FISH AND WILDLIFE COORDINATION ACT 2(b) REPORT

APPENDIX

NASSAU COUNTY BACK BAYS
COASTAL STORM RISK MANAGEMENT
FEASIBILITY STUDY

PHILADELPHIA, PENNSYLVANIA

APPENDIX G4

August 2021

NCBB
Nassau County Back Bays Study

U.S. Army Corps of Engineers
Philadelphia District

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

September 1, 2021

Angie Sowers, Ph.D.
U.S. Army Corps of Engineers
Baltimore District- Planning Division
Civil Project Development Branch
Integrated Water Resources Management Specialist
2 Hopkins Plaza
10-E-04
Baltimore, MD 21201

Dear Dr. Sowers:

Please find enclosed the U.S. Fish and Wildlife Service's Draft Fish and Wildlife Coordination Act 2(b) report for the U.S. Army Corps of Engineers' feasibility study entitled, "Nassau County Back Bays Coastal Storm Risk Management Study."

We look forward to continued coordination with your office in finalizing this report and through succeeding design phases. We have forwarded the report to the National Oceanic and Atmospheric Administration and the New York State Department of Environmental Conservation- Region I for their comments.

If you have any questions, please contact Kim Spiller (Kimberly_Spiller@fws.gov) or Steve Papa (Steve_Papa@fws.gov) of the Long Island Field Office.

Sincerely,

DAVID STILWELL

Digitally signed by DAVID STILWELL
Date: 2021.09.01 16:25:07 -04'00'

David A. Stilwell
Field Supervisor

Cc: NYSDEC-Region I (M. Gibbons)
NOAA-Fisheries (K. Greene)

Draft Fish and Wildlife Coordination Act Section 2(b) Report
Nassau County Back Bays Coastal Storm Risk Management Feasibility Study

Prepared for:

U.S. Army Corps of Engineers
Philadelphia District
Philadelphia, Pennsylvania

Prepared by:

U.S. Fish and Wildlife Service
Long Island Field Office
Shirley, New York

Preparers: Steven Papa, Kim Spiller
Field Supervisor: David A. Stilwell

August 2021

Executive Summary

This draft report has been prepared at the request of the U.S. Army Corps of Engineers (USACE or Corps) in partial fulfillment of section 2(b) of the Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report provides the U.S. Fish and Wildlife Service's (Service) comments on the biological issues relevant to the Corps' *Nassau County Back Bays Coastal Storm Risk Management Feasibility Study*. The purpose of the FWCA is to ensure equal consideration of fish and wildlife conservation in the development of the Corp' proposed Tentatively Selected Plan (TSP). Section 2(b) of the FWCA requires that the final report of the Secretary of the Interior: (1) determine the magnitude of the direct, indirect, and cumulative impacts of the proposed projects on fish and wildlife resources, and (2) make specific recommendations as to measures that should be taken to conserve those resources.

The TSP includes structural elevations for residential structures and dry flood proofing for commercial structures along the mainland, and ocean and bay shorelines of the Atlantic Ocean, Hewlett Bay, Middle Bay, Jones Bay, and South Oyster Bay in Nassau County, NY. The USACE is also considering using natural and nature-based features (NNBF) as a component of the TSP to address coastal storm risks but has not included those plans to the Service at this time. Additional non-structural measures will be further analyzed during feasibility-level design to ensure a complete non-structural alternative is formulated. These additional non-structural measures include managed coastal retreat, i.e., acquisition or relocation of residential structures, coastal storm plans and preparedness, and national flood insurance program refinement. Prior to the completion of the Final Environmental Impact Statement (EIS) prepared pursuant to the National Environmental Policy Act (NEPA), the Corps intends to provide the Service with additional plans for review, evaluation, and incorporation into in the FWCA Report.

Procedurally, project construction is not authorized; however, the FWCA requires that Section 2 (b) report be made an integral part of any report supporting further project authorization or administrative approval. We anticipate additional Service involvement for subsequent detailed planning, engineering, design, and construction phases of each planning effort and are required to fulfill our responsibilities under the FWCA. The Service recommends the Corps continue coordination under a separate FWCA agreement when additional components are included in the TSP and project funding is made available so a thorough review of the project footprint and impacts can be conducted.

The Study Area provides ecologically significant habitat for a number of regional federal and state threatened and endangered, and at-risk, species. It includes the New York State Department of State- (NYSDOS) designated South Shore Estuary Reserve, New York State Significant Coastal Fish and Wildlife Habitats, and Audubon Important Bird Areas. Major public landowners in the Study Area include the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP), the towns of Babylon, Hempstead, and South Oyster Bay, City of Long Beach, and numerous villages.

The TSP identifies over 14,000 residential structures that could be structurally elevated, but since this would be a voluntary program, the Service is unable to identify specifically which natural areas adjacent to properties undergoing structural elevation may be impacted from construction related activities. Therefore, we have taken a general approach to describing the potential

impacts and associated mitigation measures, which include noise disturbance as well as potential silt and sediment runoff. In addition, the TSP does not indicate if ancillary activities such as land filling to raise property elevations would occur, or if on-site sewage holding systems (cesspools, leaching fields, or septic tanks) would be moved or retrofitted. As a result, we have not covered the impacts associated with these activities into our report.

In the course of our review of the TSP, the Service has preliminarily identified several best management practices and mitigation planning recommendations that could potentially reduce impacts to species and natural systems and communities from implementation of the TSP. However, since the TSP is potentially extensive in its scale and breadth, a landscape level analysis would need to occur to properly ascertain the effectiveness of these measures during construction and the effects of the structural elevations on surrounding habitats and the species they support.

As the Corps has indicated that certain components of the project require further development and coordination with Federal, State, and local agencies and public review, we look forward to continued engagement with the Corps so that any necessary revisions or supplements to the 2(b) report can be provided.

Finally, this report does not constitute a Biological Opinion under section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Table of Contents

List of Figures

List of Tables

I. Introduction

This draft report was prepared pursuant to the Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended, 16 U.S.C. 661 *et seq*.) and provides conservation and planning assistance to the U.S. Army Corps of Engineers (Corps or USACE) for their study entitled, "*Nassau County Back Bays Coastal Storm Risk Management Feasibility Study"* (Study) (USACE 2020 in litt).

Projects authorized under the Water Resource Development Act (WRDA) (33 U.S.C. 2201 *et seq*.), the Endangered Species Act (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.), and the FWCA represent the primary authorities for the Service's coordination with the Corps. Under the FWCA, the Corps and the Service coordinate during project planning to conserve, protect, and enhance fish, wildlife, and plants, and their habitats. The final FWCA Report will constitute the report of the Secretary of the Interior as required by Section 2(b) of the FWCA, which establishes fish and wildlife conservation as a co-equal purpose or objective of federally funded or permitted water resource development projects. The FWCA allows for reports and recommendations from the Service and the state wildlife agency to be integrated into the Corps' reports seeking authorization for the federal action, and it grants the Corps the authority to include fish and wildlife conservation measures within these projects.

II. Project Purpose, Scope, and Authority

The purpose of the Corps' feasibility study is to evaluate federal interest in reducing the risk of coastal storm damage, introducing long-term resilience and sustainability of communities and the environment, and reducing the economic costs associated with coastal storm damage in the back bays of southern Nassau County, New York.

The Study Area stretches from the Nassau County/Queens County border in the west to the Suffolk County border in the east with a northerly boundary at the +19 ft North American Vertical Datum in 1988 (NAVD88) elevation. The southern boundary of the Study Area is the Atlantic Ocean offshore of Long Beach and Jones Beach Islands within the westerly and easterly boundaries identified above. As noted in the Corps' TSP, the scope of temporal effects includes short- to long- term impacts on a time scale from months to years, and all alternatives are being evaluated at 5, 20, and 100 years of protection.

The authorities for the Corps to survey hurricane damaged areas and identify areas to manage risk associated with coastal flooding and sea level rise are Public Laws 84-71 (15 June 1955) and 113-2 (Disaster Relief Appropriations Act of 2013). At this time, project plan optimization and the evaluation of Natural and Nature-Based Features (NNBF) that may be considered as additional components of the Tentatively Selected Plan (TSP) have not been finalized. Thus, the Service will continue to work with the Corps as the project develops to avoid and minimize

impacts to natural resources and identify enhancement opportunities. The final FWCA 2 (b) Report will reflect this coordination.

This draft report is provided under authority of the FWCA. This Act established two important federal policies, which are: (1) fish and wildlife resources are valuable to the nation, and (2) the development of water resources is potentially damaging to these resources. The FWCA mandates "...wildlife conservation shall receive equal consideration and be coordinated with other factors of water resource development programs through effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation."

In order to fully incorporate the conservation of fish and wildlife resources in the planning of water resources development, the FWCA mandates that federal agencies consult with the Service and the state agency responsible for fish and wildlife resources in the Study Area. This draft report will be sent to the Corps, the New York State Department of Environmental Conservation (NYSDEC) - Region I, and the National Oceanic and Atmospheric Administration (NOAA) for their review and comments. Comments from these agencies will be incorporated into the final FWCA 2(b) Report.

Consultation during project planning is intended to allow state and federal resource agencies to determine the potential adverse impact on fish and wildlife resources and develop recommendations to avoid, minimize, or compensate for detrimental impacts. Therefore, this report will:

1. describe the fish and wildlife resources in the Study Area, with a focus on at-risk and listed species;
2. evaluate to the degree possible, due to the existing level of planning, the potential adverse impacts, both direct and indirect, on these resources from the TSP;
3. to the degree possible due to the level of existing planning, develop recommendations to avoid, minimize, or compensate for any unavoidable, adverse environmental impacts;
4. identify fish and wildlife resources problems and enhancement opportunities; and
5. present an overall summary of findings and the position of the Service on the project.

The geographic scope of this report includes all areas that would be potentially impacted by the TSP in the Study Area, and other areas within the broader Study Area where there are opportunities for fish and wildlife enhancement.

III. Relevant Studies, Projects, and Reports

A partial list of relevant proposed or constructed federal, state, or local projects or studies within the Study Area is provided below with links to more information. As per the National

Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.), these actions should be considered in the Corps' cumulative effects analysis in any NEPA document that is prepared.

South Shore Estuary Reserve Comprehensive Management Plan (Pataki and Daniels 2001);

Northeast Coastal Areas Study (USFWS 1991);

Long Beach Island Coastal Storm Risk Management Project (see https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/Long-Beach/);

East Rockaway Inlet Federal Navigation Channel Project (see https://www.nan.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/487372/fact-sheet-east-rockaway-inlet-ny-maintenance-of-infrastructure-stewardship/);

Living with the Bay Projects (for a complete project list see https://stormrecovery.ny.gov/living-bay);

New York Rising Community Projects (see https://stormrecovery.ny.gov/community-regions/long-island);

Jones Inlet Federal Navigation Channel Project (see https://www.nan.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/487339/fact-sheet-jones-inlet-new-york-federal-navigation-channel/);

New York State Comprehensive Wildlife Strategy (https://www.dec.ny.gov/docs/wildlife_pdf/cwcs2005.pdf);

North Atlantic Coast Comprehensive Study (https://www.nad.usace.army.mil/CompStudy.aspx);

Federal Emergency Management Agency (FEMA) National Flood Insurance Program, and Structural Elevation Program;

New York State Department of Transportation Ocean Parkway Bike Path (see https://www.dot.ny.gov/regional-offices/region10/projects/oppath/repository/Ocean%20Pkwy%20Path%20-%20Slideshow.pdf); and

Town of Hempstead's High Meadow Island and Smith Salt Marsh Restoration Projects (https://regionalcouncils.ny.gov/cfa/project/291088).

