



**US Army Corps
of Engineers®**
New York District

**NEW YORK AND NEW JERSEY HARBOR AND
TRIBUTARTIES COASTAL STORM RISK
MANAGEMENT STUDY**

Tier 1 EIS

**INTEGRATED FEASIBILITY REPORT & Tier 1
ENVIRONMENTAL IMPACT STATEMENT**

APPENDIX A1: ENDANGERED SPECIES ACT

**Draft Tier 1 Biological Assessment for USFWS
Species**

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1 Introduction

1.1 Authority and Purpose

The U.S. Army Corps of Engineers (USACE), New York District, has prepared this Draft Tier 1 Biological Assessment (BA) to facilitate informal consultation with the United States Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA), as amended November 10, 1978.

The purpose of this document is to evaluate the potential impacts associated with the Tentatively Selected Plan (TSP) as identified by the New York (NY) and New Jersey (NJ) Harbor and Tributaries Coastal Storm Risk Management Study (NYNJHAT study) on threatened and endangered species and in support of the Tier 1 Environmental Impact Statement (EIS) prepared for the NYNJHAT study. This draft document focuses on the structural measures of the Tentatively Selected Plan (TSP). Project structural measures include combinations of levees, storm surge barriers (SSBs), seawalls, elevated promenades, tide gates, floodwalls, revetments, bulkheads, pedestrian/vehicular gates and road raising. It is important to note, that the TSP will have associated impacts and benefits from non-structural, natural and nature-based features (NNBFs). At this time, non-structural and NNBFs are still being evaluated and locations are being determined. Potential impacts and benefits of non-structural and NNBFs will be analyzed in the Final Integrated Feasibility Report/Tier 1 EIS.

1.1.1 Tier 1 Impact Analysis

The National Environmental Policy Act (NEPA) of 1969 requires Federal agencies, including USACE, to consider the potential environmental impacts of their proposed actions and any reasonable alternatives before undertaking a major Federal action, as defined by 40 Code of Federal Regulations (CFR) 1508.18.

To evaluate potential environmental impacts, USACE has prepared an Integrated FR/Tier 1 EIS. The EIS will be conducted in two stages or tiers. Tiering, which is defined in 40 CFR 1508.28, is a means of making the environmental review process more efficient by allowing parties to “eliminate repetitive discussions of the same issues and to focus on the actual issues suitable for decision at each level of environmental review” (40 CFR 1502.20).

The Tier 1 EIS involves technical analysis completed on a broad scale and is therefore an effective method for identifying existing and future conditions and understanding the comprehensive effects of the project. It provides the groundwork for future project-level environmental and technical studies and modeling and agency consultation. The Tier 2 EIS(s) will include a subsequent and more detailed level of review for the proposed action.

1.1.2 Modeling of Impacts for Final Integrated Report/Tier 1 Analysis

USACE Engineer Research and Development Center (ERDC) has developed the New York Bight Ecological Model (NYBEM) of the NYNJHAT Study Area. The model is presented in this Integrated FR/Tier 1 EIS for Agency and public review of the model development and the preliminary modeling results of the NYNJHAT Study Alternatives. Feedback received on the NYBEM will inform the final version of the model and the results of its application to the NYNJHAT Study Area will be presented in the Final Integrated FR/Tier 1 EIS.

The NYBEM focuses on tidally influenced ecosystems within the project boundary to quantify and evaluate potential Project impacts on aquatic resources. The USACE ERDC is also developing an Adaptive Hydraulics Model (AdH Model) to evaluate potential physical changes to flow, tidal range, and water elevations in both storm and non-storm conditions, as well as sediment budget. Currently, the Draft AdH Model has been incorporated into the Draft Integrated FR/Tier 1 EIS; however, the Final Integrated Feasibility Report/Tier 1 EIS will utilize the information gained from the NYBEM and AdH modeling efforts, as well as project design, to determine potential impacts from the SSB (open and closed), including, but not limited to, the following physical and biological resources:

- Bathymetry
- Sediment and Soil Quality and Type
- Tides
- Currents and Circulation
- Salinity
- Dissolved Oxygen
- Turbidity
- Sea Level Change/Climate Change
- Flooding
- Wetlands and water resources

Based on additional analysis completed for Tier 2, a supplemental biological assessment for USFWS species may be completed for the proposed action.

1.2 Project Background

Storms have historically severely impacted the NY/NJ Harbor region, including Hurricane Sandy most recently, causing loss of life and extensive economic damages. In 2012, Hurricane Sandy caused considerable loss of life, extensive damage to property, and massive disruption to the North Atlantic Coast. The effects of this storm were particularly severe because of its tremendous size and the timing of its landfall during high tide. Twenty-six states were impacted by Hurricane Sandy, and disaster declarations were issued in 13 states. NY and NJ were the most severely impacted states, with the greatest damage and most fatalities in the NY Metropolitan Area. For

example, a storm surge of 12.65 feet above normal high tide was reported at Kings Point on the western end of Long Island Sound and 9.4 feet at the Battery on the southern tip of Manhattan. Flood depths due to the storm tide were as much as nine feet in Manhattan, Staten Island, and other low-lying areas within the NY Metropolitan Area. The storm exposed vulnerabilities associated with inadequate coastal storm risk management (CSRM) measures and lack of defense to critical transportation and energy infrastructure.

The January 2015, USACE North Atlantic Coast Comprehensive Study (NACCS) identified high-risk areas on the Atlantic Coast for warranting further investigation of flood risk management solutions. In February 2019, a NYNJHAT Feasibility Study Interim Report was completed to document existing information and assumptions about the future conditions, and to identify knowledge gaps that warranted further investigation because of their potential to affect plan selection. The Interim Report states the impacts from Hurricane Sandy highlighted the national need for a comprehensive and collaborative evaluation to reduce risk to vulnerable populations within the North Atlantic region. To address the impacts and concerns associated with devastating storms, the USACE has proposed measures to manage coastal storm risk in the NY/NJ Harbor and its tributaries.

In response, the USACE is investigating measures to manage future flood and coastal storm risk in ways that support the long-term resilience and sustainability of the coastal ecosystem and surrounding communities, and reduce the economic costs and risks associated with flood and storm events for the NYNJHAT study area (USACE 2019). The alternative concepts proposed would help the region manage flood risk that is expected to be exacerbated by relative sea level rise.

1.3 USFWS Coordination and Consultation History

Coordination with stakeholders has been a critical component of the NYNJHAT study. The USFWS accepted the USACE's invitation to be a Cooperating Agency on the NYNJHAT study on November 28, 2017. Since early 2017 the USACE has held many workshops and meetings with Cooperating and Participating Agencies and other stakeholders to share information on the study scope and purpose and formulation of alternatives, and to exchange ideas and information on natural and marine resources within the NYNJHAT Study Area.

USACE announced the preparation of an Integrated Feasibility Report/Tiered EIS for the NYNJHAT study feasibility in the February 13, 2018, Federal Register pursuant to the requirements of Section 102(2)(C) of NEPA. The NEPA scoping period initially spanned 45 days from July 6 – August 20, 2018, but was extended to 120 days due to numerous requests from the public. On November 5, 2018, the USFWS provided a scoping comment letter highlighting key considerations within the NYNJHAT Study Area pertaining to the watersheds, threatened and endangered species, marine mammals and sea turtles, migratory birds, fish and essential fish habitat, shellfish, and wetlands (refer to Appendix H).

In 2019, four NYBEM workshops were held on January 3, March 11, June 6, and November 14 to help inform the NYBEM model set up to be used as a tool for assessing some direct and indirect effects of agency actions on regional ecosystems including the NYNJHAT study, among others. The USFWS attended the June 6 and November 14 workshops. That year, the USACE New York District and the USFWS initiated a scope of work for the preparation of a Planning Aid Letter (PAL).

In February 2020, the NYNJHAT study paused until October 2021 due to a lack of Federal funding. Following study resumption, the USACE held several Cooperating Agency meetings to facilitate open communication, share study progress, status updates, and data as it became available, including an engineering presentation on the study alternatives, a presentation on the Tentatively Selected Plan, and a presentation on the NYBEM development progress. These meetings took place on February 17, June 9, August 3, and August 11. The USFWS attended the February 17, June 9, August 3, and August 11 meetings.

Additionally, the USACE provided e-mail study status updates on January 31, May 6, July 14, August 8, and August 26 between Agency coordination meetings

Given the schedule timeline following Study resumption, USACE requested the USFWS advance to the preparation of a Fish and Wildlife Coordination Act Report (FWCAR) instead of a PAL. In August 2022, the USACE and the USFWS initiated a scope of work for the preparation of a FWCAR pursuant to the Fish and Wildlife Coordination Act 48 Stat. 401, as amended; 16 U.S.C 661 et seq., to provide information of fish and wildlife resources, including listed species under the ESA, and trust resources within the NYNJHAT Study Area. The FWCAR will be coordinated with the US Environmental Protection Agency (EPA), NYSDEC, NJDEP, and other agencies/organizations as appropriate, regarding the NYNJHAT Study Area resources, potential project related impacts, and the means and measures that should be adopted to prevent the loss of or damage to fish and wildlife resources, as well as recommendations to avoid, minimize, or compensate for impacts resulting from the Tentatively Selected Plan and other study alternatives. The USACE anticipates a Draft FWCAR by the end of November 2022, and a Final FWCAR thereafter following a review and comment period. The Draft Integrated Feasibility Report/Tier 1 EIS will be updated with the FWCAR findings and recommendations for issuance of the Final Integrated Feasibility Report/Tier 1 EIS.

2 Study Area

The Study Area is defined in 50 CFR 402.02 as "all areas to be affected directly or indirectly by the Proposed Action and not merely the immediate area involved in the action." The Study Area for this Draft Tier 1 BA includes the NY Metropolitan Area, including New York City (NYC) which is the most populous and densely populated city in the United States, and five of the six largest cities in NJ by population. The shorelines of some of the NYNJHAT Study Area is characterized by low elevation areas, developed with residential and commercial infrastructure, and is subject to tidal flooding during storms. The NYNJHAT Study Area covers more than 2,150 square miles and comprises parts of 25 counties in NJ and NY, including Bergen, Passaic, Morris, Essex, Hudson, Union, Somerset, Middlesex, and Monmouth Counties in NJ; and Rensselaer, Albany, Columbia, Greene, Dutchess, Ulster, Putnam, Orange, Westchester, Rockland, Bronx, New York, Queens, Kings, Richmond, and Nassau Counties in NY.

The NYNJHAT Study Area for the Tier 1 EIS includes NY and NJ Harbor and tidally affected tributaries encompassing all of NYC, the Hudson River (HR) to Troy, NY; the lower Passaic, Hackensack, Rahway, and Raritan Rivers; and the Upper and Lower Bays of NY Harbor, Newark, Jamaica, Raritan and Sandy Hook Bays; the Kill Van Kull, Arthur Kill and East River tidal straits; and western Long Island Sound (Figure 2-1).

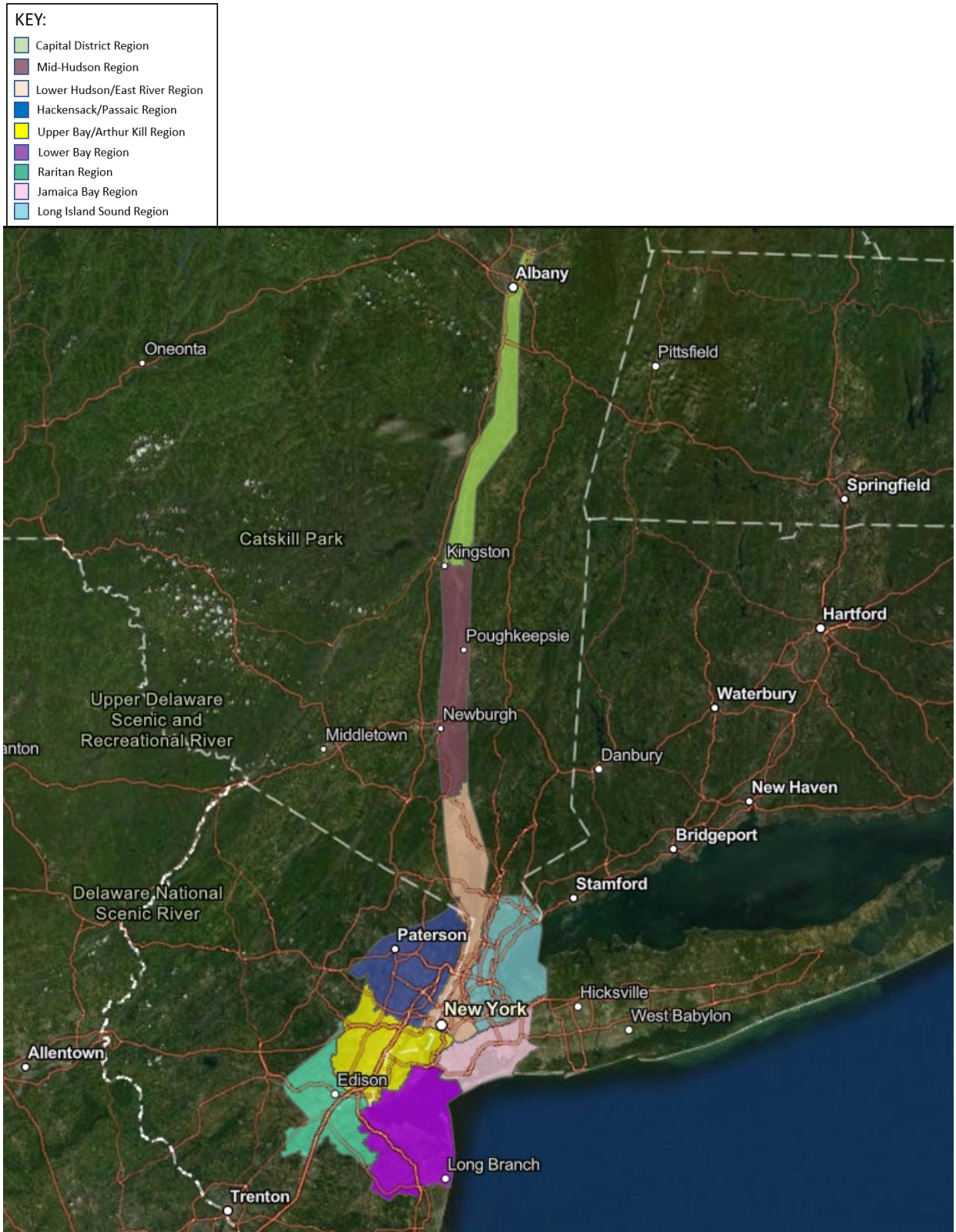


Figure 2-1. Overview of USACE New York-New Jersey Harbor and Tributaries Study Area

2.1 Tentatively Selected Plan

The TSP is Alternative 3B – Multi-basin SSBs With Shore-Based Measures. The TSP includes a combination of coastal storm risk management (CSRMs) measures that function as a system to manage the risk of coastal storm damage in the New York Metropolitan Area, including a combination of shore-based and in-water measures. These measures are located within the Hackensack/Passaic, Upper Bay/Arthur Kill, Lower Hudson/East River, Long Island Sound and Jamaica Bay Planning Regions. The TSP measures include storm surge barriers (SSBs), Shore-Based Measures (SBMs), complementary Induced Flooding-Mitigation Features (IFFs) and Risk Reduction Features (RRFs) as well as nonstructural measures and natural and nature-based features described in more detail as follows:

The TSP includes SSBs and complementary SBMs at Jamaica Bay, Arthur Kill, Kill Van Kull, Gowanus Canal, Newtown Creek, Flushing Creek, Sheepshead Bay, Gerritsen Creek, Hackensack River, Head of Bay, Old Howard Beach East, and Old Howard Beach West. The SBMs would provide land-based CSRMs and include floodwalls, levees, elevated promenades, buried seawalls/dunes, revetments, berms, bulkheads, pedestrian/vehicular gates, and road raisings. Ringwalls and SBMs will also be considered under the TSP, to be further refined for the Final Integrated FR/Tier 1 EIS.

RRFs would provide CSRMs in areas behind SSBs that may experience high frequency flooding when the barriers are not operated.

IFFs would provide CSRMs in areas in front of SSBs that may experience induced flooding due to operation of the SSBs.

Nonstructural measures to be included in the TSP may include structure elevations and floodproofing. Currently, conceptual nonstructural measure locations are located throughout the Study area; however, nonstructural measures and locations will be further refined for the Final Integrated FR/Tier 1 EIS.

Natural and nature-based features (NNBF) to be included in the TSP consist primarily of natural features such as wetlands and living shorelines that may provide both CSRMs and ecological enhancement. Specific NNBF types and locations will be further refined for the Final Integrated FR/Tier 1 EIS. At this time, it is anticipated they will be located in areas that experience high frequency coastal flooding.

While the TSP will improve coastal flood risks in the project area, it will not totally eliminate flood risks; therefore, residual risk for flooding still remains a threat to life and property. It is essential that flood risk be proactively communicated to residents in accessible and thoughtful ways.

This assessment only includes structural measures of the TSP. Structural measures included in the TSP are shown in Table 1 by Planning Region, and on Figures 2-2 and 2-3.

Table 1: Structural measures included in the TSP, by Planning Region.

Planning Region	Storm Surge Barriers	Tide Gates	Floodwalls	Levees	Elevated Promenades	Buried Seawalls/Sand Dunes	Seawalls	Revetments	Berns	Bulkheads	Pedestrian/Vehicular Gates	Road Raising
Capital District												
Mid-Hudson												
Lower Hudson/East River	●		●	●	●		●				●	
Upper Bay/Arthur Kill	●	●	●	●			●	●	●		●	
Lower Bay												
Hackensack/Passaic			●					●	●		●	●
Raritan Region												
Long Island Sound	●		●		●		●					
Jamaica Bay	●	●	●	●	●	●	●	●	●	●	●	●

● = Included in the Planning Region



Figure 23-2. NYNJHAT Study Tentatively Selected Plan

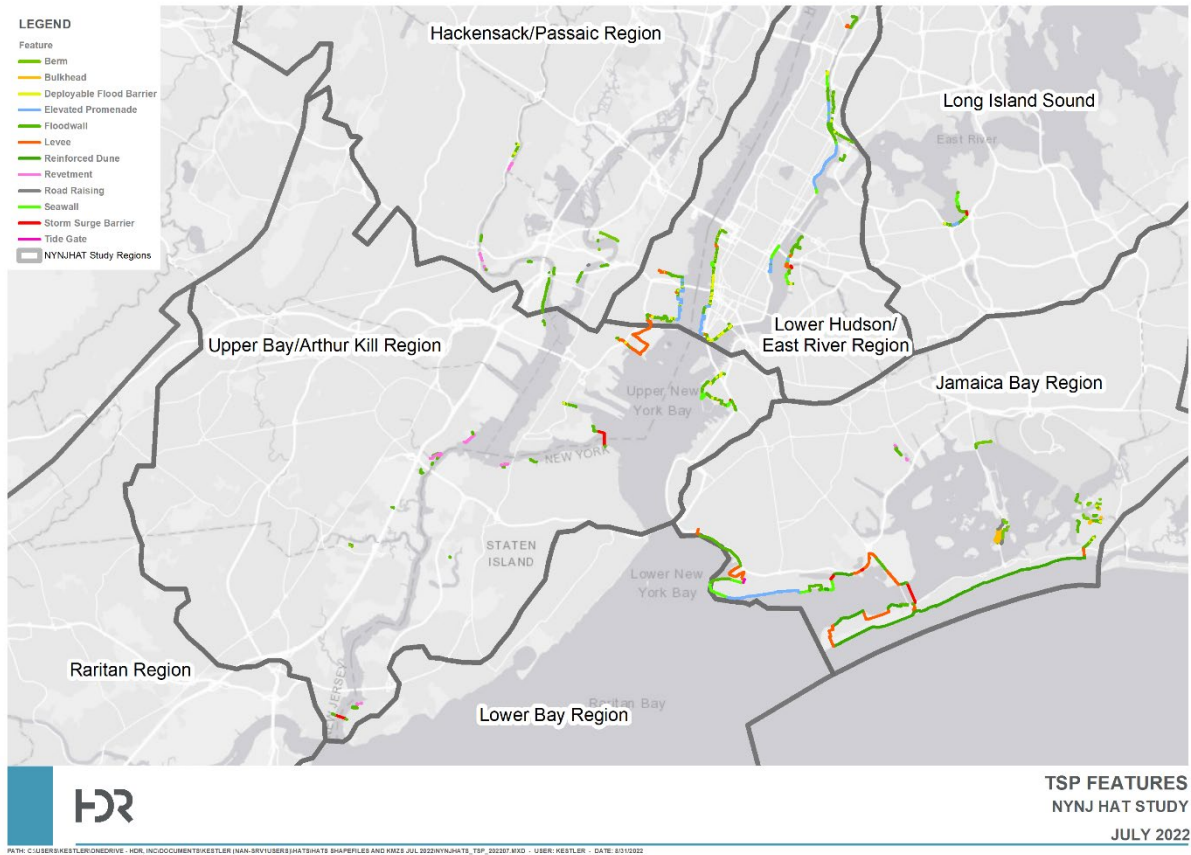


Figure 23-3. Overview of NYNJHAT Study Measures Included in the TSP

3 USFWS Trust Species in the NYNJHAT Study Area

The USFWS trust species that may occur in the NYNJHAT Study Area are listed in Table 4-1, with their status, listing and recovery plan citations, and the Planning Regions where there may occur. A total of 14 species were identified in the USFW IPaC mapper on September 7, 2022, as potentially occurring in the NYNJHAT Study Area: two mammals, one reptile, three birds, two insects and six flowering plants. The IPaC results are valid for 90 days, therefore the IPaC will be re-queried in the Final Integrated FR/Tier 1 EIS. The FWCAR is being prepared concurrently and will also be incorporated into the Final Integrated FR/Tier 1 EIS report. Six additional species have been included in the list below based on USWFS comments on the NJ Back Bays project consultation. Those species include: one mammal, two birds, two insects and one invertebrate.

ESA designated Critical Habitat is an area that was occupied by an ESA listed species at the time of its listing or is an area essential to a species conservation (USFWS 2017). No USFWS designated Critical Habitat has been identified in any of the Planning Regions. Within the Lower Hudson/East River Planning Region, the east side of the Hudson River from Yonkers to the town of Peekskill is designated as a NY State Critical Environmental Area for exceptional or unique character. The entirety of the Jamaica Bay Region is also designated as a NY State Critical Environmental Area for protection of ecosystems and wildlife. There is one NJ Critical Environmental Area within the NYNJHAT Study Area located along the coastline from Highlands Beach south to Long Branch Beach. In NJ, critical environmental sites are included in the NJ State Development and Redevelopment Plan. The critical environmental sites are used to help organize planning for new development or redevelopment and protect these resources from adverse impacts where possible.