IV. Description of the Study Area

The Study Area is about 98 square miles (sq. mi.) in area and contains all of the tidally influenced bays and estuaries along the southern coastline of Nassau County, New York, directly east of Queens County and west of Suffolk County (*Federal Register* Vol. 85, No. 176 dated September 10, 2020). It encompasses both the mainland and the barrier islands within the east-west geographical extent of Nassau County, including all of Long Beach Island and the western segment of Jones Beach Island, as well as their corresponding watersheds, with the northern boundary on the mainland of Long Island along the +19 ft NAVD88 contour. The Study Area includes private and public lands within the towns of Hempstead, Oyster Bay, and Babylon, and several villages that front the back bays and connected creeks, channels, and minor waterbodies, as well as the City of Long Beach on the Long Beach Barrier Island.

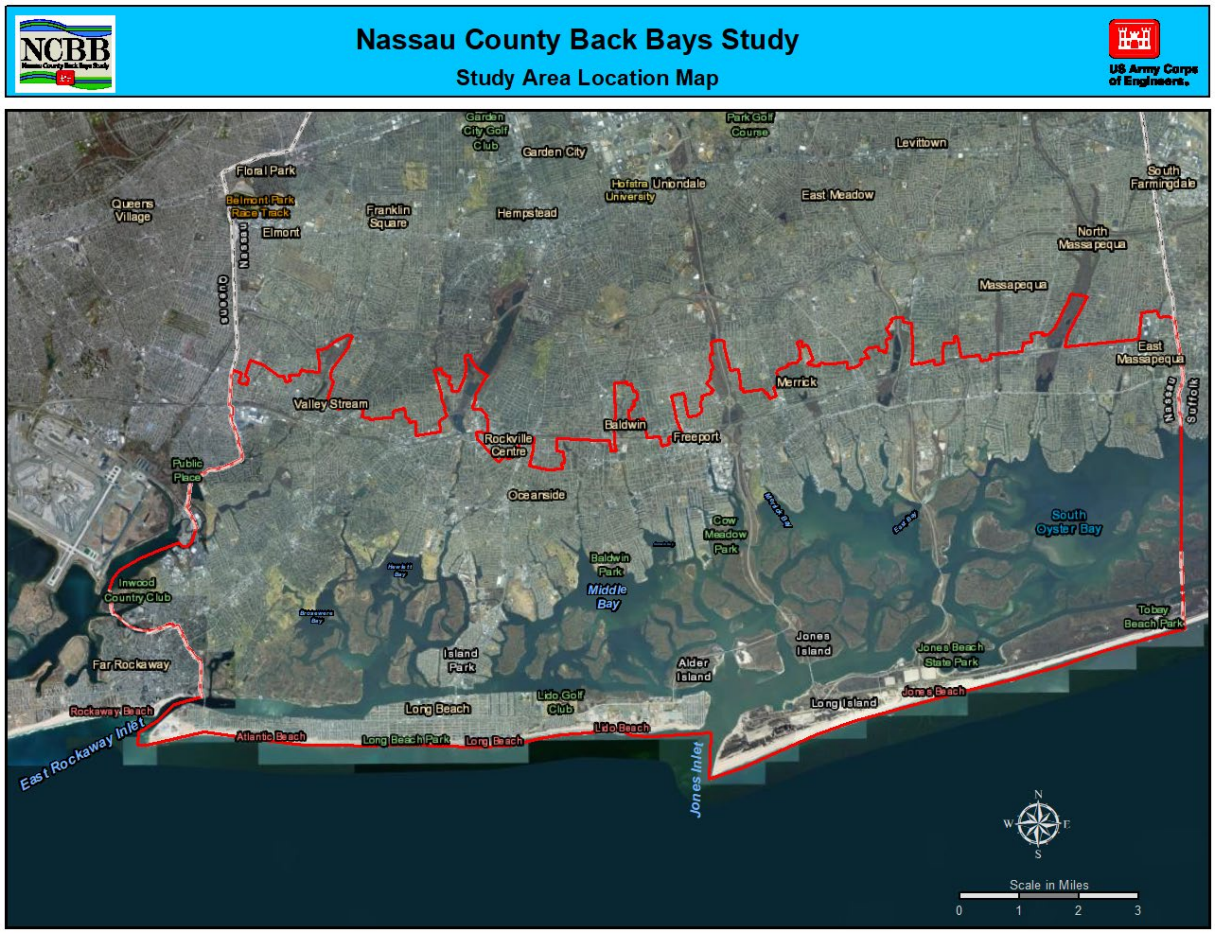


Figure 1. Map of the Study Area for the Nassau County Back Bay Coastal Storm Risk Management Feasibility Study.

A. Back Bays

The Hempstead Bays – South Oyster Bay complex includes West Hempstead Bay (West Bay, including Brosewere Bay and Hewlett Bay) and Middle Hempstead Bay (Middle Bay) north of Long Beach, as well as East Hempstead Bay (East Bay, including Jones Bay) and South Oyster Bay north of the western portion of Jones Beach (NYDOS 1987, USFWS 1997). The bays and their wetlands are under the jurisdiction of the towns of Oyster Bay, Hempstead, and Babylon and are managed as recreational fishery and wildlife conservation areas by the respective town's conservation and/or environmental agencies (USFWS 1997).

This part of the Long Island barrier beach/back-barrier lagoon system is characterized by an extensive system of sheltered shallow bays and salt marsh islands connected by a network of channels and tidal creeks. There is a higher percentage of salt marsh islands in the Nassau County back bays than in the Great South Bay to the east (NYDOS 1987). Salt marsh and dredged material islands dominate much of the bay acreage, with the remainder of the bays being open water. Extensive mud and sandflats are exposed at low tide throughout the bay system. The bay and barrier beach sediments are composed predominantly of water-sorted sands and gravels derived from glacial outwash and marine sources, with extensive peat deposits in East Bay (USFWS 1997).

The bay complex is in the Outer Coastal Plain physiographic province (USFWS 1997). There are severable sizable tributaries entering the bays, but most of their natural shorelines have been modified with bulkheads or revetments. Several ponds also exist in the Study Area. East Rockaway Inlet and Jones Inlet are tidal inlets that separate the barrier islands and allow exchange between the back bays and the Atlantic Ocean (USFWS 1997).

West Bay has a surface area of approximately 400 acres (ac), Middle Bay and East Bay are about 5,000 ac. each, and South Oyster Bay is approximately 7,700 ac. The bay complex has a drainage area of 223 sq. mi. (USFWS 1997). Water depths in the bays vary from less than 6 feet (ft) below mean low water in the natural creeks and small bays to 30 ft. in portions of some of the dredged navigation channels and larger open water areas. Tidal fluctuations in the bays average 1.4 to 3.96 ft. Salinity ranges from 25 to 30 practical salinity unit (psu); temperature ranges from 28 to 85°F, depending on location and time of year. The water column is well-mixed, with relatively high dissolved oxygen levels (NYDOS 1987).

B. Long Beach and Jones Barrier Islands

Long Beach Island is 9.25 mi in length, and mostly residentially and commercially developed. It can be accessed via the Long Beach Boulevard and Atlantic Beach Bridges. Nassau County recreational parks are found at either end of the island, and the Town of Hempstead manages Lido Beach and Point Lookout Town Parks on the eastern end of the island for breeding and migratory shorebirds and protected plant species. As discussed later in this report, a portion of

Nickerson Beach County Park and these Town parks provide breeding habitat for federally-listed piping plover (*Charadrius melodus*; threatened), tern species (*Sterna* spp.), American oystercatcher (*Haematopus palliatus*), and black skimmer (*Rhynchops niger*). They also serve as migratory stopover habitat for these and many other shorebird species including the federally listed red knot (*Calidris canutus rufa*; threatened). The Service manages the Lido Beach Wildlife Management Area (LBWMA) on the north shore of Long Beach Island. The LBWMA includes 22 ac. of saltmarsh, open water, and scrub-shrub habitat important to many species of plants and wildlife including shorebirds, grassland species, waders, and waterfowl. The City of Long Beach manages its ocean beach as a recreational swimming area.

Jones Beach Island has roads and recreational facilities to support recreational facilities at Jones Beach State Park and Tobay Beach, and other developments outside of the Study Area. The west end of Jones Beach State Park is undeveloped, but the western shoreline contains the eastern jetty of the Corps' Jones Inlet Federal Navigation Channel. This area contains maritime dunes, swales, ocean, and bay beaches and is managed, in part, for wildlife conservation. Heading east from Jones Beach State Park, the Study Area on the barrier island is bifurcated by Ocean Parkway. The ocean side includes sandy beach and primary dunes. On the north side of the Parkway, there are scrub/shrub and saltmarsh habitats. Habitat within the undeveloped John F. Kennedy Memorial Wildlife Sanctuary includes a 40-ac. brackish pond, large expanses of tidal salt marsh, high dunes, and a coastal woodland.

C. Mainland

The mainland in the Study Area is a highly developed, low-lying region in the New York City metropolitan area that is home to over 700,000 residents and thousands of businesses (see Appendix – Correspondence). As noted above, human development has modified the natural creek and tributaries entering the bay such that the amount of natural shoreline has been drastically reduced. The network of primary and secondary roads is extensive. Highways include the Wantagh State Parkway, Meadowbrook Parkway, and Bay State Parkway that connect to Jones Beach State Park (NYDOS 1987), and the Loop Parkway, leading to Long Beach Island.

Open upland space is limited in the Study Area and is comprised of golf courses and municipal park lands, most notable of these is the Oceanside Marine Nature Study Area.

Low topographic relief characterizes the region with most of the area being less than 30 m in elevation but ranging from sea level to nearly 120 meters (m) (USFWS 1997).

D. Coastal Barrier Resources System Unit

The Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.) established the Coastal Barrier Resources System (CBRS), a defined set of geographic coastal units to encourage the

conservation of hurricane-prone and biologically rich coastal barriers (www.fws.gov/cbra). No expenditures or financial assistance may be made available under authority of any Federal law for any purpose within a CBRS unit, including construction or stabilization projects, unless that activity meets one of the CBRA's exceptions.

The eastern end of Long Beach Island, the portion of Jones Beach Island within the Study Area, and most of the back bay within the Study Area, have been designated and mapped as undeveloped beach units of the CBRS (NY-59). This designation prohibits federal financial assistance or flood insurance within the unit. Sections of the eastern end of Long Beach Island have been designated and mapped as otherwise protected beach units (NY-59P); the only prohibition of federal expenditures in these areas is federal flood insurance. Some structures identified by the Corp for structural elevations may be in NY-59 and NY-59P on Long Beach Island. It is also likely NNBFs that focus on the back bay wetlands would be in NY-59.