Table 4-1: Federally Listed Species in the NYNJHAT Study Area

Common Name	Scientific Name	Federal Status ¹	New York Status ¹	New Jersey Status ¹	Listing/Recovery Plan Citation	Region(s) Where Species May Occur ²
Mammals						
Indiana bat	<i>Myotis sodalis</i>	E	E	E	32 FR 4001; Draft Recovery Plan: USFWS 2007	UB, MH, ER, LIS, RAR, HP, CD
Northern long-eared bat	<i>Myotis septentrionalis</i>	T	T	NL	80 FR 17973 18033	All Regions
Tricolored bat	<i>Perimyotis subflavus</i>	C	SC	NL	82 FR 60362	All Regions
Birds						
Piping plover	<i>Charadius melodus</i>	T	E	E	49 FR 44712; Recovery plan USFWS 2016	UB, ER, LIS, JB, LB

Common Name	Scientific Name	Federal Status ¹	New York Status ¹	New Jersey Status ¹	Listing/Recovery Plan Citation	Region(s) Where Species May Occur ²
Red knot	<i>Calidris canutus rufa</i>	T	T	E	79 FR 73705; Draft Recovery plan: USFWS 2021	UB, ER, LIS, JB, LB
Roseate tern	<i>Sterna dougalli dougalli</i>	E	E	E	52 FR 42064; Recovery plan USFWS 1998	UB, ER, LIS, JB, LB
Saltmarsh sparrow	<i>Ammodramus caudacutus</i>	NL	NL	NL	Not Found	UB, LIS, ER, HP, RAR, JB, LB
Eastern black rail	<i>Laterallus jamaicensis</i>	T	E	SC	85 FR 63764 63803	UB, LIS, ER, HP, RAR, JB, LB
Reptiles						
Bog turtle	<i>Glyptemys muhlenbergii</i>	T	E	E	62 FR 59605 59623; Recovery plan: USFWS 2001	UB, MH, ER, RAR, HP, LB
Insects						
Monarch butterfly	<i>Danaus plexippus</i>	C	NL	NL	85 FR 81813	All Regions
Northeast beach tiger beetle	<i>Habroscelimorpha dorsalis dorsalis</i>	T	T	E	55 FR 32088; Recovery plan: USFWS 1994	LB
Rusty-patched bumble bee	<i>Bombas affinis</i>	E	NL	NL	80 FR 56423 56432; Recovery plan: 85 FR 4334 4336	All Regions
Yellow-banded bumble bee	<i>Bombas terracola</i>	C	NL	NL	Not Found	All Regions
Invertebrates						
Dwarf wedgemussel	<i>Alasmidonta heterondon</i>	E	E	E	55 FR 9447 9451; Recovery plan: USFWS 1993	RAR, UB, MH
Flowering Plants						
American chaffseed	<i>Schwalbea americana</i>	E	NL	E	57 FR 44703 44708; Recovery plan: USFWS 2019	LB
Knieskern beaked-rush	<i>Rhynchospora knieskernii</i>	T	NL	E	56 FR 32978 32983; Recovery plan: USFWS 1993	LB
Sandplain gerardia	<i>Agalinis acuta</i>	E	E	NL	53 FR 34701 34705; Recovery plan: USFWS 1989	JB

Common Name	Scientific Name	Federal Status ¹	New York Status ¹	New Jersey Status ¹	Listing/Recovery Plan Citation	Region(s) Where Species May Occur ²
Seabeach amaranth	<i>Amaranthus pumilus</i>	T	T	E	58 FR 18035; Recovery plan: USFWS 1996	UB, ER, LIS, JB, LB
Small whorled pogonia	<i>Isotria medeoloides</i>	T	E	E	59 FR 50852 50857; Recovery plan: USFWS 1992	MH, ER
Swamp pink	<i>Helonias bullata</i>	T	NL	E	53 FR 35076 35080; Recovery plan: USFWS 1991	RAR, LB

Notes: ¹ Status Abbreviations – Threatened (T), Endangered (E), Candidate (C), Not Listed (NL), Species of Concern (SC)

² Region Abbreviations - Upper Bay/Arthur Kill Region (UB), Mid-Hudson Region (MH), Long Island Sound Region (LIS), Lower Hudson/East River Region (ER), Raritan Region (RAR), Hackensack-Passaic Region (HP), Jamaica Bay Region (JB), Lower Bay Region (LB), Capital District Region (CD)

Although 20 species were identified, several of these species were not carried forward for further consideration in this document, based on lack of habitat or known occurrences in the NYNJHAT Study Area. Table 4-2 details the habitat preferences/requirement for each ESA species identified in the NYNJHAT Study Area and whether they have been carried forward for consideration in this document.

Table 4-2: Habitat and Potential Impacts to Federally Listed Species in the NYNJHAT Study Area

Common Name	Habitat in NYNJHAT Study Area	Potential for Impact	Carried Forward for Consideration
Mammals			
Indiana bat	Maternal roosts under the bark of dead trees during the summer. Prefers riparian zones, floodplain habitat, and wooded wetlands.	Potential habitat loss of live or dead trees from placement of shore-based features. Potential temporary disturbances from construction.	Yes
Northern long-eared bat	Roosts under the bark, bridges and crevices of live and dead trees during the summer. Roosts sometimes in buildings, barns, sheds, under eaves, bridges and other man-made structures (USFWS 2022b).	Potential habitat loss of live or dead trees from placement of shore-based features. Potential temporary disturbances from construction.	Yes
Tricolored bat	Roosts among live and dead leaf clusters of live or recently dead deciduous hardwood trees.	Potential habitat loss of live or dead trees from placement of shore-based features. Potential temporary	Yes

Common Name	Habitat in NYNJHAT Study Area	Potential for Impact	Carried Forward for Consideration
		disturbances from construction.	
Birds			
Piping plover	Ocean beaches, sand dunes, tidal inlets and tidal flats.	Potential disturbance to nesting and foraging habitat along beaches and sand dunes. Temporary disturbances to food sources (benthic invertebrates) along beaches could impact this species.	Yes
Rufa red knot	Uses ocean beaches, tidal flats and inlets for foraging and resting during migration.	Potential disturbance to foraging habitat could impact food sources.	Yes
Roseate tern	Ocean beaches and barrier islands with vegetation. Nests from Nova Scotia to Long Island.	Potential disturbance to foraging habitat and food chain disruption.	Yes
Eastern black rail	Nest on upland portions of coastal salt and brackish marshes, wet meadows, and freshwater emergent marshes. Prefer dense marshes of rushes, grasses, and sedges.	Potential disturbance to foraging, nesting and breeding could impact food sources along brackish and freshwater marshes.	Yes
Saltmarsh sparrow	Coastal marshes. Found mostly in salt marshes with sedges, rushes, cordgrass, saltgrass, and other typical plants; sometimes in fresh marshes or fields adjacent to coast.	Potential disturbances could impact foraging, nesting and breeding habitat along areas of potential tidal inundation.	Yes
Reptiles			
Bog turtle	Sunny open wetlands, especially fens, bogs, and marshes bordering wooded areas.	Habitat is not expected to occur within the action areas. Suitable habitat may occur in the regions is unlikely in the action area, due to the bog turtle's requirement for fresh water, not areas of tidal inundation. Disturbance to any potential habitat will be avoided.	No
Insects			
Monarch butterfly	Open wildflower meadows and grasslands, including vegetated roadsides. Requires milkweed for egg laying, larval development, and protection of larvae.	Potential disturbance to habitat bordering beaches and along drainage ditches.	Yes

Common Name	Habitat in NYNJHAT Study Area	Potential for Impact	Carried Forward for Consideration
Northeast beach tiger beetle	Inter-tidal zone on undisturbed sandy beaches. Considered extirpated from NY and NJ	Potential disturbance to habitat on beaches and inlets, and dune SBM. This species is known to be extirpated from the action area. Impacts to occupied habitat will be avoided.	No
Rusty patched bumble bee	Prairies, woodlands, marshes, agricultural landscapes and residential parks and gardens	Potential disturbance to foraging habitat and food chain disruption. This species has not been recorded within 200 miles of the action areas since 2007.	No
Yellow-banded bumble bee	Mixed woodlands, farmlands, wildflower grasslands, seeps, and urban areas. Prefer wetland vegetation for pollinator activity.	Potential disturbance to foraging, nesting and breeding could impact habitat within vegetated open parkland areas bordering beaches and along drainage ditches.	Yes
Invertebrates			
Dwarf wedgemussel	Freshwater from small brooks to large rivers. Bottom substrates include silt, sand and gravel, which may be distributed in relatively small patches behind larger cobbles and boulders.	Habitat is not expected to occur within the action area. Suitable habitat may occur in the regions is unlikely in the action area, due to the dwarf wedgemussel's requirement for fresh water, not areas of tidal inundation. Disturbance to any potential habitat will be avoided.	No
Flowering Plants			
American chaffseed	Sandy (sandy peat, sandy loam), acidic, seasonally-moist to dry soils in early successional habitats described as open, moist pine flatwoods, fire-maintained savannas.	Habitat is not known to occur in the action area. Impacts to occupied habitat will be avoided.	No
Knieskern beaked-rush	An obligate wetland species endemic to NJ; occurs in early successional wetland habitats, often on bog-iron substrates adjacent to slow-moving streams in the Pinelands region.	Habitat is not known to occur in the action area. Impacts to occupied habitat will be avoided.	No

Common Name	Habitat in NYNJHAT Study Area	Potential for Impact	Carried Forward for Consideration
Sandplain gerardia	Dry, sandy soils within sandplains and serpentine barrens.	Habitat is not known to occur in the action area. Impacts to potential habitat will be avoided.	No
Seabeach amaranth	Barrier islands, inlets and overwash areas	Potential disturbance to habitat on beaches and inlets, and dune SBM.	Yes
Small whorled pogonia	Upland locations in mixed-deciduous or mixed-deciduous/coniferous forests. Grows in highly acidic and nutrient poor soils.	Habitat is not known to occur in the action area. Impacts to occupied habitat will be avoided.	No
Swamp pink	Forested wetlands.	Habitat is not known to occur in the Study Area. Disturbance to any potential habitat will be avoided.	No

3.1 Mammals

Two federally listed mammals may occur in the NYNJHAT Study Area: the endangered Indiana bat (*Myotis sodalis*) and the threatened northern long-eared bat (*Myotis septentrionalis*) (USFWS 2022a). The northern long-eared bat has been proposed to be reclassified as endangered due to its rapidly declining population (USFWS 2022b). Not currently federally listed but proposed to be reclassified as threatened due to its rapidly declining population, the tricolored bat (*Perimyotis subflavus*), may occur in the NYNJHAT Study Area (USFWS 2022h).

The Indiana bat is a temperate, migratory species that feeds on insects and hibernates primarily in caves and abandoned mines during the winter (USFWS 2007). Most hibernation occurs in the east-central United States, along with some central and southern U.S. locations (USFWS 2022c). Reproductive females migrate during the spring to roost in colonies where they give birth and raise their young (USFWS 2007). Males and non-reproductive females usually do not form colonies. The Indiana bat roosts beneath the bark of dead trees during the warmer months (USFWS 2007).

The northern long-eared bat is found within the Midwest and northeastern United States, and every Canadian province westward to the Yukon Territory and British Columbia (USFWS 2022b). During summertime, the Northern long-eared bat roosts underneath tree bark and within the hollows of live and dead trees (USFWS 2022b). These bats roost in a variety of different tree species within the native range and select trees based upon availability, or opportunistically (USFWS 2022b). Roosting northern long-eared bats are sometimes also found in buildings, barns, sheds, under eaves, bridges and other man-made structures (USFWS 2022b). Maternity colonies consist of between 30 and 60 individual females and their young. Males and females are

sometimes solitary during summer (USFWS 2022b). During the winter, the Northern long-eared bat hibernates in caves and abandoned mines (USFWS 2022b). The species has experienced a sharp population decline in the past decade, primarily due to white-nose syndrome (NYSDEC 2022).

The tricolored bat is found within the Midwest and throughout most of the forested regions of the eastern United States (USFWS 2022h). Summer roosts are typically found in tree crevices, beneath loose bark of live or dead deciduous forests. Less frequently, tricolored bats have been discovered in a variety of other accommodations, including rock crevices, caves, and even buildings. In winter, they hibernate underground in caves and road-associated culverts (USFWS 2022h). Suitable hibernacula are rare, bats often annually return to the same microhabitat site. Maternity colonies consist of between 30 and 60 individual females and their young. Males and females are sometimes solitary during summer (USFWS 2022h). The species has experienced a sharp population decline in the past decade, primarily due to white-nose syndrome (USFWS 2022h).

3.1.1 Presence Within Planning Regions

Some populations of Indiana bat are known to hibernate and or roost in counties within the NYNJHAT Study Area, including Passaic, Essex and Union Counties in NJ and Albany and Ulster Counties in NY (USFWS 2022c; NYSDEC 2022a). These individuals may remain close to their hibernation grounds during the spring and summer or migrate to other locations (USFWS 2007). With consideration to NYNJHAT study, the Indiana bat is expected to occur within the Upper Bay/Arthur Kill Region, the Mid-Hudson Region, Lower Hudson/East River Region, the Long Island Sound, Raritan River Region, and the Hackensack/Passaic Region.

The northern long-eared bat has been documented within Bergen, Essex, Monmouth, Passaic, and Union Counties in NJ. In NY, with exception of the NYC County's, the species is found within all NY Counties in the NYNJHAT Study Area (USFWS 2022b; NYSDEC 2018). Therefore, the species is expected to occur within every Planning Region.

The tricolored bat has been documented within Bergen, Essex, Monmouth, Passaic, and Union Counties in NJ in NJ. In NY the species is found within all NY Counties in the NYNJHAT Study Area (USFWS 2022h). Therefore, the species is expected to occur within every Planning Region.

3.2 Birds

Four federally listed bird species may occur in the NYNJHAT Study Area: the endangered roseate tern (*Sterna dougalli dougalli*), the threatened piping plover (*Charadrius melodus*), the threatened red knot (*Calidris canutus rufa*), and the threatened eastern black rail (*Laterallus jamaicensis*) (2022a USFWS).

Roseate terns are medium sized shorebirds that breed along the north Atlantic coast and Caribbean coasts, on barrier islands and beaches. The north Atlantic and Caribbean populations are considered two Distinct Population Segments (DPS), with the north Atlantic DPS listed as

endangered and the Caribbean population listed as threatened. The nesting range of the north Atlantic DPS roseate tern is from Nova Scotia to Long Island, NY (Federal Register 1987). Nesting habitat is on barrier islands, salt marshes and coastal areas above the high tide line, in dunes or areas with dense vegetation. Roseate terns mostly feed on small fish in shallow water areas but may also feed in inlets and offshore areas (Audubon 2022). The last nesting pair in NJ was recorded in 1980 (Conserve Wildlife NJ 2022). This species is listed as endangered by the states of NJ and NY.

Piping plovers are small shorebirds that have three DPSs, one endangered in the Great Lakes watershed, two threatened, on the Atlantic coast and northern Great Plains (2022d USFWS). The DPS on the Atlantic coast breeds on coastal beaches from Newfoundland to North Carolina and winters south from North Carolina to Gulf Coast and in the Caribbean (USWS 1996). This species nests on coastal beaches above the high tide line, behind, within and between dunes, in sparsely vegetated areas and on sandflats and barrier islands (USWS 1996). Piping plovers are listed as endangered by the states of NJ and NY.

The rufa red knot is a medium-sized shorebird that breeds in the central Canadian Arctic and migrates long distances to four regions for overwintering: the southeast United States through the Caribbean, western Gulf of Mexico from Mississippi through Central America, northern Brazil and along the north coast of South America, and Tiera del Fuego and extending north along the Patagonian coast of Argentina (USFWS 2020b). As the rufa red knot migrates in the spring and fall, it used key stopover areas to rest and feed. The population in the southern United States uses NJ and NY coastal areas for stopover sites to feed and rest during migration. Time spent in these stopover sites can be significant, up to 60 percent of the year (USFWS 2020b). Rufa red knot stopover habitat includes coastal and marine waters, tidal flats and inlets, sand spits, sand bars, shoals, islets, and bays and lagoons with access to intertidal sediments (USFWS 2020b). They feed on mollusks, shrimp, crabs, worms, and horseshoe crab eggs (USFWS 2020b). This species is listed by the state of NY as threatened.

The eastern black rail is the smallest of North American rails and considered a medium sized shore bird. It occurs in coastal salt and brackish marshes and often nest in areas of elevated marsh that are flooded only during supratidal events (USFWS 2022i). Nests are typically located in marshes dominated by salt hay (USFWS 2022i). These marshes also may contain spike grass, black rush, or marsh elder. Marshes containing salt hay provide characteristically thick mats of overlapping vegetation, beneath which the rails traverse on pathways of flattened vegetation. Eastern black rails may seek cover within vegetation in adjacent upland fields and meadows during high tides and occupy similar habitats throughout the year (USFWS 2022i). In the past three decades, they have been observed along the Atlantic Coast during the nesting season at Nummy Island, Marmora, Upper Township, Lester G. MacNamara Wildlife Management Area, Edwin B. Forsythe National Wildlife Refuge, and Manahawkin. Most breeding records of this species occur south of the Raritan River (Conserve Wildlife NJ 2012).

The saltmarsh sparrow is a small sized shorebird that can be found along the entirety of the Atlantic coast. Breeding, foraging, nesting can occur within areas of tidal inundation along the NY and NJ shoreline (Audubon 2022). The saltmarsh sparrow prefers coastal marshes with dense beds of sedges, rushes, cordgrass, and saltgrass; they have been observed foraging in freshwater marshes or fields adjacent to the coast. Nesting occurs in marshes, where standing plants mixed with dead grass from preceding seasons and are usually placed just beyond the high tide mark; many nests are destroyed by supratidal events (Audubon 2022). The saltmarsh sparrow is not currently a federally listed species; in recent years climate change induced habitat loss has greatly reduced species population density. This species is a Species of Special Concern in NJ (Conserve Wildlife NJ 2022).

The Migratory Bird Treaty Act (MTBA) of 1918 protects migratory bird populations that are native to the United States or U.S. territories (USFWS 2022f). The MTBA prohibits the take, sale, trade, and transportation of any protected migratory bird species without permission by USFWS (USFWS 2022f). Similarly, The Bald and Golden Eagle Protection Act of 1940 offers specific protections for Bald Eagle and Golden Eagle populations (USFWS 2022g). Additional bird species covered under the MBTA of 1918 and the Bald and Golden Eagle Protection Act of 1940 may potentially be affected by proposed activities in action area, according to the USFWS Migratory Bird Program. The NYNJHAT Study Area is also located within the North America Atlantic Flyway for migratory birds, which is a critical corridor for migrating birds (USFWS, 2022e).

3.2.1 Presence Within Planning Regions

Within the NYNJHAT Study Area, the roseate tern is expected to be present within several of the Planning Regions, including the Upper Bay/Arthur Kill, Lower Hudson/East River, Long Island Sound, Jamaica Bay, and the Lower Bay. The species is presumed to occur in the highest numbers within Jamaica Bay and the Long Island Sound, as habitat in these regions is most suitable.

Piping plover could be present on the Sandy Hook shoreline, along the Queens shoreline, and on the shorelines of Breezy Point and Jamaica Bay. Historically, Jamaica Bay and Sandy Hook have been a preferred nesting location for the species, given the availability of many sand dunes, sand flats, and areas of beach vegetation (USWS 1996). Most piping plover within the NYNJHAT Study Area are expected to occur in the Jamaica Bay and Lower Bay Planning Regions.

During the spring and fall migration seasons, the rufa red knot is present within the Upper Bay/Arthur Kill Region, the Lower Hudson/East River Region, the Long Island Sound, Jamaica Bay, and the Lower Bay Region. Jamaica Bay and the Long Island Sound Planning Regions are expected to have the highest occurrence of this species.

Within the NYNJHAT Study Area, the eastern black rail is expected to be present within several of the Planning Regions including the Upper Bay/Arthur Kill, Lower Hudson/East River, Long Island Sound, Raritan Bay, Hackensack-Passaic, Jamaica Bay, and the Lower Bay (USFWS

2022i). The species is presumed to occur in the highest numbers south of Raritan Bay, as habitat in these regions is most suitable for breeding (Conserve Wildlife NJ 2012).

The list of migratory bird species protected under the MTBA is extensive and includes many native species found in each of the Planning Regions (USFWS 2022f). The Bald Eagle (*Haliaeetus leucocephalus*) is found within each of the Planning Regions and the Golden Eagle (*Aquila chrysaetos*) migrates through the NYNJHAT Study Area each year.

3.3 Insects

One federally listed threatened species, northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) and two candidate species, monarch butterfly (*Danaus plexippus*), and the yellow-banded bumble bee (*Bombas terracola*) may occur in the Planning Regions.

The monarch butterfly undertakes long migrations from their forested overwintering areas in Mexico and the southwest United States to summer breeding areas in the northern US and Canada. Milkweed is the sole food source for monarch butterfly larvae and reproduction is dependent on its presence in the spring and summer northern habitats. Habitat loss and climate change has contributed to a population decline in monarch butterflies over the past two decades (Federal Register 2020). In the NYNJHAT Study Area monarch butterflies may be found in open meadows or fields with wildflowers and milkweed, and coastal beaches with dunes (NYSDEC 2022b).

Yellow banded bumble bees are generalist foragers that live in highly organized colonies. They can live in a diverse range of habitats from open parkland, wildflower meadows to mixed woodlands. They forage on flowers for pollen and nectar from a variety of plant genera (USFWS 2022j). Like many bumble bees, it usually nests underground in pre-existing cavities such as abandoned rodent burrows and rotten logs. Yellow-banded bumble bee queens overwinter underground and in decomposing organic material such as rotting logs (USFWS 2022j). Habitat loss and climate change has contributed to a population decline in yellow-banded bumble bees over the past two decades (Federal Register 2020). In the NYNJHAT Study Area they may be found in open meadows or fields with wildflowers, and along drainage seeps (NYSDEC 2022b) Foraging habitat should include flower abundance and species richness with overlapping blooms to ensure nectar availability throughout the growing season (NYNHP 2015).

3.3.1 Presence Within Planning Regions

The monarch butterfly is found within each of the Planning Regions, especially in meadows and other locations where wildflowers and milkweed grow. Monarch butterflies are also expected to be encountered along the beaches in the NYNJHAT Study Area (NYSDEC 2022b).

The yellow banded bumble bee can potentially be found within each of the Planning Regions, especially in meadows and other locations where wildflowers and facultative upland vegetation species grow (NYNHP 2015).

3.4 Flowering Plants

The one federally listed plant with potential to be impacted by NYNJHAT study is seabeach amaranth (*Amaranthus pumilus*). This species is listed as threatened by the state of NY; NJ does not designate rare, threatened or endangered plant species. Seabeach amaranth is an annual flowering plant that occurs on barrier islands, inlets and overwash areas (Federal Register 1990). It has small yellow flowers and green waxy leaves. Its historical range was from Massachusetts to South Carolina, and became limited to populations in NY, North Carolina, and South Carolina. Since this species was placed on the endangered species list, it has recolonized areas in some states, including NJ. It is known to occur within Gateway National Recreation area and other locations on Monmouth County, NJ (Center for Biological Diversity 2022).

3.4.1 Presence Within Planning Regions

Seabeach amaranth occurs in the Upper Bay/Arthur Kill, Lower Hudson/East River, Long Island Sound, Jamaica Bay, and Lower Bay Planning Regions. The flower has been predominantly documented in the Gateway National Recreation area, which encompasses Jamaica Bay and Sandy Hook. The Jamaica Bay and Lower Bay Regions are presumed to be where the species predominantly grows in the NYNJHAT Study Area due to the availability of ideal habitat.