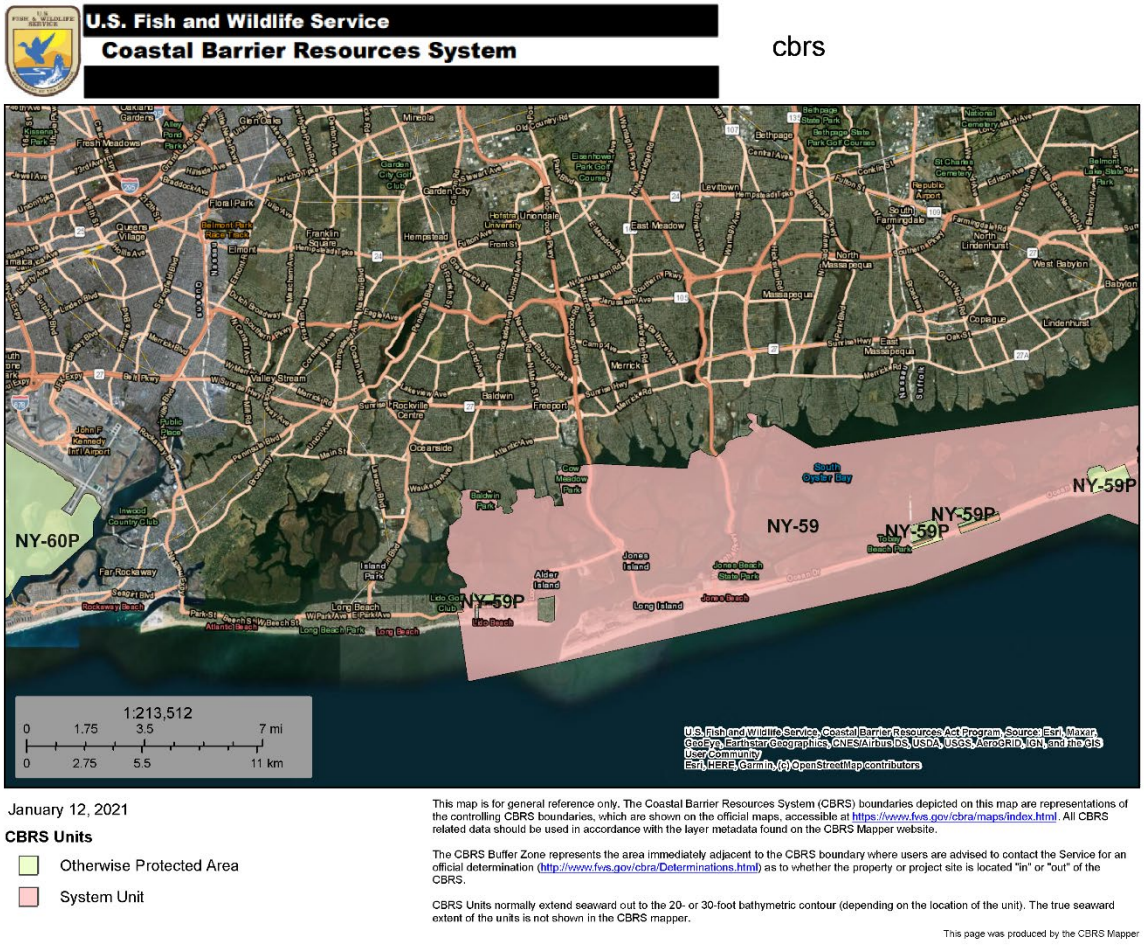


Figure 2. Map of Coast Barrier Resources System units NY-59 and NY59P in the Study Area. Note CBRS Unit NY-60P while shown on this map is not in the Study Area.

V. Fish and Wildlife Resource Concerns and Planning Objectives

As previously noted, the purpose of the FWCA consultation is to ensure equal consideration of fish and wildlife resources in the planning of water resource development projects. The Service's emphasis in this regard is to identify means and measures to mitigate the potential adverse impacts of the proposed project and to make positive contributions to fish and wildlife resource problems and opportunities.

A desired output of the FWCA consultation is a project that contributes and promotes healthy riverine, estuarine, and terrestrial ecological communities. Further, this consultation will result in measures to avoid and minimize further losses of habitat value. Overall, the Service recommends that conservation of fish and wildlife resources be accomplished by:

1. recommending that the Study evaluate alternatives that ensure natural areas are protected and conserved and that biological diversity is maintained;
2. identifying a Study alternative that is most beneficial to fish and wildlife resources;
3. obtaining basic biological data to aid in the development of appropriate conservation measures;
4. implementing mitigation measures to avoid and minimize potential direct and indirect project related impacts;
5. incorporating habitat enhancement opportunities to benefit fish and wildlife resources in the Study Area;
6. recommending monitoring plans for habitats created or impacted by the project.

Specific Objectives for this FWCA Report:

1. To restore and enhance saltmarsh islands to increase Study Area resiliency and to conserve habitat values associated with mainland tributaries, lakes, and ponds.
2. To protect and restore saltmarsh islands and mainland saltmarsh habitats for the benefit of saltmarsh dependent species including at-risk species such as the saltmarsh sparrow and other species of special concern.
3. To restore native plant species to create better urban/suburban habitat resiliency and promote conservation of native bird and pollinator species.
4. To reduce invasive species populations in the Study Area, thereby promoting species diversity and resiliency.
5. To promote increased coastal resiliency and species and habitat diversity through acquisition of properties identified by the Corps; and
6. To improve water quality and reduce environmental contaminants in the Study Area.

Nitrogen loading leading to micro and macro algal blooms is prevalent in the estuary (Raciti et al. 2020). Sources of nitrogen loading include point and non-point sources such as wastewater treatment plants, sewer outfalls, and upland runoff. Activities that may affect water quality or introduce environmental contaminants into the environment include clearing and grubbing

operations, demolition of existing structures, soil importing and stockpiling, landscaping operations, excavation, waste or wastewater from concrete washing operations, on-site trash collection, and accidental release of hazardous materials or sanitary waste.

VI. Evaluation Methods

In this report, the Service provides a discussion of federal trust resources (i.e., migratory birds, wetlands, endangered species, and anadromous fish), as well as other significant fish and wildlife resources in the Study Area.

The Corps' planning schedule and funding limitations precluded the Service from conducting field surveys and investigations for Service trust resources in the Study Area. Without the benefit of a Planning Aid Letter/reconnaissance Phase, the agencies do not have the benefit of early coordination and consultation that could inform later aspects of the planning process. Therefore, descriptions of existing natural resources are based on relevant grey and peer-reviewed literature; local, state, and federal fish and wildlife reports and plans; and personal communications with knowledgeable biologists, planners, coastal geologists, and engineers.

Overall, this report is not the product of an iterative process, which the FWCA consultation process was intended to be. The Service did provide comments on the Corps' Notice of Intent to prepare an Environmental Impact Statement and the Corps' Purpose and Need Statement for the feasibility report (see Appendix – Correspondence). As we note later in this report, certain aspect of our coordination such as review of the NNBFs and further development of mitigation recommendations will need additional coordination and evaluation as the project planning proceeds.

VII. Fish and Wildlife Resources Without the Project

A. Habitat Designations

New York State Department of State-designated (NYSDOS) Significant Coastal Fish and Wildlife Habitats (SCFWH) are present in the Study Area. These include, from west to east: Silver Point Beach, West Hempstead Bay, Middle Hempstead Bay, Nassau Beach, East Hempstead Bay, Cedar Creek County Park, West End (Jones Beach State Park), Storehouse (Jones Beach State Park), South Oyster Bay, Short Beach (Jones Beach State Park), Parking Lot 9 (Jones Beach State Park), and the J.F.K. Bird Sanctuary at Tobay Beach. In terms of ecosystem rarity, NYDOS has evaluated these bays as being part of one of the largest, undeveloped coastal wetland ecosystems in New York, and as being an irreplaceable fish and wildlife resource. The bays also constitute one of the most important waterfowl hunting areas on Long Island, with wintering waterfowl concentrations of regional significance. It is also an area of recreational fishing of regional significance in New York (NYDOS 1987).

The New York State Legislature established the South Shore Estuary Reserve (Reserve) in 1993. The Reserve extends 75 miles (mi) east from the Nassau County/Queens County line to the Village of Southampton in Suffolk County. From south to north, the Reserve extends from the mean high tide line on the ocean side of the barrier island to the inland limits of the drainage areas (https://www.dos.ny.gov/opd/sser/). The western portion of the Reserve watershed is in the geographic boundary of the Study Area. A Comprehensive Management Plan (CMP) for the Reserve was developed in cooperation with many Federal, State, and local government agencies, and non-governmental organizations (see Pataki and Daniels 2001).

The National Audubon Society-designated West Hempstead Bay/Jones Beach West global Important Bird Area (IBA) is located in the Study Area, and includes the western portion of Jones Island, as well as the bay islands and marshes, with habitat characterized by sandy beach and dune systems, natural salt marshes and spoil islands (National Audubon Society 2021). The IBA is used by large numbers of waterfowl in the winter, as well as breeding and migrating species that use the shoreline, wetlands, uplands, and grasslands in the Study Area. See Figure 3 which shows locations of New York State habitat designations and Audubon NY IBA in the Study Area and in relation to properties that could be structurally elevated or dry flood proofed.

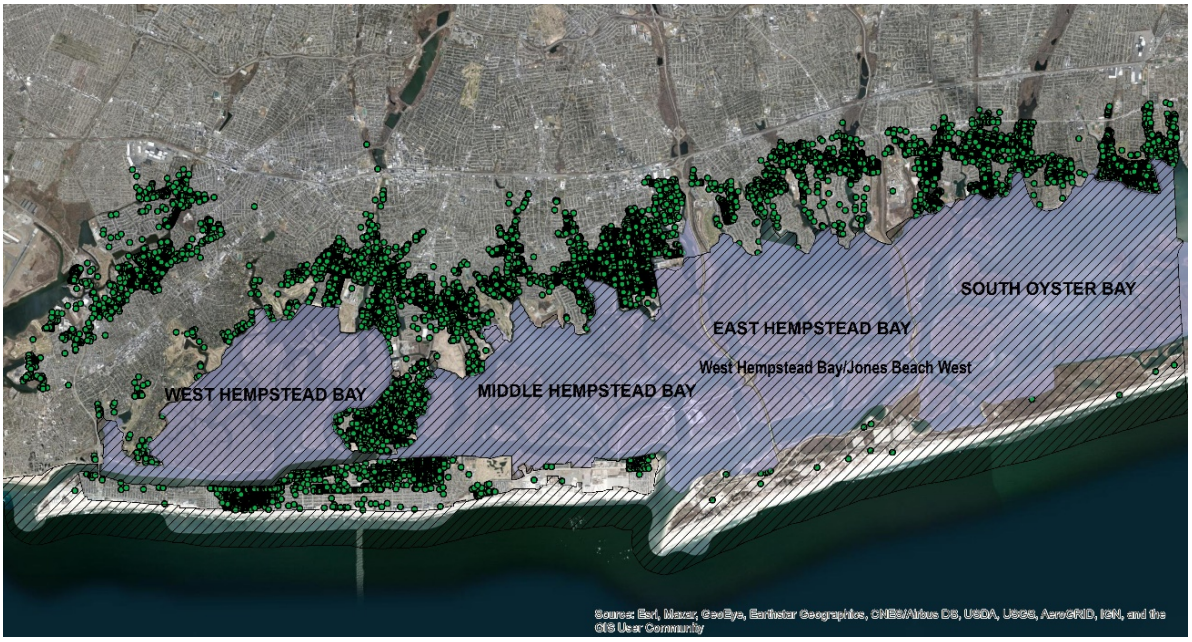


Figure 3. Map showing locations of NYS Significant Habitats (West Hempstead Bay, Middle Hempstead Bay, East Hempstead Bay, and South Oyster Bay; blue-colored areas) and Audubon IBA (West Hempstead Bay/Jones Beach West; cross hatched areas) in the Study Area. Structures that could be structurally elevated or dry flood-proofed are depicted by green dots.