4 Existing Conditions

4.1 Planning Regions

The NYNJHAT Study Area and description of existing environment have been separated into nine Planning Regions based on the hydrologic unit codes (HUCs) from the Watershed Boundary Dataset of the U.S. Geological Survey (USGS). Figure 2-1 provides an overview of the NYNJHAT Study Area. The following sections describe the planning regions in the NYNJHAT Study Area as well as listing what ESA or state listed species may occur in each

4.1.1 Upper Bay/ Arthur Kill Region

The Upper Bay/Arthur Kill Region is based on the 10-digit HUCs for the Arthur Kill-Upper Bay watershed and the Rahway River watershed, from the Watershed Boundary Dataset (USGS 2018). This region lies between the mouth of the HR and the Lower Raritan River and includes portions of Richmond and Kings counties in NY, as well as Governors Island, NY County. This Region also includes portions of Hudson, Essex, Union, and Middlesex counties in NJ. The Upper Bay is comprised predominantly of deep water (67 percent is >25 ft [7 m] deep).

The Arthur Kill is a tidal strait that connects to Upper Bay via the Kill Van Kull (another tidal strait) and mixes waters with Newark Bay. The Arthur Kill also connects Newark Bay with Raritan Bay. Important tributaries to the Arthur Kill include the Rahway and Elizabeth Rivers, Old Place Creek, Woodbridge Creek, and Fresh Kills Creek (USACE 2004a). The Arthur Kill and Kill Van Kull have deepwater navigation channels that allow transport of cargo into and out of the Ports of NY and NJ. The area is highly industrialized, however, approximately 55 percent of the shoreline is natural mudflats and marshes (NOAA 2022).

The Arthur Kill Complex is a significant habitat of the NY Bight Watershed (NOAA 2022). Rich in freshwater and tidal wetlands, rivers, creeks and upland forest, the area provides nesting and foraging habitat for a variety of wading birds, waterfowl, and gulls (NOAA 2022). During the spring and fall, the Region serves as stopover habitat for migratory birds. The shoreline marshes and mudflats are home to shellfish and other invertebrates that are prey to birds, and wooded locations provide shelter for roosting birds (NOAA 2022).

The Gowanus Canal is a prominent site within the Upper Bay Planning Region. The canal is a 100-foot-wide, 1.8-mile-long canal in a highly developed section of Brooklyn, NY that has become one of the most contaminated water bodies in the country. Contaminants found in high levels include polycyclic aromatic hydrocarbons, polychlorinated biphenyls, mercury, lead, and copper. In 2010, this site was added to the EPA Superfund List. A plan has been put in place to dredge the contaminated soil and then cap the area (EPA 2018).

4.1.2 Lower Bay Region

The Lower Bay Region is based on the 10-digit HUCs for the Raritan Bay-Lower Bay watershed and the Navesink River-Shrewsbury River watershed, and well as the 8-digit HUC for the Mullica-Toms subbasin, from the Watershed Boundary Dataset (USGS 2018). This includes a portion of Richmond County in NY, and portions of Middlesex and Monmouth counties in NJ.

The major waterbodies in this Region are home to diverse marine and estuarine wildlife communities (USACE 2019). Sandy Hook and some parts of Staten Island comprise a portion of the Gateway National Recreation Area, which features estuarine and freshwater wetland habitat (USFWS 2018). Upland areas within the Lower Bay Region provide migratory and overwintering habitat for many species of birds, while the beaches and waterways are home to a variety of fish and shellfish (USACE 2019).

4.1.3 Jamaica Bay Region

The Jamaica Bay Region is based on the 8-digit HUCs for the Southern Long Island subbasin from the Watershed Boundary Dataset (USGS 2018). This includes a portion of Kings, Nassau, and Queens Counties in NY.

Jamaica Bay is a saline to brackish, nutrient-rich estuary covering almost 40 square miles. The bay has a mean depth of 13 feet, a tidal range averaging five feet, and a residence time of about 33 days (USFWS 1997). The bay opens into Lower Bay and the Atlantic Ocean via the Rockaway Inlet. Rockaway Inlet is a high current area that is 0.63 miles wide at its narrowest point, with an average depth of 23 feet (USFWS 1997).

Jamaica Bay is part of the Gateway National Recreation Area and is a designated National Wildlife Refuge. The Region offers a range of habitats such as deep-water channels, tidal creeks, salt marshes, and tidal flats, Upland habitat within the bay includes open fields, sparse woodlands, sand dunes and shrublands (USACE 2019). Areas of existing salt marsh in the region provide reproductive habitat for invertebrates such as mussels and crabs. Each spring, horseshoe crabs congregate on the mudflats of this region to breed. Migratory shorebirds that winter in temperate or tropic locales and breed in the Arctic stop during their migration to rest and replenish their fat reserves by feeding on the horseshoe crab eggs. Species such as ruddy turnstones (*Arenaria interpres*) and red knots (*Calidris canutus*) rely on the horseshoe crabs for their survival.

Jamaica Bay is located within the Atlantic migratory flyway and is a major stopover area for over 325 species of migratory birds each year (EEA 1996). The bay provides shelter and foraging opportunities for avian visitors and is a major overwintering ground for many waterfowl (EEA 1996).

4.1.4 Hackensack/Passaic Region

The Hackensack/Passaic River Region is based on the 8-digit HUCs for the Hackensack-Passaic subbasin from the Watershed Boundary Dataset (USGS 2018). This includes portions of Bergen, Passaic, Essex, and Hudson counties in NJ, as well as a small part of Rockland County in NY.

This watershed is connected to Upper Bay and Lower Bay via Kill Van Kull and Arthur Kill, respectively. An important and ecologically valuable habitat in this region is the NJ Hackensack Meadowlands which includes the largest remaining brackish wetland complex in the NYNJHAT study area, measuring approximately 8,400 acres (USACE 2004b). Although degraded, the Meadowlands and surrounding areas in this Region are ecologically significant and continue to provide ecosystem functions, including flood storage and fish/wildlife habitat, and offer a variety of potential restoration opportunities (USFWS 1997). The Meadowlands provide important habitat for thousands of shorebirds, both in spring and fall migrations, and for wintering and summering waterfowl (USFWS, 1997). Bald eagles also forage and roost in the Region (USACE 2019).

4.1.5 Raritan Region

The Raritan River Region is based on the 8-digit HUCs for the Raritan subbasin in the Watershed Boundary Dataset (USGS 2018). This includes portions of Middlesex, Monmouth, Somerset, and Union counties in NJ, and is the westernmost region in the NYNJHAT Study Area.

This region contains the lower six miles of the Raritan River before its confluence with Raritan Bay (USACE 2004a). The shoreline of the Lower Raritan River is flanked with residential or industrial development. Land use is predominantly industrial development with bulk-headed shorelines and piers at the river's mouth, and changes to a mix of industrial, commercial, and residential development farther upstream (USACE, 2004a; USACE, 1999). Agricultural lands are located along the upstream boundary of the region (USACE, 2004a).

This tidally influenced river features diverse floral and faunal assemblages (RPA 2003; USACE 2004a). A large wetland complex of 1,000 acres, located in Edison Township, provides habitat for waterfowl, wading birds, mammals, and fish (USACE 2004a). Saltwater intrusion occurs throughout the length of the Lower Raritan River, with sensitive estuarine resources such as tidal wetlands, submerged aquatic vegetation, and intertidal mud flats occurring in shallow, nearshore areas (USACE 1999).

4.1.6 Long Island Sound Region

The Long Island Sound Region (Figure 2-1) is based on the 8-digit HUCs for the Bronx, Saugatuck, Long Island Sound, and Northern Long Island subbasins from the Watershed Boundary Dataset (USGS 2018). This region contains sections of Bronx County and Queens County, as well as portions of Westchester and Nassau Counties.

The Long Island Sound is connected to the Upper Bay via the East River, a tidal strait. Tributaries of the Sound in this region include the Bronx River, Flushing Creek, Westchester Creek, Hutchinson River, Mamaroneck River, and Byram River. There are major estuarine wetlands in Little Neck Bay, sections of the coastline in Sands Point on Long Island, Hen Island and Milton Harbor, Mamaroneck River and its tributaries, and Pelham Bay Park (USFWS 2018). The 437-acre Thomas Pell Wildlife Refuge is also within Pelham Bay Park on the Bronx River. A portion of this region has been designated as the Upper East River-Long Island Sound SNWA by NYC due to the extensive marsh systems in the area, such as those in Alley Pond Park, and islands that support significant populations of nesting shorebirds (NYCDCP 2011).

Several islands in this Region support large populations of wading birds, most notably the 12-acre South Brother Island. Little Neck Bay, Manhasset Bay, and Hempstead Harbor contain significant waterfowl wintering areas (USACE, 2019; USACE, 2004a).

4.1.7 Lower Hudson/East River Region

The Lower HR/East River Region is based on the 8-digit HUCs for the Lower Hudson subbasin in the Watershed Boundary Dataset (USGS 2018). This region extends from the Upper Bay to the Bear Mountain Bridge (also known as the Purple Heart Veterans Memorial Bridge), and includes all of NY County, as well as portions of Kings, Queens, Bronx, Rockland, and Westchester Counties in NY and portions of Bergen and Hudson Counties in NJ.

Strong semi-diurnal tides make the HR one of the few major tidal rivers of the North Atlantic coast (USFWS 1997). The water level of the HR rises and falls, accompanied by changes in flow direction, based on the ocean's tide from the Upper Bay to Troy, NY. Salt water from the ocean remains in the mix between the Governor Mario M. Cuomo Bridge (formerly known as the Tappan Zee Bridge) and Poughkeepsie, depending on the time of year and drought conditions (NYSDEC 2014). There are estuarine wetland systems on the northern tip of Manhattan at Sherman Creek, Muscota Marsh, and Inwood Hill Park (USFWS, 2018). Along the HR there are additional major wetland systems at Croton Bay and River, Stony Point Bay and State Park, Cedar Pond Brook, Furnace Brook, Dickey Brook, and the Piermont Marsh and Iona Island components of the HR National Estuarine Research Reserve (HRNERR) (NYSDEC, 2009; USFWS, 2018). The HR provides important winter feeding and roosting areas for bald eagles (USACE 2019).

4.1.8 Mid-Hudson Region

The Mid-Hudson Region is based on the 8-digit HUCs for the Hudson-Wappinger subbasin and the Rondout subbasin in the Watershed Boundary Dataset (USGS 2018). This region includes portions of Orange, Putnam, Ulster, and Dutchess counties in NY.

There are major wetland systems at Constitution Marsh, Moodna Creek, Fishkill Creek, and Sleightsburgh Park at the mouth of Rondout Creek (USFWS 2018). The HR provides important winter feeding and roosting areas for bald eagles.

4.1.9 Capital District Region

The Capital District is the northernmost portion of the NYNJHAT Study Area and is based on the 8-digit HUCs for the Middle Hudson, Mohawk, and Hudson-Hoosic subbasins in the Watershed Boundary Dataset (USGS 2018). This region includes portions of Ulster, Dutchess, Greene, Columbia, Albany, and Rensselaer Counties in NY. This region is also home to the Wappinger Creek superfund site (EPA, 2018). The HR also provides important winter feeding and roosting areas for bald eagles.

The northernmost portion of this Region contains the Troy Lock and Dam and is dredged to a maintenance depth of approximately 14 feet deep. The Federal Dam at Troy is the limit of the HR's tidal influence (approximately 1.5 meters or 4.92 feet).

5 Environmental Effects and Consequences

The following sections describe the potential effects and consequences from the construction, operation and maintenance of the Tentatively Selected Plan (TSP) per this Tier 1 level of analysis. Potential impact producing factors to USFWS ESA regulated species by implementation of the NYNJHAT Study TSP are physical seabed/land disturbance, air emissions, habitat conversion, noise, visible structures, and land use and economic change. Impacts to USFWS listed species associated with the NYNJHAT study TSP and have been described at a broad level to be comparable to the level of detail provided in the Tier 1 EIS.

As measures and construction methods become more refined for some TSP measures to be included in the Final Integrated FR/Tier 1 EIS (with the remainder of measures to be further analyzed in the Tier 2 EIS), that ongoing analyses will be included in this Tier 1 draft BA and coordinated with USFWS. At such time USFWS has determined that USACE has provided sufficient information upon which to issue a Biological Opinion, USACE will request to initiate formal consultation under Section 7.

5.1 Summary of Impacts

Table 6-1 summarizes the potential affects the TSP may have on USFWS trust species. As proposed project measures and construction methods become more defined, site specific surveys for ESA-listed species and their suitable habitat may be performed, and included in the Final Integrated FR/Tier 1 EIS for those measures for which sufficient information exists, with the remainder of measures to be further analyzed in the Tier 2 EIS.

Table 6-1: Impact Summary Table (Stressors vs Species)

Stressor	Mammals (Bats)	Birds	Insects	Plants
Physical Seabed/ Land Disturbance	NLAA	LAA	NLAA	NLAA
Air Emissions	NLAA	NLAA	NLAA	NLAA
Habitat Conversion	LAA	LAA	NLAA	NLAA
Noise	NLAA	LAA	NLAA	N/A
Visible Structures	NLAA	NLAA	NLAA	N/A
Land Use and Economic Change	NLAA	NLAA	NLAA	NLAA

NLAA (Not Likely to Adversely Affect) is the appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial.

LAA- (Likely to Adversely Affect) means the appropriate conclusion when effects on listed species are expected to be measurable and significant to the species.

N/A – (Not Applicable) means the effects will not be considered further.

5.2 Environmental Consequences

5.2.1 Mammals

5.2.1.1 Direct

The two listed and one candidate bat species, the Indiana bat, northern long-eared bat, and the tricolored bat are not likely to be affected by construction impacts associated with the TSP. Bat habitat is generally in forested areas and/or in caves, while most of the shore-based project measures are in urbanized areas without forests. With the exception of the Mid-Hudson Region and parts of the Capital District Region, the NYNJHAT Study Area is highly urbanized and bat species are not expected to be a common occurrence. Northern long-eared bat can sometimes utilize manmade structures; however, bats are not expected to be common in highly urbanized environments.

The Planning Regions with the most shore-based measures under the TSP are the Lower Hudson/East River, Upper Bay/Arthur Kill, Hackensack/Passaic, and Jamaica Bay Regions. Shore-based measures in each of these Regions are primarily associated with the deployable flood barriers, seawalls and floodwalls. The Indiana bat, northern long-eared bat, and the tricolored bat are present in these Regions, however, are not likely to be affected because few bats are presumed to inhabit the highly urbanized areas where shore-based measures are planned.

All three species of bat also occur within the Mid-Hudson, Long Island Sound, and Raritan River Regions. The impact to each species within the Long Island Sound Region is expected to be minor because few measures in the TSP are planned in these regions. Similarly, no impact is expected to occur to bat species in the Raritan, Mid-Hudson, or Capital District Regions because no measures in the TSP are planned within these regions.

Physical Seabed/Land Disturbance

Minor short-term direct impacts on bats from potential vegetation removal, earth moving, and construction site preparation activities could occur under the TSP. These impacts are not likely to adversely affect bats and are expected to be temporary. Sediment suspension is related to in-water construction measures and mammals will not be impacted as it will not affect their habitat, or their prey. Similarly, mammals are not expected to be impacted by the operation of the in-water measures in any of the Planning Regions because the measures should not affect their habitat.

Air Emissions

The TSP will produce temporary localized emission increases from the diesel-powered construction equipment working at the various project locations. The localized emission increases from the diesel-powered equipment will last only during the project's construction period in each location and then end when the project phase is complete at each location, thus any potential impacts will be temporary in nature and geographically dispersed over the project duration. The

Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants; therefore, bats are not likely to be adversely affected by air emissions.

Habitat Conversion

Potential for impact to bats would be associated with direct removal of roosts or hibernacula for placement of the shore-based measures, such as levees, seawalls, or floodwalls. Trees that provide potential habitat for bats may be removed to install linear seawalls, levees, or floodwalls. Bats are anticipated to seek other trees or roosting areas that are available nearby, and while short-term impacts to available habitat may adversely affect bats, the replacement of lost trees and other habitat will likely be required. Short-term impacts are expected to be mitigated over the long-term, as trees and available habitat regrows. As the projects become more defined, site-specific surveys for hibernacula and nesting locations in the vicinity of onshore project measures may be conducted to evaluate and minimize impacts during the Tier 2 EIS.

Noise

Temporary short-term impacts associated with noise may occur during construction to bats roosting or hibernating in the vicinity of the construction but are not expected to be extensive. Bat species are anticipated to move away from active construction areas and use adjacent suitable habitat until construction is complete; therefore, bats are not likely to be adversely affected by noise.

Visible Structures

Placement of visible structures such as floodwalls and seawalls will not have a direct impact on the listed and candidate bat species.

Land Use and Economic Change

No direct impacts to listed and candidate bats will occur with land use changes, as land use will generally remain unchanged in the NYNJHAT Study Area. Conversion of habitat as described above may have minor impact due to loss of nesting habitat, but impacts are expected to be minor.

5.2.1.2 Indirect

Physical Seabed/Land Disturbance

Indirect impacts on bats from potential vegetation removal, earth moving and during construction site preparation activities are unlikely under the TSP. Soil displacement and vegetation removal may temporarily disturb insects and foraging habitat preferred by bats, but prey organisms are anticipated to move to other habitat nearby. Furthermore, insect populations should not be significantly impacted by soil displacement and vegetation removal; therefore, bats are not likely to be adversely affected.

Air Emissions

As described above, the localized emission increases from the diesel-powered equipment will last only during the project's construction. The Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants. The protection provided by the TSP to the ecosystems in the NYNJHAT study area will enable the greater coastal ecosystem to continue to sequester carbon through sustainable vegetation growth resulting from the project and will minimize future storm damage further inland and associated reconstruction emissions. A net benefit to bats and other mammals in the NYNJHAT study area is anticipated from this project; therefore, bats are not likely to be adversely affected by air emissions.

Habitat Conversion

Conversion of habitats to physical structures may have a minor indirect impact on the listed bat species as some of their insect prey source may have inhabited the areas of impact, but insect populations should not be significantly impacted therefore their feeding efficiency should remain unchanged. No adverse indirect impacts are expected.

Noise

Trucks or bulldozers in construction areas could create noise from their operation and impact mate selection, courtship displays, and territorial defense. This could lead to a loss of productivity due to construction disturbance and harassment to the listed bat species. However, indirect impacts from noise are expected to be minor because bats will seek other appropriate habitat nearby.

Visible Structures

Placement of visible structures such as floodwalls and seawalls will not have an indirect impact on the listed and candidate bat species, as their primary food source, flying insects should not be affected by placement of visible structures.

Land Use and Economic Change

No indirect impacts to listed and candidate bats will occur with land use changes, as land use will generally remain unchanged in the NYNJHAT Study Area.

5.2.2 Birds

Construction impacts associated with the TSP to the four listed and one candidate bird species, roseate tern, rufa red knot, piping plover, eastern black rail, and the saltmarsh sparrow may occur

The Jamaica Bay Region is the only Planning Region that contains the composite seawall/dune measures included in the TSP. Therefore, most of the impacts to the four listed and one candidate bird species will primarily be in Jamaica Bay Planning Region, as this feature is expected to have the largest impact on threatened and endangered birds.

The Lower Hudson/East River, Upper Bay/Arthur Kill, and Jamaica Bay Regions also contain shore-based measures such as floodwalls, levees, seawalls, and elevated promenades that have the potential to impact the listed bird species. However, the areas of these proposed measures are in more urbanized, less suitable habitats and because birds are expected to avoid the construction zones, direct construction impacts to the bird species from those measures will be minor. Each of the four listed and one candidate species of bird also occur within the Long Island Sound and Lower Bay Regions, but impact within these Regions is expected to be minimal because fewer shore-based measures are included in the TSP.

No measures in the TSP are located in the Lower Bay Region, therefore no impacts to listed bird species are expected there. Additionally, no impact to listed birds are expected within the Raritan, Mid-Hudson, and Capital District Regions because none of the listed species occur there.

Beneficial long-term impacts to the four listed and one candidate bird species are anticipated from wetland restoration that would provide more nesting and foraging habitat opportunities for species that utilize wetlands. Further, shoreline measures such as composite seawall/dunes could potentially provide more stable, suitable nesting and foraging habitat that is at a reduced risk from large storm events. As the measures become more defined, site-specific impacts to these three bird species may be evaluated.

5.2.2.1 Direct

Physical Seabed/Land Disturbance

Direct impacts from the construction of TSP features in areas where birds may be nesting are likely to adversely affect listed bird species. However, as described above, avoidance and minimization measures such as time of year restrictions and species and nest surveys may be conducted prior to construction.

Temporary short-term impacts associated with habitat disturbance are expected during construction. Beach-nesting birds may be disrupted when project measures such as buried seawalls with beach/dune are constructed. Construction activities would take place outside of beach-nesting seasons to the extent practicable and any beach-nesting birds present are anticipated to use adjacent suitable habitat. Suitable nesting habitat may be identified in later stages of planning and, if identified, these areas will be avoided to the maximum extent practicable.

Temporary unavailability of suitable resting, foraging, and nesting habitat during construction could occur, particularly within Jamaica Bay during construction of dunes along the shoreline. However, construction activities would not occur during the piping plover nesting season in areas that have been identified as nesting habitat. In order to avoid direct impacts, construction activities will avoid listed species habitat to the maximum extent practicable. If construction activities during the nesting season cannot be avoided (due to monetary issues, quantity of sand required, weather constraints, etc.), USACE may survey for nests and mark avoidance buffers around them and schedule activities in such a way as to avoid areas within the action area with active nests until

nesting is complete. It is anticipated that plover nest sites will be identified during nest surveys and construction will not be allowed in the vicinity of plover nests.

Short-term impacts to migratory birds from habitat disturbance are anticipated during construction. Activity, lighting, and noise during construction of the shore-based measures can temporarily affect migratory birds. Construction noise can hinder migratory birds' ability to call and communicate. Beach-nesting, shore birds and gulls can be displaced near tidal flats and beach areas during construction activities. Construction activities would take place outside of breeding seasons to minimize impacts and any beach-nesting birds present are anticipated to use adjacent suitable habitat outside of the construction area. Minor, short-term direct impacts on migratory birds from potential tree clearing and vegetation removal during construction site preparation activities could occur, but birds are expected to avoid active construction sites; therefore, impacts are not anticipated to be significant.

During operation of SSBs and tide gate closures, no direct impacts to birds are anticipated, as these measures are located offshore. Beneficial indirect impacts could occur through reduction of risk from flooding and subsequent erosion during large storm events of coastal and terrestrial habitats during barrier closure utilized by migratory birds. Temporary impacts to migratory birds are anticipated during potential maintenance of shore-based measures due to the noise and presence of equipment. These impacts would be minor, short-term, and localized as migratory birds would be able to move to suitable adjacent habitat for the duration of maintenance activities.

Beneficial long-term impacts to migratory birds are anticipated from wetland restoration that would provide more nesting and foraging habitat opportunities. Further, shore-based measures such as buried seawall/dunes could potentially provide suitable nesting and foraging habitat that is at a reduced risk from large storm events.

Air Emissions

The localized emission increases from the diesel-powered equipment will last only during the project's construction period in each location and then end when the project phase is complete at each location. The Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants; therefore, birds are not likely to be adversely affected by air emissions.