B. Description of Fish and Wildlife Resources

There are three major ecological systems in the Study Area: estuarine, marine, and terrestrial, and their corresponding subsystems and communities (see Edinger et al. 2014). These include several estuarine subsystems and communities including, but not limited to, estuarine subtidal habitats, such as tidal creeks; estuarine intertidal habitats (including high and low salt marsh, salt shrub, and pannes); and estuarine cultural habitats such as hardened shorelines (rip-raps and revetments; see Edinger et al 2014). The Study Area also includes, to a lesser degree, marine cultural habitats, marine deep-water habitats, and marine intertidal habitats such as sandy beaches. Terrestrial communities are found on the mainland and the barrier islands.

1. Plants

The Service did not undertake any field surveys for plant species in the Study Area. The back bays support a variety of benthic macroalgae (seaweeds) and some submerged vascular plants (seagrasses). Eelgrass (*Zostera marina*) beds are an important component of the submerged aquatic vegetation (SAV) community, along with small amounts of widgeon grass (*Ruppia maritima*); sea lettuce (*Ulva lactuca*) is abundant in all areas, rockweed (*Fucus sp.*) is also common, and *Entermorpha sp.* is the common intertidal green alga in most locations. Vegetation on tidal marshes is dominated by cordgrasses (*Spartina alterniflora* and *S. patens*); maritime plants such as marsh elder (*Iva frutescens*) dominate areas above normal tidal influence. Dense shrubby stands of groundsel-bush (*Baccharis halimifolia*), bayberry (*Myrica pensylvanica*), poison ivy (*Toxicodendron radicans*), and black cherry (*Prunus serotina*) are interspersed with open sandy areas on dredged material islands. (USFWS 1997).

Terrestrial communities include the barrier beaches, where the primary or foredune is dominated by American beachgrass (*Ammophila breviligulata*) and various salt-tolerant annuals such as saltwort (*Salsola kali*), sea rocket (*Cakile edentula*), and seaside spurge (*Euphorbia polygonifolia*); the sheltered back sides of the dunes are vegetated with poison ivy, bayberry, and black cherry. Habitat within the essentially undeveloped John F. Kennedy Sanctuary includes a 40-ac. brackish pond, large expanses of tidal salt marsh, high dunes, and a coastal woodland dominated by black cherry (USFWS 1997).

Jones Beach Island also provides habitat for populations of several regionally rare plant species, including the federally listed seabeach amaranth (*Amaranthus pumilus*; threatened), red pigweed (*Chenopodium rubrum*), and seabeach knotweed (*Polygonum glaucum*); the interdunal swales support saltmarsh bulrush (*Scirpus maritimus*), salt-meadow grass (*Diplachne maritima*), Carolina clubmoss (*Diphasiastrum digitatum),* and golden dock (*Rumex maritimus*) (USFWS 1997).

Residential and commercial properties, as well as open spaces and parklands on the mainland likely consist of a mix of native and non-native perennial and annual grasses and flowers, shrubs,

and trees. We are not aware of any comprehensive inventories that characterize these habitats in the Study Area.

2. Avian Species

The Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703-712) implements four treaties that provide for international protection of migratory birds, which are a federal trust resource. The MBTA prohibits taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. Bald and golden eagles are afforded additional legal protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d). Unlike the ESA, neither the MBTA nor its implementing regulations at 50 Code of Federal Regulations (CFR) Part 21, provide for permitting of "incidental take" of migratory birds.

The Service did not undertake any field surveys for avian species in the Study Area. Avian data was obtained from the Service's Information for Planning and Conservation (IPaC) website (http://ecos.fws.gov/ipac/) and eBird (Cornell Lab of Ornithology at http://www.ebird.org). IPaC identified 72 species of migratory birds that may be found in the Study Area, as either migrants, permanent residents, or seasonal breeders (Appendix – IPaC Resource List). Three of these species – piping plover, red knot, and roseate tern – are federally listed (described further below in subsection 7). A number of these species are also listed by New York state as endangered, threatened, or special concern: golden eagle (*Aquila chrysaetos*; endangered), common tern (*Sterna hirundo*; threatened), least tern (*Sterna antillarum*; threatened), bald eagle (*Haliaeetus leucocephalus*; threatened), black skimmer (special concern), common loon (*Gavia immer*; special concern), red-headed woodpecker (*Melanerpes erythrocephalus*; special concern), golden-winged warbler (*Vermivora chrysoptera*; special concern), cerulean warbler (*Dendroica cerulea*; special concern), and the seaside sparrow (*Ammodramus maritimus*; special concern). Other state-listed species occur in the study area according to eBird data, including the NYS-endangered peregrine falcon (*Falco peregrinus*), the NYS-threatened upland sandpiper (*Bartramia longicauda*), and osprey (*Pandion haliaetus*) as a species of special concern (eBird 2021). Additionally, the Birds of Conservation Concern 2021 list (USFWS 2021b) identifies migratory bird species that could become candidates for listing under the ESA without additional conservation actions and therefore represent the Service's highest conservation priorities. Using the species identified in the Service's IPaC report for the Study Area, we identified a total of 32 Birds of Conservation Concern that may occur seasonally or year-round within the Study Area (USFWS 2021b; Appendix Table 1).

Many species of migratory birds have experienced population declines in recent decades, largely due to direct and indirect destruction and fragmentation of their habitats (Dunne 1989). These include species of shorebirds and seabirds, saltmarsh birds, waterfowl, and landbirds, all of which occur in the Study Area.

Many species of shorebirds and seabirds in the U.S. are suffering from declines in populations. The Atlantic Flyway Shorebird Business Plan (Atlantic Flyway Shorebird Initiative 2015), which was developed by numerous stakeholders including federal, state, and local governments, and private organizations under the leadership of the National Fish and Wildlife Federation, identifies hunting, predation, human disturbance, and habitat loss and change as some of the main threats to shorebirds. This plan recognizes these shorebird species of greatest conservation concern: American oystercatcher, semipalmated sandpiper, red knot, whimbrel (*Numenius phaeopus*), Wilson's plover (*Charadrius wilsonia*), marbled godwit (*Limosa fedoa*), piping plover, purple sandpiper (*Calidris maritima*), red-necked phalarope (*Phalaropus lobatus*), ruddy turnstone (*Arenaria interpres*), sanderling, snowy plover (*Charadrius nivosus*), American golden-plover (*Pluvialis dominica*), greater yellowlegs (*Tringa melanoleuca*), and lesser yellowlegs (*T. flavipes*). Except for the snowy plover, all of these species have been recorded in the Study Area (eBird 2021). The ocean beaches and back bay wetlands in the Study Area provide essential nesting and foraging habitats for a number of these shorebirds and seabirds, including the piping plover, least tern, common tern, black skimmer, willet, and American oystercatcher. It should also be noted that the black skimmer colonies within the Study Area represent two of only three nesting skimmer colonies in NY. Numerous migratory shorebirds can also be found during migratory periods in the estuarine communities of the Study Area and the marine and maritime beaches of the Long Beach and Jones Islands. Flocks of semipalmated sandpiper (*Calidris pusilla*), red knot, and sanderling (*C. alba*) have been documented (eBird 2021).

Historic and current losses of saltmarsh habitat have led to a number of saltmarsh bird species being recognized as species of conservation concern (NYSDEC 2015, International Union for Conservation of Nature 2021, USFWS 2021a). Sea-level rise continues to threaten saltmarsh birds as it reduces available saltmarsh habitat and may lead to an increased frequency of nest flooding – a major cause of nest loss for marsh-nesting species (Shriver et al. 2007, Gjerdrum et al. 2008, Bayard and Elphick 2011). The marsh islands and fringing marshes in the Study Area provide nesting habitat for a number of marsh-nesting birds, including saltmarsh sparrow (*Ammospiza caudacuta*), seaside sparrow, clapper rail (*Rallus longirostris*), American bittern (*Botaurus lentiginosus*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), yellow-crowned night-heron (*Nyctanassa violacea*), black-crowned night-heron (*Nycticorax nycticorax*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), and marsh wren (*Cistothorus palustris*).

Waterfowl are of conservation concern as mid-winter survey data from 1970-2003 indicated that various wintering waterfowl species have suffered population declines (Atlantic Coast Joint Venture 2005). This includes species such as American black duck (*Anas rubripes*), American wigeon (*Anas americana*), canvasback (*Aythya valisneria*), common goldeneye (*Bucephala clangula*), long-tailed duck (*Clangula hyemalis*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), and scoters (*Melanitta spp.*). The main threats to waterfowl are habitat loss,

fragmentation and degradation, contaminants, disease, invasive species, predation and harvest, human population and disturbance, and global climate change (Atlantic Coast Joint Venture 2005). Wintering waterfowl that have been observed in the Study Area include brant (Branta bernicla), American black duck, Canada goose (*Branta canadensis*), scaup (*Aythya* spp.), red-breasted merganser (*Mergus serrator*), mallard, American wigeon, bufflehead (*Bucephala albeola*), canvasback, and ruddy duck (*Oxyura jamaicensis*). Nesting waterfowl in the Study Area include Canada goose, mallard, American black duck, and gadwall (*Anas strepera*) (USFWS 1997).

Neotropical migrants are those bird species that breed in the U.S. and Canada and migrate south to overwinter in the neotropics. Neotropical migratory landbirds (e.g., migratory songbirds) make up a large proportion of neotropical migrants, as well as a large proportion of the avian community in the northeastern United States (Rappole 1995). Many neotropical migrants, including species of migratory songbirds, have suffered population declines in recent decades (Robbins et al. 1989, Sauer et al. 2019). Neotropical landbird migrants suffer mortality during all phases of their annual lifecycle; however, the greatest mortality for some species may occur during migratory periods (Holmes 2007). Numerous species of migratory neotropical migratory landbird species fulfill many of their life stages (i.e., breeding and migration) in the Study Area.