Habitat Conversion

Direct impacts to birds from habitat conversion would occur where measure foundations and structures are installed, converting upland or beach habitat to hard structured habitat. Impacts are expected during construction of composite seawalls with beach/dune. Conversion of habitats could decrease the available nesting and foraging habitat for any of the bird species. Composite seawalls with beach and dune are proposed on beaches in NY and NJ, to protect from induced flooding from installation of the SSBs. Sediment removal, fill, and installation of stone will be required to

construct the support structure that will be covered in sand to create a beach/dune feature. This has the potential to permanently impact beach nesting and breeding birds such as roseate tern, piping plover, and saltmarsh sparrow. Other shore-based measures such as wetland restoration, and stone toe-protection and rock sill structure measures may have a minor temporary impact on birds overall.

Temporary impacts during barrier closure include changes to water quality, such as increases in turbidity and sediment suspension, or minor restriction of birds that prey on benthic or tidal fish species. The Regions where four listed and one candidate bird species could be temporarily impacted are the Upper Bay/Arthur Kill, the Lower Hudson/East River, the Long Island Sound, and the Jamaica Bay Regions. No impact would occur in any of the other Planning Regions.

Noise

Noise from construction activities may disturb listed bird species if present in the area. However, birds are anticipated to move away from the area of construction activities to suitable available habitat adjacent to the project sites. No direct impacts to bird species are anticipated for SSB and tide gate measures, as these will be constructed offshore and not within bird habitat. Seasonal restrictions and BMPs will be employed for all bird species to ensure that compliance with the ESA, MTBA and Bald and Golden Eagle Protection Act are achieved during construction and operation and maintenance of the TSP.

Visible Structures

Placement of visible structures such as floodwalls and seawalls will not have a direct impact on the listed and candidate bird species.

Land Use and Economic change

No direct impacts to listed and candidate bats will occur with land use changes, as land use will generally remain unchanged in the NYNJHAT Study Area. Conversion of habitat as described above may have minor impact due to loss of nesting habitat, but impacts are expected to be minor.

5.2.2.2 Indirect

The Planning Regions where in-water structures are planned and may therefore have a temporary indirect effect on the listed birds are the Jamaica Bay, Upper Bay/Arthur Kill, and Hackensack Passaic Regions. Because the bird species will most likely be in the Jamaica Bay Planning Region and could be nesting there, the impacts to this Region are highest of all NYNJHAT Study Area Planning Regions. However, as described above, bird species could be temporarily impacted by shore-based measures within the Upper Bay/Arthur Kill, the Lower Hudson/East River, the Long Island Sound, and Jamaica Bay Regions, because of reduced foraging efficiency related to construction impacts, such as increased turbidity. However, all three bird species can forage in other areas, away from the construction and the potentially disturbed forage communities will be

stabilized soon after the completion of construction. No indirect impacts would occur in any of the other Planning Regions.

Physical Seabed/Land Disturbance

Dredging, sand nourishment, excavation, and fill activities from the in-water or shore-based measures may temporarily cause indirect impacts to benthic feeding areas for migratory or ESA listed birds. Turbidity from dredging activities and sediment placement in the water column can decrease foraging rates and cause birds to relocate to adjacent habitats (Greene 2002). As such, migratory birds that rely on benthic areas for feeding are anticipated to utilize suitable adjacent habitat until construction is complete. Turbidity impacts would be localized and expected to cease once dredging and construction is complete. Colonial nesting sites and certain raptor nesting sites may be temporarily impacted during construction activities due to construction noise, vibration, and physical disturbances. Migratory and ESA listed bird species are anticipated to vacate the areas of project activities and utilize adjacent suitable habitat until construction operations are complete. Although indirect impacts to foraging are expected, these impacts will be temporary and bird species will return to the area when construction is complete.

Similarly, construction of in-water structures will cause short-term indirect impacts to pelagic birds like the red knot by disturbing benthic habitat, invertebrates and potentially the fish on which they feed. However, as described above, the area of impact is relatively small, and birds can forage in adjacent areas where construction is not taking place. The construction of the in-water structures is not likely to adversely affect other USFWS ESA-listed species.

Based on previous studies, the re-establishment of benthic communities varies between six months to a year after the project's completion depending on substrate type (USACE 2007; Wilber and Clarke 2007). Thus, no long-term indirect impacts are expected on benthic communities, the fish that feed on them, or the ESA-listed birds in the NYNJHAT Study Area as a result of construction. Additionally, the overall area that would be impacted includes a small percentage of the habitat that is available and bird species will be able to forage in adjacent areas.

Indirect impacts of the TSP during barrier closure include temporary changes to hydrology and water quality, such as increases in turbidity and sediment suspension. Increased noise and vibration would be temporary and limited to the duration of barrier closure and opening operation. These indirect operational impacts are not likely to adversely affect USFWS ESA-listed species identified as potentially occurring in the action area.

Air Emissions

The localized emission increases from the diesel-powered equipment is expected during project construction but will last only during the project's construction period in each location and then end when the project phase is complete at each location. But the Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants. The

protection provided by the TSP to the ecosystems in the NYNJHAT Study Area will enable the greater coastal ecosystem to continue to sequester carbon through sustainable vegetation growth resulting from the project and will minimize future storm damage further inland and associated reconstruction emissions. A net benefit to birds and other animals in the NYNJHAT Study Area is anticipated from this project; therefore, birds are not likely to be adversely affected by indirect impacts from air emissions.

Habitat Conversion

Indirect impacts from habitat conversion are similar to those described for physical seabed and land disturbance. Impacts are expected to be localized and foraging communities are expected to recover.

Noise

Trucks or bulldozers in dune areas may create noise during construction and disturb breeding birds during mate selection, courtship displays, and territorial defense. This could lead to a loss of productivity due to construction disturbance and harassment to sensitive listed bird species. However, seasonal restrictions and BMPs will be employed for all bird species to ensure that compliance with the ESA, MTBA and Bald and Golden Eagle Protection Act are achieved during construction and operation and maintenance of the TSP.

Visible Structures

Placement of visible structures such as floodwalls and seawalls should not have an indirect impact on the listed and candidate bird species, as their primary food sources, fish and flying insects should not be affected by placement of visible structures.

Land Use and Economic Change

No indirect impacts to listed and candidate birds and migratory birds will occur with land use changes, as land use will generally remain unchanged in the NYNJHAT Study Area.

5.2.3 Insects

Most of the shore-based TSP measures are in urbanized areas. Although it is possible to have direct impacts to monarch butterflies and yellow-banded bumble bee in any of the Planning Regions, they are most likely to occur in the Jamaica Bay Region, where the measures are being proposed in less developed areas with a higher likelihood of emergent flowering plants. Both species are most likely to be found in areas with meadows, flowering plants, and milkweed.

Other Planning Regions with shore-based measures included in the TSP are the Lower Hudson/East River, Upper Bay/Arthur Kill, Hackensack/Passaic Raritan, and Long Island Sound Regions. Direct impacts to either species are possible in these Planning Regions, but unlikely.

No direct construction impact to either species is expected within the Mid-Hudson, Lower Bay and Capital District Regions because no project measures included in the TSP occur there.

However, beneficial long-term impacts to monarch butterflies and the yellow-banded bumble bee from habitat creation, particularly for the buried seawall/dune measure, within the Jamaica Bay Planning Region, include an expanded shoreline and dune area for foraging and a coastal habitat buffer from future large storm events.

5.2.3.1 Direct

Physical Seabed/Land Disturbance

The two candidate insect species, monarch butterfly and the yellow-banded bumble bee may experience minor direct construction impacts associated with the TSP from equipment or during sand or soil displacement activities.

Insects are not expected to be impacted by the operation of the in-water measures in any of the Planning Regions because the measures will not affect their habitat. Therefore, insect species are not likely to be adversely affected by direct impacts from physical seabed/land disturbance.

Air Emissions

The TSP will produce temporary localized emission increases from the diesel-powered construction equipment working at the various project locations. The localized emission increases from the diesel-powered equipment will last only during the project's construction period in each location and then end when the project phase is complete at each location, thus any potential impacts will be temporary in nature and geographically dispersed over the project duration. The Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants; therefore, monarch butterfly and the yellow-banded bumble bee are not likely to be adversely affected by air emissions.

Habitat Conversion

Direct impacts to both candidate insect species may occur from conversion of meadow or beach dune habitat to permanent foundation structure. As the projects become more defined, desktop surveys for potential milkweed habitat or site-specific surveys may be conducted to further evaluate the impacts under the TSP. Mitigation and planting of emergent vegetation will minimize the impacts of habitat conversion. Therefore, insect species are not likely to be adversely affected by direct impacts from habitat conversion.

Noise

Direct impacts from noise will not likely adversely affect the candidate insect species.

Visible Structures

Direct impacts from the placement of visible structures such as floodwalls and seawalls will not likely adversely affect the candidate insect species.

Land Use and Economic Change.

Direct impacts from land use changes will not likely adversely affect candidate insect species, as land use will generally remain unchanged in the NYNJHAT Study Area. Conversion of habitat as described above may have minor impact due to loss of vegetative habitat, but impacts are expected to be minor.

5.2.3.2 Indirect

Physical Seabed/Land Disturbance

The primary indirect impact to ESA-listed species from the NYNJHAT study is the effect of construction activities on forage species for insects related to construction of shore-based measures such as the buried seawall dune included in the TSP. Loss of plants that the insects feed on may indirectly affect the butterfly and bees forage efficiency. However, areas of disturbance will be planted with native plants that will become viable forage areas once established.

Air Emissions

The localized emission increases from the diesel-powered equipment will last only during the project's construction period in each location and then end when the project phase is complete at each location; thus, any potential impacts will be temporary in nature and geographically dispersed over the project duration. The Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants. The protection provided by the TSP to the ecosystems in the NYNJHAT Study Area will enable the greater coastal ecosystem to continue to sequester carbon through sustainable vegetation growth resulting from the project and will minimize future storm damage further inland and associated reconstruction emissions. A net benefit to ESA-listed insects in the NYNJHAT Study Area is anticipated from this project, so insects are not likely to be adversely affected by air emissions.

Habitat Conversion

Indirect impacts from habitat conversion are similar to those described for physical seabed and land disturbance. Loss of foraging habitats and efficiency is temporarily expected from construction of shore-based measures. However, mitigation and planting of emergent vegetation will minimize the indirect impacts of habitat conversion.

Noise

Indirect impacts from noise will not likely adversely affect candidate insect species.

Visible Structures

Indirect impacts from the placement of visible structures such as floodwalls and seawalls will not likely adversely affect candidate insect species.

Land Use and Economic Change

Indirect impacts from land use changes will not likely adversely affect candidate insect species, as land use will generally remain unchanged in the NYNJHAT Study Area.

5.2.4 Flowering Plants

The Jamaica Bay and Lower Bay Regions are the predominant areas where seabeach amaranth grows in the NYC area. No project measures are proposed in the Lower Bay Region, therefore the Jamaica Bay Region is the only Planning Region where this species is likely to occur and be impacted by the TSP. This region contains the composite seawall/dune measures included in the TSP and will likely be the only area where potential construction impact to the Seabeach amaranth may occur. However, as described above, avoidance and minimization measures, such as time of year restrictions and species surveys, maybe conducted prior to construction; therefore, impacts to the species will be reduced to the greatest extent possible.

Seabeach amaranth also occurs in the Long Island Sound Planning Region, however, fewer shore-based measures are planned in this Region, and the species is not expected to occur in the locations of the planned measures, so impacts are not anticipated.

No impact to Seabeach amaranth is expected within the Lower Bay, Hackensack/Passaic, Raritan, Mid-Hudson, and Capital District Regions because the species does not occur there.