3. Amphibians and Reptiles

The Service did not undertake any field surveys for amphibians and reptiles in the Study Area. Reptiles and amphibians that are known to occur here include spotted salamander (*Ambystoma maculatum*), northern redback salamander (*Plethodon cinereus*), eastern spadefoot (*Scaphiopus holbrookii*), Fowler's toad (*Anaxyrus fowleri*), spring peeper (*Pseudacris crucifer*), bullfrog (*Rana catesbeiana*), green frog (*R. clamitans*), wood frog (*R. sylvatica*), southern leopard frog (*R. sphenocephala utricularius*), pickerel frog (*R. palustris*), common snapping turtle (*Chelydra s. serpentina*), eastern box turtle (*Terrapene c. carolina*), northern diamondback terrapin (*Malaclemys t. terrapin*), painted turtle (*Chrysemys picta*), Italian wall lizard (*Podarcis sicula*), northern water snake (*Nerodia s. sipedon*), northern brown snake (*Storeria d. dekayi*), common garter snake (*Thamnophis sirtalis*), eastern ribbon snake (*T. sauritus*), and eastern milk snake (*Lampropeltis t. triangulum*) (see NYSDEC 2007a). The eastern spadefoot, southern leopard frog, and box turtle are NYS special concern species.

Diamondback terrapin populations declined due to overharvesting in the late 1800s and early 1900s (NYSDEC 2021). In locations near the Study Area, terrapins were found to nest on sandy beaches and trails, as well as in shrubland, dune, and mixed-grassland habitats. Nesting typically occurs between early June and early August (Feinberg and Burke 2003). Major threats to terrapins include predation, pollution, development, commercial harvesting, and by-catch (Feinberg and Burke 2003, NYSDEC 2021).

4. Mammals

The Service did not undertake any field surveys for mammalian species in the Study Area. Common mammal species which would be expected in the Study Area include eastern cottontail rabbit (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), raccoon (*Procyon lotor*), and eastern gray squirrel (*Sciurus carolinensis*), opossum (*Didelphis virginiana*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), muskrat (*Ondatra zibethicus*), and house mouse (*Mus musculus*). Bat species likely include little brown bat (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans)*, red bat (*Lasiurus borealis*), and hoary bat (*L. cinereus*) (USFWS 1997). Introduced nuisance mammal species include Norway rat (*Rattus norvegicus*), feral cat (*Felis catus*), and feral dog (*Canis familiaris*) (USFWS 1997).

The harbor seal (*Phoca vitulina*) may occur in the bay waters of the Study Area. Other marine mammals that have been observed more widely in the New York Bight, but likely outside the Study Area, include humpback whale (*Megaptera novaeangliae*), bottlenose dolphin (*Tursiops truncates*), sperm whale (*Physeter microcephalus*; endangered) (USFWS 1997), blue whale (*Balaenoptera musculus*), fin whale (*B. physalus*), North Atlantic right whale (*Eubalaena glacialis*), common dolphin (*Delphinus delphis*), Cuvier's beaked whale (*Ziphius cavirostris*), minke whale (*B. acutorostrata*), pilot whale (*Globicephala melas*), and Risso's dolphin (*Grampus griseus*) (Tetra Tech and Smultea Sciences 2018).

5. Fish

The Service did not undertake any field surveys for fish species in the Study Area. The Essential Fish Habitat (ESH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) authorize the NOAA Fisheries to evaluate development projects proposed or licensed by federal agencies, including the Corps. If coastal development projects have the potential to adversely affect marine, estuarine, or anadromous species or their habitat, NOAA makes recommendations on how to avoid, minimize, or compensate these impacts.

The MSFCMA also establishes measures to protect EFH. The NOAA Fisheries must coordinate with other federal agencies to conserve and enhance EFH, and federal agencies must consult with the NOAA Fisheries on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. In turn, the NOAA Fisheries must provide recommendations to federal and state agencies on such activities to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency.

The NOAA Fisheries' website has an EFH Mapper that displays maps for essential fish habitat, habitat areas of concern, and EFH areas protected from fishing (https://www.habitat.noaa.gov/application/efhmapper/index.html). Species designated as EFH

species in the Study Area by the NOAA Fisheries include winter flounder (*Pleuronectes americanus*), little skate (*Leucoraja erinacea*), ocean pout (*Zoarces americanus*), Atlantic herring (*Clupea harengus*), Atlantic cod (*Gadus morhua*), pollock (*Pollachius pollachius*), red hake (*Urophycis chuss*), monkfish (*Lophius americanus*), windowpane flounder (*Scophthalmus aquosus*), winter skate (*Leucoraja ocellata*), white hake (*Urophycis tenuis*), bluefin tuna (*Thunnus thynnus*), sandbar shark (*Carcharhinus plumbeus*), skipjack tuna (*Katsuwonus pelamis*), white shark (*Carcharodon carcharias*), smoothhoud sharks (*Mustelus spp.*), sand tiger shark (*Carcharias taurus*), longfin inshore squid (*Doryteuthis pealeii*), Atlantic mackerel (*Scomber scombrus*), bluefish (*Pomatomus saltatrix*), Atlantic butterfish (*Peprilus triacanthus*), Atlantic surfclam (*Spisula solidissima*), scup (*Stenotomus chrysops*), summer flounder (*Paralichthys dentatus*), and black sea bass (*Centropristis striata*).

In general, the Study Area provides important spawning, foraging, and nursery habitat for many finfish species. Other species documented in the bay include weakfish (*Cynoscion regalis*), northern kingfish (*Menticirrhus saxatilis*), tautog (*Tautoga onitis*), Atlantic silverside (*Menidia menidia*), Atlantic menhaden (*Brevoortia tyrannus*), striped bass (*Morone saxatilis*), American sandlance (*Ammodytes americanus*), grey snapper (*Lutjanus griseus*), mummichog (*Fundulus heteroclitus*), striped killifish (*F. majalis*), and banded killifish (*F. diaphanus*) (USFWS 1997).

6. Estuarine Invertebrates

The Service did not undertake any field surveys for invertebrate species in the Study Area. The Service recommends that the Corps also coordinate with NOAA for further information on estuarine invertebrate resources in the Study Area and potential impacts resulting from implementation of the TSP alternative. All of the species mentioned below are a critical resource in the predator-prey relationships and food web dynamics of the freshwater-estuarine-marine continuum in the Study Area.

The back-bays support shellfish and crustaceans such as soft clam (*Mya arenaria*), northern quahog (*Mercenaria mercenaria*), bay scallop (*Argopecten irradians*), ribbed mussel (*Geukensia demissa*), and blue crab (*Callinectes sapidus*) (USFWS 1997). Other marine subtidal benthic macrofauna that may be found in the Study Area include tellin clam (Tellinidae spp.), sand dollar (*Echinarachnius parma*), amphipod species (e.g., *Protohaustarius deichmaae*, *Unicola irrorata*), and polychaete species (e.g., *Sthenelais limicola*, *Lumbrineris fragilis*, *Spiophanes bombyx*), all of which are found in habitats described as a medium, coarse-grain sand community (Steimle and Stone 1973).

Horseshoe crabs (*Limulidae*) are also found in the back-bays of the Study Area (USFWS 1997). Their eggs provide an important food source for migrating shorebirds. Horseshoe crabs are also important to medical research and pharmaceutical companies and are harvested by commercial fishermen to be used as bait in eel and conch fisheries. Coast-wide management of horseshoe crabs is essential to maintain healthy populations. The status of horseshoe crab populations

along the Atlantic coast is poorly understood, but horseshoe crabs continue to be harvested while their populations decline. The survival of this species is linked to the survival of the red knot, as horseshoe crab eggs are an important food source for this species.

The Study Area likely provides habitat for a number of insects, including several regionally- and state-rare species such as the checkered white butterfly, which has been observed in the nearby Jamaica Bay Wildlife Refuge along with 53 other species of butterflies and skippers (see USFWS 1997 for information on nearby Jamaica Bay and Breezy Point).

7. At-Risk, Threatened, and Endangered Species

Pursuant to section 7 of the ESA, the Corps is required to make a determination as to whether the proposed project "may affect" listed species and seek the concurrence from both the Service and the NOAA Fisheries. The Service's Information, Planning, and Conservation System (IPaC) (https://ecos.fws.gov/ipac/) contains information on listed species and should be used in the Corps' determination process along with consultation with the Service.

Should the project also necessitate consultation with the NOAA Fisheries, in accordance with the ESA, the appropriate contact is provided below:

Mr. Mark Murray Brown
Section 7 Coordinator
NOAA Fisheries
Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester, MA 01930
(978) 281-9328

Below is a brief discussion of the federally listed threatened and endangered species under the jurisdiction of the Service, and, where noted, under the jurisdiction of NOAA, that are likely to occur in the Study Area. Their status has been previously noted in this report, but more detailed information is provided below.

Piping Plover

The Atlantic Coast piping plover was listed as threatened pursuant to the ESA on January 10, 1986. Protection of the species under the ESA reflects the species precarious status rangewide. Threats to Atlantic Coast piping plovers in the breeding portion of their range identified in the 1996 Recovery Plan include habitat loss and degradation, disturbance by humans and pets, increased predation, and oil spills (USFWS 1996a).

The Atlantic Coast piping plover breeds on sandy, coastal beaches from Newfoundland to North Carolina. The ocean beaches within the Study Area support nesting piping plovers and are

monitored and managed each nesting season. The Town of Hempstead's Department of Conservation and Waterways monitor and manage the beaches in Point Lookout and Lido Beach; the NYSPRHP manages the beaches at Jones Beach State Park; the Town of South Oyster Bay manages the beaches at Tobay Beach. Piping plovers nest above the high tide line on coastal beaches, sandflats at the ends of sandspits and barrier islands, gently sloping fore dunes, blowout areas behind primary dunes, sparsely vegetated dunes, and washover areas cut into or between dunes. Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wracklines, and shorelines of coastal ponds, lagoons, or saltmarshes (USFWS 1996a).

Red Knot

The red knot is a medium-sized migratory shorebird. The rufa red knot subspecies was listed as threatened under the ESA on January 12, 2015, due to loss of both breeding and nonbreeding habitat; likely effects related to disruption of natural predator cycles on the breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies (mismatches) in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions.

Red knots breed in the Canadian arctic and winter mainly in Tierra del Fuego, northern Brazil, or Florida, and migrate through New York (as well as other places along the Atlantic Coast), to and from breeding sites in the spring and fall (USFWS 2014b). In North America, red knots are found along sandy, gravel or cobble beaches, tidal mudflats, saltmarshes, shallow coastal impoundments, and lagoons and peat banks. Red knots use sandy beaches during both the spring and fall migration (USFWS 2014b).

Within the Study Area, red knots utilize low-energy bay and ocean intertidal areas (e.g., tidal flats and tidal marshes) as stopover/foraging habitat during spring and fall migrations. Critical habitat for this species has been proposed in areas around Jones Inlet and Jones Beach State Park (*Federal Register* Vol. 86 (133); 37410-37668).

Roseate Tern

The roseate tern is a medium-sized, gull-like tern. The northeastern and Caribbean breeding populations of the roseate tern were designated, respectively, as endangered and threatened, on November 2, 1987. The northeastern population includes birds that breed (or formerly bred) along the Atlantic coast of the U.S. from North Carolina to Maine. The primary reasons for listing the northeastern population of the roseate tern as endangered were the concentration of the population into a small number of breeding sites and, to a lesser extent, a decline in total numbers (USFWS 1998).

Roseate terns are an exclusively marine bird, usually breeding on small islands and occasionally on sand dunes of barrier beaches. During the breeding season, birds typically forage over shallow coastal waters around the breeding colony. Roseate terns have historically nested in the Study Area (USFWS 1998).

Eastern Black Rail

The eastern black rail (*Laterallus jamaicensis*, or black rail) is a sparrow-sized secretive marsh bird that is the smallest and rarest of the rail species. On November 9, 2020, the black rail was listed as threatened under the ESA (85 *Federal Register* 63764). Black rails nest in very shallowly flooded, densely vegetated salt, brackish, and freshwater marshes. Populations have experienced an estimated annual decline of 9% and a total estimated loss of >90 percent since the 1990s (Atlantic Coast Joint Venture 2020). While there have been no known recent sightings of black rails in the Study Area (eBird 2021), there has been possible breeding evidence in the nearby intertidal bays of Suffolk County (NYDEC 2007b).

Northern Long-eared Bat

The northern long-eared bat is a wide-ranging species that is found in a variety of forested habitats in summer and hibernates in caves, mines, and other locations in winter. On January 14, 2016, it was listed as a threatened species under the ESA based on the impact of white-nose syndrome (WNS) on hibernating bat species, a fungal disease that has caused population declines of 90–100 percent where the disease has occurred. Declines in the numbers of northern long-eared bats are expected to continue as WNS extends across the species' range (USFWS 2016). There have been confirmed summer occurrences of northern long-eared bat in Nassau County (NYDEC 2018).

Seabeach Amaranth

Seabeach amaranth is an annual plant that grows on sandy ocean beaches. On April 7, 1993, it was listed as a threatened species under the ESA based upon the elimination of seabeach amaranth from two-thirds of its historic range, and continuing threats to the 55 populations that remained at the time (USFWS 1993). Threats to seabeach amaranth include trampling from off-road vehicles (ORV) and/or pedestrians; loss of habitat from development; beach stabilization practices that promote dense beach grass growth, burial of seed banks, and competition with perennial plants as beach habitat is stabilized (USFWS 1996b).

Seabeach amaranth grows within the Study Area on the maritime beach on Long Beach Island and Jones Island. Within the Study Area, seabeach amaranth is monitored and managed by the Town of Hempstead's Department of Conservation and Waterways and the NYSOPRHP.

Sea Turtles

The Service and the NOAA Fisheries share jurisdiction for sea turtles. In the marine environment, these species fall under the jurisdiction of NOAA. When nesting or loafing on land, they are under the jurisdiction of the Service. There are four threatened or endangered sea turtle species that may occur within the Study Area: loggerhead sea turtle (*Caretta caretta*; threatened), Kemp's ridley sea turtle (*Lepidochelys kempii*; endangered), green sea turtle (*Chelonia mydas*; threatened), and leatherback sea turtle (*Dermochelys coriacea*; endangered). These species are usually observed in estuarine or marine waters and, therefore, are typically the sole responsibility of NOAA. The following have been identified as threats to sea turtles: bycatch in commercial and recreational fisheries, capture during channel dredging, vessel collisions, marine pollution, and impingement on power plant intakes, among others (NOAA 2021). Threats to nesting sea turtles, eggs, and hatchlings include (but are not limited to): beach erosion, beach armoring, beach nourishment, artificial lighting, predators, invasive plants, beach driving, beach cleaning, human presence, inundation by tides, and poaching (NMFS and USFWS 1991; NMFS, USFWS, and SEMARNAT 2011).

Shortnose and Atlantic Sturgeons

There are two other federally listed species that may occur in the Study Area that are under the jurisdiction of the NOAA Fisheries: shortnose sturgeon (*Acipenser brevirostrum*; endangered) and Atlantic sturgeon (*Acipenser oxyrinchus*; endangered, threatened). Sturgeons are an anadromous species found in rivers, estuaries, and coastal waters along the Atlantic Coast. The shortnose sturgeon was originally listed as endangered on March 11, 1967, under the Endangered Species Preservation Act (80 Stat. 926; 16 U.S.C. 668 [a][c]) and remained when the ESA was enacted in 1973. Atlantic sturgeon is also listed as endangered. Specifically, Atlantic sturgeons that are spawned in rivers of the U.S. or are captive progeny of Atlantic sturgeon that spawned in the U.S. are listed under the ESA as five Distinct Population Segments (DPS). As of February 6, 2012, the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs were listed as endangered. The Gulf of Maine DPS is listed as threatened.

Species under Review for Federal Listing

Four species under review for federal listing under the ESA may be present in the Study Area. We note that species being evaluated for listing do not receive any substantive or procedural protection under the ESA, and the Service has not yet determined if listing of any of these four species is warranted. However, the Corps should be aware that these species are being evaluated for possible listing and may wish to include them in field surveys and/or impact assessments, particularly for projects with long-term planning horizons and/or long operational lives. Despite the current status of these species regarding listing decisions, each of these species is in decline range-wide for the East Coast: little brown bat (*Myotis lucifugus*), tri-colored bat (*Perimyotis subflavus*; NYSDEC species of concern), yellow-banded bumble bee (*Bombus terricola*), and monarch butterfly (*Danaus plexippus*). The monarch butterfly is a candidate species for listing

under the ESA. As a candidate species, it is not yet listed or proposed for listing. There are generally no section 7 of the ESA requirements for candidate species (see our Section 7 Questions and Answers on the monarch at https://www.fws.gov/savethemonarch/FAQ-Section7.html), but we encourage all federal agencies to take advantage of any opportunity they may have to conserve the species.

Saltmarsh Sparrow

The saltmarsh sparrow is a tidal marsh-obligate songbird that breeds in coastal states from Maine to Virginia, including in the Study Area (eBird 2021). Saltmarsh sparrows generally nest in high marsh habitat just above the mean high-water level. Due to the historic loss and degradation of salt marsh habitat, especially high marsh, as well as accelerated sea level rise, saltmarsh sparrows have experienced an 87 percent population decline since 1998 (Hartley and Weldon 2020). Although not federally listed, the Service has deemed the saltmarsh sparrow as an "at-risk" species, a designation for species that are candidates, petitioned, or proposed for listing under the ESA. Concentrated efforts are being made for the saltmarsh sparrow in an effort to preclude the need for listing and improve salt marsh habitat. The saltmarsh sparrow was included as a high priority species in the 2019 Salt Marsh Bird Conservation Plan (Atlantic Coast Joint Venture 2019), and the actions identified in this plan were further built on in the 2020 Saltmarsh Sparrow Conservation Plan. The Saltmarsh Sparrow Conservation Plan sets population and habitat targets at the state and regional levels to create sufficient high-quality habitat to support a long-term sustainable population of 25,0000 individuals (Hartley and Weldon 2020). The Service developed a Saltmarsh Sparrow Habitat Prioritization Tool to identify and rank salt marsh habitat patches within the species' breeding range (https://fws.maps.arcgis.com/apps/MapSeries/index.html?appid=1bc5b29be4ac43d8949b2941d2ce5174). Many of the salt marsh islands and tidal wetlands in the back bays of the Study Area contain salt marsh habitat patches highly ranked by the Prioritization Tool (Figure 3).

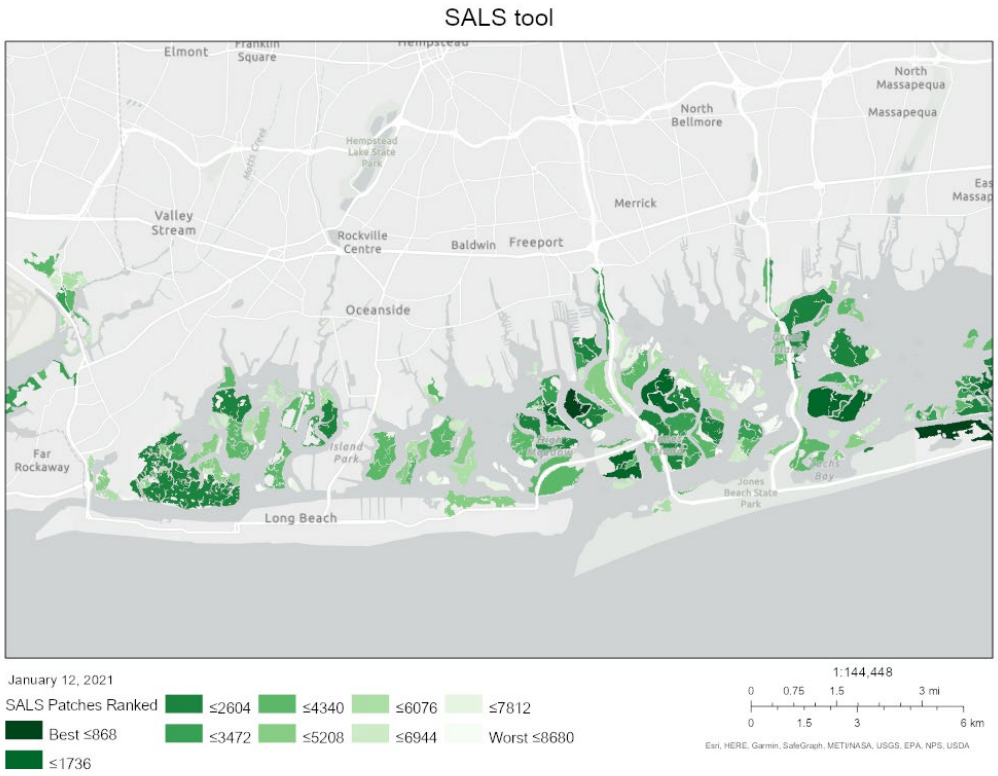


Figure 4. Saltmarsh Sparrow Habitat Prioritization Tool results for high quality salt marsh habitat patches in the Study Area, with lower numbers indicated the highest quality patches and the higher numbers indicating the poorest salt marsh habitat patches.

American Eel

The American eel (*Anguilla rostrata*) is a catadromous fish (migrates from freshwater to spawn in the sea), which uses different habitats throughout its life stages (USFWS 2015). Eels spawn in the Sargasso Sea where the eggs hatch into larvae and are transported on the currents towards the coast of the United States. As they drift, the larvae mature into glass eels which are 2-3 inches (in.) long and transparent. Glass eels enter into the estuaries and mature into elvers which are greater than 4 in. in length and begin to develop pigmentation. Elvers migrate into brackish waters and continue to develop while some migrate into streams, lakes, ponds, and rivers. Before the eels sexually mature, they are called yellow eels. It may take the eels another 3-40 years to reach maturation before they head back to the Sargasso Sea (USFWS 2015).