5.2.4.1 Direct

Physical Seabed/Land Disturbance

Direct impacts to the federally listed plant, seabeach amaranth are possible during construction of shore-based measures under the TSP, such as composite seawall/dune measures. Construction of the composite seawall/dune will involve sediment displacement, structure installation, and placement of sand in potential habitat for this species, as well as movement of heavy equipment in potential habitat. Direct placement of sand on plants or seeds could kill plants and smother seeds and plants could be run over or pulled out of the ground during digging or sand relocation.

However, targeted species surveys may be conducted to identify plants and suitable habitat so they can be avoided during construction. Time of year restrictions may also be implemented in areas with identified habitat to avoid the growing season and times when impacts are expected to be highest. Construction is expected to be short-term and temporary, and plant identification surveys and construction restrictions are expected to protect seabeach amaranth habitat from harm. Construction of the dunes in Jamaica Bay will provide a long-term benefit to the species by

enhancing the beachfront habitat for protection from future large storm events. Therefore, seabeach amaranth is not likely to be adversely affected by land disturbance.

Air Emissions

Direct impacts from air emissions associated with construction or operations and maintenance are not likely to adversely affect seabeach amaranth. The TSP will produce temporary localized emission increases from the diesel-powered construction equipment working at the various project locations. The localized emission increases from the diesel-powered equipment will last only during the project's construction period in each location and then end when the project phase is complete at each location, thus any potential impacts will be temporary in nature and geographically dispersed over the project duration. The Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants.

Habitat Conversion

Direct impacts from the conversion of native dune habitats to buried seawalls/dunes could impact seabeach amaranth by reducing the area of sand habitat for placement of roots. Sediment removal, fill and installation of stone will be required to construct the support structure that will be covered in sand to create a beach/dune feature. However, it is expected that the support structure will be covered in sand and create a more stable habitat for this species to root. The species is expected to grow in the new dune habitat following construction, so habitat conversion is not expected to be significant impact.

Beneficial impacts are likely through protection of dune habitats for the seabeach amaranth during barrier closure from flooding and subsequent erosion during large storm events. These benefits will outweigh any short-term impacts to habitat for the species and therefore impact from habitat conversion is not likely to adversely affect seabeach amaranth.

Noise

Direct impacts from noise are not applicable to flowering plants.

Visible Structures

Direct impacts from the placement of visible structures such as floodwalls and seawalls are not applicable to flowering plants.

Land Use and Economic Change

Direct impacts from land use changes will not likely adversely affect seabeach amaranth as land use classified as beach will remain unchanged in the NYNJHAT Study Area.

5.2.4.2 Indirect

Physical Seabed/Land Disturbance

Indirect impacts to the seabeach amaranth may occur from changes in dune and beach topography or slope related to construction or the secondary effects of implementation of the in-water measures, due to changes in hydrology. However, the potential long-term benefit to this species by protecting and enhancing the dune and beachfront habitat from future large storm events and reducing the potential for future indirect impacts of scouring, sedimentation and changes to hydrology from storms would outweigh any potential short term indirect impacts.

Air Emissions

The localized emission increases from the diesel-powered equipment will last only during the project's construction period in each location and then end when the project phase is complete at each location; thus, any potential impacts will be temporary in nature and geographically dispersed over the project duration. The Project's General Conformity-related annual emissions are below the de minimis threshold levels for the relevant pollutants. The protection provided by the TSP to the ecosystems in the NYNJHAT Study Area will enable the greater coastal ecosystem to continue to sequester carbon through sustainable vegetation growth resulting from the project and will minimize future storm damage further inland and associated reconstruction emissions. A net benefit to plants in the NYNJHAT Study Area is anticipated from this project and therefore seabeach amaranth is not likely to be adversely affected by the indirect impacts from air emissions.

Habitat Conversion

Indirect impacts from habitat conversion to seabeach amaranth are similar to those described above for physical seabed/land disturbance. Therefore, seabeach amaranth is not likely to be adversely affected by the indirect impacts of habitat conversion.

Noise

Indirect impacts from noise are not applicable to flowering plants.

Visible Structures

Indirect impacts from the placement of visible structures such as floodwalls and seawalls are not applicable to flowering plants.

Land Use and Economic Change

Indirect impacts from land use changes will not likely adversely affect seabeach amaranth as land use classified as beach will remain unchanged in the NYNJHAT Study Area.

5.3 Cumulative Impacts

Other permitted and pending projects located within the Study Area have been authorized by permits issued under the USACE's Permits Program for the Clean Water Act Section 404 and Section 10 of the Rivers and Harbors Act of 1899. Some examples of dredging projects in the NY/NJ Harbor include the Harbor Deepening Project, East Rockaway Inlet maintenance, Jamaica Bay Federal Navigation Channel maintenance, and maintenance of several other USACE navigation channel maintenance projects in the Harbor. Other than the Port Authority and USACE projects, the permitted and pending work typically represents maintenance around pier areas and includes dredging, pier rehabilitation, and pier maintenance, rehabilitation of wave breaks, bridge abutment rehabilitation, and wharf reinforcements. Numerous sand and aggregate borrow areas also lie off the coasts of NJ and NY. These areas are dredged periodically and used for beach nourishment and coastal storm risk reduction. Some examples of other coastal storm risk management projects include the Passaic River Tidal Protection Area, the Sea Bright to Manasquan Project, the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay project, and others.

In addition to dredging, beach nourishment, and navigation projects, several other in-water and restoration projects exist in the region. For example, the HR Estuary Program includes the development of a habitat restoration plan and provides funding and planning assistance for restoration projects. Restoration efforts include the improvement of water quality and wetlands, as well as bird, shellfish, and other sensitive species habitat in the Port District of NY and NJ. Additional restoration projects in the region include the NY Rising Community Reconstruction Program, implemented in 2013 with over 3,000 projects across the state addressing critical infrastructure, drainage improvements, and shoreline protection. Environmental mitigation and restoration related to the Tappan Zee Bridge replacement project on the HR include wetland restoration and management, oyster restoration, and stormwater treatment construction projects. In addition, the NYCDEP is undertaking large infrastructure improvement projects at several of its wastewater treatment facilities including at Wards Island in Manhattan and Coney Island in southern Brooklyn. The cumulative impact of these projects in improving overall water quality in the Harbor should represent a net benefit; such benefits may be further evaluated as the project details become more defined.

Short-term cumulative impacts are related to Project activities and in-water construction associated with other permitted projects that are ongoing concurrently within the Harbor area. These short-term cumulative impacts would be a combination of disturbances associated with each project. Cumulative construction impacts are the combined effect on wildlife and the natural environment related to temporary effects such as pollution and contaminant discharges, habitat disturbance and conversion in the Study Area. Impacts related to construction would be minimized as practicable using the best management practices (BMPs) described below.

Long-term cumulative impacts would be limited to localized changes in coastal habitat including beach and dune systems, changes in bathymetric contours, hydrodynamics, and sedimentation rates, such as those potential impacts associated with the operation and maintenance of the existing or proposed deepened channels, any deepening or operations and maintenance proposed by private entities, and the berth deepening being proposed by the Port Authority of NY and NJ, as well as sand borrow and beach nourishment activities and other restoration projects ongoing or planned for the region. However, cumulative restoration activities related to habitat improvement or coastal storm risk management are expected to generate cumulative benefits to the Study Area by reducing water quality impacts from potential flooding and improve quality of habitats and wetlands.

To minimize the potential for cumulative adverse impacts on USFWS listed and candidate species, USACE will follow recommendations previously provided by the NYSDEC and USFWS for these species on similar projects in the area. These measures are expected to minimize potential adverse impacts on numerous other species that may use coastal habitats in the NYNJHAT Study Area, including several state-listed shorebird species. These best management practices may include:

- Time of year (TOY) no-dredge/work restriction recommendations are as follows: for piping plover and rufa red knot from April 1 through September 2, and for seabeach amaranth from June 1 through November 1, when the presence of these species within an area of potential effect is confirmed.
- Conduct construction activities near active plover nesting areas only from September 2 through March 31 to avoid the protected shorebird nesting period.
- Construction activities will avoid all delineated locations of the bird during the breeding season and the plant species will undertake all practicable measures to avoid incidental taking of the species.
- USACE will reinitiate consultation with the USFWS to identify acceptable protective measures should any changes to the project or species elicit a trigger to support such reinitiation.

5.3.1 Pollution and Contaminants

Human activities in the NYNJHAT Study Area causing pollution are reasonably certain to continue in the future, as are impacts of pollution on birds, mammals, insects, and plants. However, the magnitude of these impacts cannot be projected. Sources of contamination in the NYNJHAT Study Area includes atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, industrial and residential development, etc.

Chemical contamination may have effects on listed and candidate species reproduction and survival. The extent of these effects is dependent upon the type of contaminant and the chemical concentration in ESA-listed species habitat. Excessive turbidity due to coastal development and/or construction sites could influence the foraging ability of pelagic and shorebirds. This could be

particularly detrimental during breeding and nesting season when pelagic and shorebirds are present in higher numbers. Marine debris (*e.g.*, discarded fishing line or lines from boats, and plastics) also has the potential to entangle ESA-listed species in the water or to be fed upon by them. Birds commonly ingest plastic or mistake debris for food and sometimes this may lead to asphyxiation.

5.3.2 Habitat Loss

Loss of habitat by conversion of forests, grassland and coastal habitats to commercial, residential, and industrial development has contributed to species loss. Future development and habitat loss is expected to occur and impact the listed species over the temporal scale of the TSP (*i.e.*, over the next 50 years).

The northern long-eared bat, Indiana bat, and tricolored bat depend upon trees for roosting within the native range (USFWS 2022b) and future development could contribute to habitat loss within the NYNJHAT Study Area. The northern long-eared bat is sometimes found in structures such as buildings, barns, sheds, under eaves, so it is possible these bats would utilize man-made structures if trees were not available. Bats could possibly leave their existing habitat in search of other wooded or forested locations as future development continues.

Shoreline development will inevitably impact shorebirds that utilize marshes and beach habitat for nesting, breeding, and foraging each year. Impacts are unpredictable and depend upon habitat protections and future development along beachfronts in the NYNJHAT Study Area.

Monarch butterfly and the yellow-banded bumble bee populations have declined as a result of habitat loss over the past two decades (Federal Register 2020) and future development in meadows or fields where wildflowers and milkweed grow could continue to impact the species. Milkweed is the sole food source for monarch butterfly larvae and reproduction is dependent on its presence in the spring and summer northern habitats. Both species also utilize habitat along coastal beaches with dunes and future development along beaches could impact these species (NYSDEC 2022b). Seabeach amaranth is a flowering plant that occurs on barrier islands, inlets and overwash areas (Federal Register 1990) that could also be impacted by coastal development. Beach slope is a critical factor for the growth of seabeach amaranth and changes to existing slopes could degrade or reduce the habitat available to the species.

5.3.3 Global Climate Change

Global climate change is expected to continue and may impact listed and candidate species and their habitats in the NYNJHAT Study Area. Given the rate of change associated with climate impacts (*i.e.*, on a decadal to century scale), it is likely that climate related impacts will have an effect on the status of any listed species over the temporal scale of the TSP (*i.e.*, over the next 50 years) or that the abundance, distribution, or behavior of these species in the NYNJHAT Study Area will significantly change as a result of climate change impacts.

There are numerous impacts associated with climate change; the effect on ESA-listed species within the NYNJHAT Study Area is difficult to predict. Sea-level rise will continue to impact coastal habitats such as marshes, inlets, barrier islands, coastal meadows, and sand dunes which provide habitat for the listed bird species and insect species. As tropical storms continue to increase in severity, forested inland habitat that is utilized by ESA-listed and candidate species of bats in the NYNJHAT Study Area will be impacted. Beach erosion is another concern and contributes to habitat loss for listed and candidate shorebirds that depend upon nesting locations each year. These impacts are unpredictable and will vary in severity over the temporal scale.

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