Species of Greatest Conservation Need

Since 2001, the Service has awarded State Wildlife Grants (SWG) for "the development and implementation of programs for the benefit of wildlife and their habitat, including species that are not hunted or fished…" To participate in the SWG program, as directed by Congress, the fish and wildlife resource agencies of each state, commonwealth, territory, and the District of

Columbia developed a Comprehensive Wildlife Conservation Plan (later referred to as a State Wildlife Action Plan or SWAP) for review and approval by the Service. All the SWAPs were submitted to the Service and approved by early 2006. These plans identify and describe species of greatest conservation need and include many species that have experienced significant population declines.

The Service recognizes that the State of New York has identified species of greatest conservation need as part of their SWAP. Many of those identified species overlap with species that are discussed in this report. *We seek recommendations from the NYSDEC on the particular species of greatest conservation need that they prefer addressed in the Final FWCA Report.*

C. Wetlands

Saltmarsh

Saltmarshes can be found throughout the back bays. The majority of the wetlands present in the Study Area are categorized as estuarine and marine deepwater, and estuarine and marine wetland. Of the nearly 8,000 ac. of tidal wetlands that existed in the Study Area in 1974, approximately 6,730 ac. remained by 2008 (see Cameron Engineering & Associates 2015). Almost all mainland salt marshes and associated wetland creeks in this area have been eliminated by bulkheading and filling, and there are no sizable tributaries entering the bays (NYDOS 1987). The Service has prioritized many of these wetlands relative to restoration of saltmarsh habitat for the saltmarsh sparrow. Restoration of wetlands would also benefit other species of shorebirds and wildlife including clapper rail, diamond back terrapins, Atlantic silversides, bluefish, and other species. Advancing conservation of these species are considered a planning objective for the purposes of this consultation.

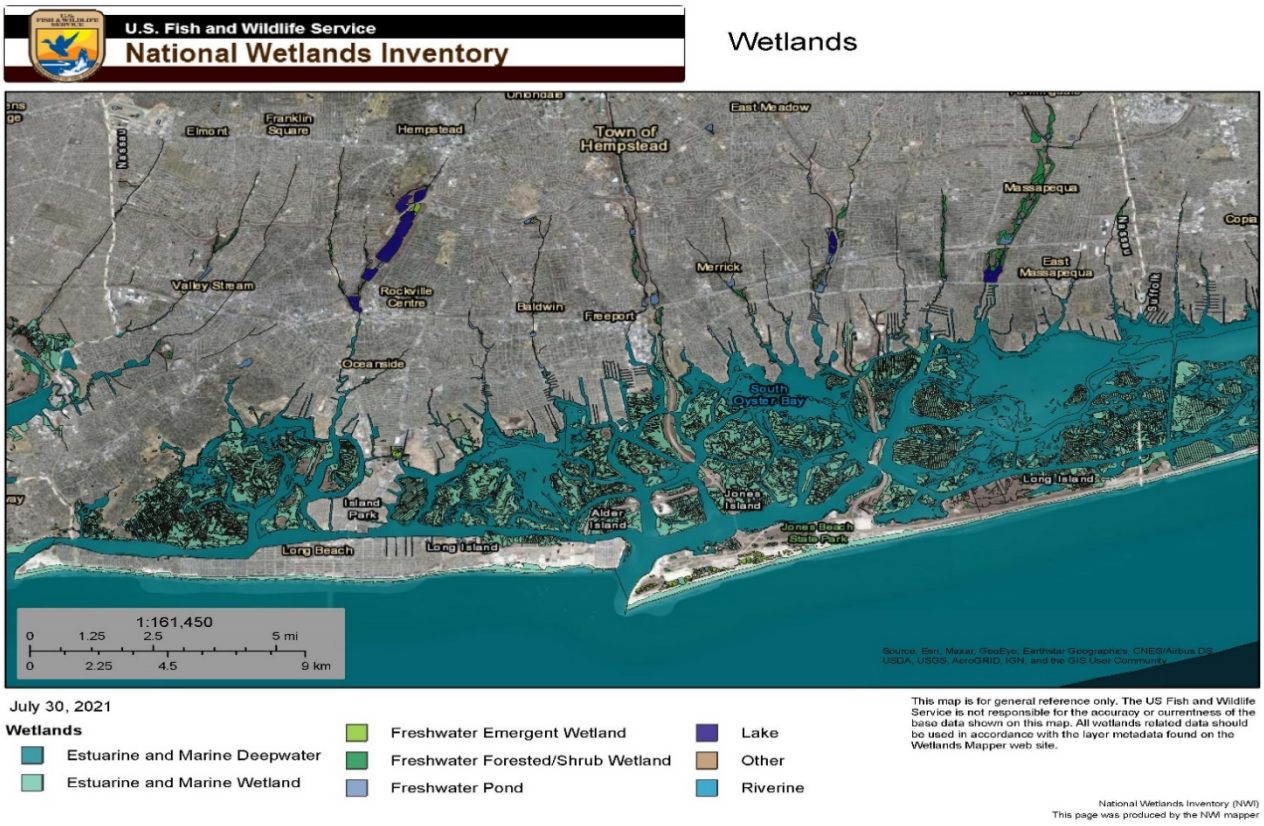


Figure 5. Federally designated Wetlands Present in the Proposed Project Area.

Saltmarshes are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries). Marshes are among the most productive communities known, providing important ecological services including wildlife habitat, shoreline erosion control, and water column filtration (Atlantic Coast Joint Venture 2019). They perform a variety of important functions that benefit both fish and wildlife resources such as spawning and nesting habitat for fish and wildlife. Saltmarshes also provide storm protection for human infrastructure through positive effects on wave attenuation and shoreline stabilization (Shepard et al. 2011). Coastal wetlands have been shown to reduce flooding by 35 percent and mitigate damages by 37 percent from large storms via localized wave attenuation and estuary-scale surge attenuation, which indicates that they mitigate storm flooding and associated costs via multi-scale processes (Fairchild et al. 2021). Wetlands in New Jersey avoided $625 Million in direct flood damages during Hurricane Sandy in 2012 (Narayan et al. 2017).

Freshwater Wetlands

Freshwater wetlands on the mainland are present mainly at the headwaters of several of the larger tributaries of the back bays. Like tidal marshes, freshwater wetlands provide habitat for a

variety of fish and wildlife resources while also providing ecological services for people. Historically, the Study Area contained more freshwater wetland habitat. However, due to conversion of wetlands to commercial or residential uses, many these wetlands were lost.

Invasive Plant Species

Invasive plants can be problematic as they can have negative impacts on native species and ecosystems. Invasive plant species may lower plant diversity by outcompeting native species (Charles and Dukes 2007, Hejda et al. 2009). The presence of invasive species may also lower wildlife diversity and species composition can be different in areas of high densities of invasive plants than in areas with native plants (Benoit and Askins 1999, Herrera and Dudley 2003, Burghardt et al. 2009).

Invasive plants may have other ecosystem effects, such as alterations of energy, nutrient, and hydrological cycles; changes to disturbance regimes; alterations to physical habitat; and impacts on climate and atmospheric composition (Charles and Dukes 2007). There were over an estimated 220 ac. of common reed (*Phragmites australis*) within the Study Area in 2005/2008. The average size of common reed stand in the Study Area was 4.6 ac., and there were eight wetland complexes that had common reed areas over 10 ac. (see Cameron Engineering & Associates 2015).

Other invasive plant species that occur in the Study Area include Asiatic Sand Sedge (*Carex kobomugi*), tree of heaven (*Ailanthus altissima*), purple loosestrife (*Lythrum salicaria*), oriental bittersweet (*Celastrus orbiculatus*), water chestnut (*Trapa natans*), brittle naiad (*Najas minor*), Japanese knotweed (*Fallopia japonica* var. Japonica), parrot feather watermilfoil (*Myriophyllum aquaticum*), fanwort (*Cabomba caroliniana*), Indian lotus (*Nelumbo nucifera*), black locust (*Robinia pseudoacacia*), Eurasian water-milfoil (*Myriophyllum spicatum*), border privet (*Ligustrum obtusifolium*), curly pondweed (*Potamogeton crispus*), yellow iris (*Iris pseudacorus*), multiflora rose (*Rosa multiflora*), Brazilian waterweed (*Egeria densa*), hydrilla (*Hydrilla verticillata*), garlic mustard (*Alliaria petiolata*), wineberry (*Rubus phoenicolasius*), Amur corktree (*Phellodendron amurense*), Amur honeysuckle (*Lonicera maackii*), periwinkle (*Vinca minor*), winged euonymus (*Euonymus alatus*), porcelain berry (*Ampelopsis brevipedunculata*), Chinese wisteria (*Wisteria sinensis*), Japanese honeysuckle (*L. japonica*), and Japanese stiltgrass (*Microstegium vimineum*) (NatureServe 2021). The top ten recorded invasive plant species in 2019 were as follows (from liisma.org): common reed (*Phragmites australis*), tree-of-heaven (*Ailanthus altissima*), mile-a-minute weed (*Persicaria perfoliata*), dasya red algae (*Dasya* sp.); Japanese knotweed (*Reynoutria japonica*), water cress (*Nasturtium officinale*), Chinese silver grass (*Miscanthus sinensis*), purple loosestrife (*Lythrum salicaria*), wineberry (*Rubus phoenicolasius*), and Japanese barberry (*Berberis vulgaris*).

VIII. Future Without Project Fish and Wildlife Resources

This report assumes that several ongoing and future projects and conservation efforts are likely to continue or be undertaken in the Study Area even if this project is not implemented. At the federal level, these projects include the Corps' Jones and East Rockaway Inlet Federal Navigation Channel Maintenance Projects and the Long Beach Island Coastal Storm Risk Management Project. The effects of the latter project on fish and wildlife resources was discussed in the Service's FWCA 2(b) Report for that project which is incorporated herein by reference (see USFWS 2014a).

In the absence of the TSP, it is also likely local communities would continue to participate in FEMA's Hazard Mitigation Program, and to seek funding to implement the New York Rising Community plans to reduce flooding effects and that they would apply for FEMA grants to fund structural elevations of residences at risk of flooding. A number of state and local efforts have been undertaken to improve estuarine habitats and to restore water quality in the Study Area. If this general trend in habitat restoration and water quality improvement continues, then the general condition of the back bays will improve. Federal, state, and local governments also continue to monitor and manage wildlife and their habitats on their properties and work cooperatively on issues related to endangered species and at-risk species recovery efforts.

In the without-project condition, erosional events and future storms are likely to occur. Natural features such as dunes and beaches would likely be shaped by these events and natural processes would occur to the extent possible along the developed and engineered ocean shoreline along most of Long Beach Island. Erosion and storms may directly threaten human structures such as the reconstructed City of Long Beach boardwalk and other infrastructure along the oceanfront, bay shorelines, and upland interior on both the barrier islands and mainland. If the elevation of the beach and dunes is lowered due to storms and erosion, their capability to provide storm protection may be reduced, which may expose the coastal communities to extensive property damage and loss. However, sand accretion due to storms may also occur. The marine intertidal system would naturally fluctuate in response to patterns and rates of shoreline accretion and erosion in the without project condition.

Due to limited open space on the mainland, the carrying capacity of those habitats will not increase substantially in terms of area; however, local initiatives to control invasive species may provide some modest increases in habitat availability or increase habitat quality.

Avian abundance and diversity on the mainland will likely continue to reflect trends typically seen in dense suburban habitats. As noted previously, a number of species of conservation concern rely on the saltmarsh for one or all of their life history. Their conservation will be dependent on efforts to protect, conserve, and restore that habitat.

IX. Other Environmental Conditions: Climate Change and Sea-Level Rise

The term "climate change" refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (Intergovernmental Panel on Climate Change 2007). Extensive analyses of global average surface air temperature, the most widely used measure of change, clearly indicate that warming of the global climate system has occurred over the past several decades (Intergovernmental Panel on Climate Change 2013). One very likely outcome of climate change is an accelerated rise in sea level. Measurements of global mean sea level indicate sea level has risen at an average rate of 1.7 millimeters (mm) per year from 1901 to 2010; at a faster rate of 3.2 mm per year from 1993 to 2010; and will exceed that rate during the 21st Century (International Panel on Climate Change 2013). Additional tidal flow from modest sea-level rise may have both beneficial and adverse impacts on restoration of coastal habitats that are difficult to predict without additional information (e.g., precise elevations of restoration sites, site-specific sedimentation/erosion rates, and predicted future current velocities) (USFWS 2007). Recently, sea-level rise in a 1,000 kilometers (km) reach of the Atlantic Coast from Cape Hatteras, NC, to Cape Cod, MA (which includes the HRE Feasibility Study Area), experienced three to four times higher sea-level rise rates than the global average (Sallenger et al. 2012). Many models of climate change project a shift to more intense individual storms and fewer weak storms in the North Atlantic Basin.

Long-term effects of climate change may impact coastal communities such as the communities in the Study Area. Climate change is expected to have impacts on oceans and estuaries beyond sea-level rise. The Intergovernmental Panel on Climate Change identified changes in water temperature and acidification of ocean water as other wide-reaching concerns resulting from climate change (Wong et al. 2014). Changes in water temperature may impact the distribution, abundance, and production of aquatic life (Scavia et al. 2002, Wong et al. 2014). As a result of warmer temperatures, some species may be pushed pole-ward, some may suffer from living in sub-optimal temperatures, while others may be lost entirely (Scavia et al. 2002, Wong et al. 2014). Acidification due to the absorption of increased atmospheric carbon dioxide could have impacts on the ocean's "calcifiers," such as shellfish, which may not be able to survive at higher acidity levels (Wong et al. 2014).

The effects of climate change will likely result in more localized impacts, as well. A concern for estuaries is the exacerbation of existing human pressures, such as eutrophication. For example, changes in climate may result in alterations of freshwater inputs, water temperature, sea level, and ocean exchange, which can make estuaries more vulnerable to eutrophication (Scavia et al. 2002). Other climate-related impacts to estuaries may include changes in water residence time, nutrient delivery, dilution, vertical stratification, phytoplankton growth rates, and sediment deposition/erosion balances due to changes in freshwater inflow, air temperatures, and precipitation patterns (Scavia et al. 2002, Wong et al. 2014).

X. Description of the Tentatively Selected Plan

The TSP includes non-structural features and possibly NNBFs that will be analyzed later. The non-structural measures include the structural elevation of potentially 14,183 residential structures to the modeled 1 percent Annual Exceedance Probability (AEP; 100-year storm return period) non-structural design water surface elevation, which includes intermediate sea level change projected to 2080. In addition, the plan includes dry floodproofing for potentially 2,667 industrial/commercial structures with vertical construction of 3 ft for floodproofing measures. Additional non-structural measures will be further analyzed during feasibility-level design to ensure a complete non-structural alternative is formulated. These additional non-structural measures include managed coastal retreat, i.e. acquisition or relocation of residential structures, coastal storm plans and preparedness, and national flood insurance program refinement.

At this time, the TSP does not include any environmental features specific to enhancing or restoring fish and wildlife habitat in the back bays. The TSP also does not include measures that would avoid, minimize, or compensate for impacts to fish and wildlife resources. As plans progress, we will continue to work with the Corps on incorporating environmental features and mitigative measures into the project plans, with a focus on meeting the fish and wildlife planning objectives outlined in Section V, above.

XI. Impacts

General Comments

The TSP identifies structures that may be eligible for participation in a program to implement structural elevations or dry floodproofing, but these are conceptual at this time as the project has not been authorized. Any authorized project would involve voluntary participation of property owners, so the degree of participation is unknown at this time. As the program is to be voluntary it is not possible to ascertain how the benefits and impacts will occur. It will be critical to understand the geographical context of these actions and density of actions on a finer scale. As noted above, the TSP also did not include NNBF plans, so wetlands that may be targeted for enhancement for flood control purposes have not been identified. Consequently, due to the status of the TSP planning, we approached this assessment very broadly, identifying impacts from structural elevations and dry floodproofing on a gross level. We also excluded any discussion on impacts resulting from NNBFs that may be included in the TSP at some future time.

Overall, we have determined several potential impacts of the TSP on the fish and wildlife resources including avian disturbance and mortality, potential run-off effects from elevated homes and yards, potential water quality issues with septic systems if they are not included in the structural elevation plans. The degree and intensity of these impacts would depend on the number of properties that participate in the structural elevations and dry floodproofing

construction activities. We expect that more potential impacts would be associated with structural elevations than dry flood proofing, as the former requires more land disturbance on properties that are more likely to be close to natural areas or waterbodies due to local zoning rules.

The TSP also mentions possible preparation of coastal storm plans and preparedness, and national flood insurance program refinement. We anticipate that these plans would likely not entail construction or modification of wetland habitats in the Study Area and therefore would not result in any adverse affects to fish and wildlife resources. As later drafts of this plan include more detail on these measures and ramifications for fish and wildlife resource, we will continue to consult with the Corps.

Structural Elevations

The structural elevations of primary residences proposed in the TSP may result in siltation of nearby waterways if there is lack of adequate sediment control at the construction site. Depending on the scale of the construction associated with elevating structures, the construction could result in the trampling or removal of vegetation, or existing vegetation could be buried by sediments, which consequentially may affect habitat for small mammals, birds, reptiles, and amphibians or pose a danger to nests and young. The use of heavy equipment for clearing and grubbing could result in soil compaction, the exposure of soil to contaminants, and erosion. Project-related construction could also cause potential noise disturbances higher than that of background residential activities. Many residential waterfront properties in the Study Area are located on small parcels of land, and construction activities may increase the risk of erosion on the coastline.

Invasive Species

A variety of invasive plant species occur in the Study Area, including large stands of common reed. The construction associated with elevating structures could result in the removal or disturbance of native or noninvasive vegetation. Ground disturbance related to construction has the potential for invasive species to gain a competitive advantage if revegetation is not conducted correctly. Construction equipment and machinery, if not properly cleaned and inspected prior to moving to another site, may transport invasive species from one sit to another.

Dredging

Dredging activities could be associated with construction of the yet to be determined NNBFs. In general, dredging activities can have multiple impacts including alteration of habitat and direct mortality of organisms, increased turbidity, resuspension of contaminants, and contribute to nutrient loading (see Knott et al. 2009). Adverse effects can begin at the base of the food chain, accounting for toxicity to phytoplankton and autotrophic bacteria (Nayer et al. 2004). Dredging

can also result in sediment resuspension, which can enhance the growth of water column bacteria and protozoa through release of nutrients. This establishes a pathway for organic contaminants to be accumulated by microorganisms and higher trophic animals such as filter feeding organisms (Latimer et al. 1999, Zarull et al. 1999). The degree of contaminant bioavailability is determined by '...the reactivity of each contaminant with the biological interface, the presence of other chemicals that may antagonize or stimulate uptake, and external factors such as temperature that affect the rate of biological or chemical reactions...' (Luoma 1983, as quoted in Eggleton and Thomas 2004).

Avian Species

Nesting birds, including saltmarsh nesting birds and neotropical migrant songbirds, typically occupy the Study Area between April and September. Migrants are typically present from March through late May and early September through mid-October. Resident species are present year-round.

Conducting construction activities during important biological windows can lead to disruption of breeding, feeding, and resting/staging behavior or destroy nests, eggs, or young as vegetation is removed during the process of elevating structures. Construction activities may result in sub-lethal effects due to temporary disturbance to resident birds and breeding migrants. Prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool and fail to hatch. Young nestlings rely on their parents to provide warmth or shade and may die from hypothermia or heat stress if adults are forced away from the nest for an extended period of time. Eggs and juveniles are also subject to greater predation risk while they are unattended. Some species could be displaced if construction activities are planned during breeding or migration periods. Other species that overwinter in wetlands may be disturbed and displaced should construction occur during the winter season.

Turtle Species

Habitat for diamondback terrapins along the creeks that have been bulkheaded in the Study Area is limited. If they are present along the shoreline in the areas where appropriate mitigation controls are not implemented nesting turtles, their nests, and/or overwintering turtles could be killed or otherwise disturbed.

Fish and Aquatic Invertebrates

Fish and aquatic invertebrates are vulnerable to impacts from upland runoff of sediments and from in-water dredging and fill placement activities. Localized turbidity plumes can have lethal and sublethal effects on benthos and fish. Suspended sediments can have direct impacts on fish, including hematological compensation for reduced gas exchange across gill surfaces; abrasion of epithelial tissue; packing of the gut with large quantities of ingested solids, which may have little

nutritive value; disruption of gill tissues (abrasion, clogging, increased activity of mucosa); and increased activity with a reduction of stored metabolic reserves (Profiles Research and Consulting Groups, Inc. 1980). Some of these impacts, such as the coating of gills, can cause mortality (O'Connor et al. 1976). Impacts may vary across species, but motile organisms, such as fish, appear to be the least affected by construction activities as they are able to move to avoid disturbances (Hurme and Pullen 1988).

Other direct impacts of sediments include the smothering of immobile benthic organisms, fish eggs, and non-motile fish larvae or adults (Stern and Stickle 1978). Sediment burial can delay hatching time or lower hatching success of the eggs of some species (Schubel and Wang 1973, Auld and Schubel 1978; Nelson and Wheeler 1997). The impacts of suspended sediment and sediment burial on benthic invertebrates includes mortality, decreased body condition, and changes in growth or development (Wilber and Clarke 2001, Greene 2002, Colden and Lipcius 2015). However, the impacts of sediment on fish and benthic invertebrates are varied across species and life stages, and some species such as bivalves can be somewhat silt tolerant (Sherk et al. 1974, Wilber and Clarke 2001).

In addition to direct effects, turbidity and suspended sediments may also impact fish and benthos in indirect ways. For example, suspended sediment can mask pheromones used by migratory fishes to reach their spawning grounds and impede their migration (Newcombe and MacDonald 1991). Suspended sediments may also impact aquatic organisms by creating anoxic water conditions (O'Connor et al. 1976) and/or decreasing light penetration (Stern and Stickle 1978). Studies have shown that turbidity and resulting shading and light scattering can have negative impacts on the ability of fish to detect prey and may hinder foraging efforts (Breitburg 1988, Benfield and Minello 1996). However, the influence of turbidity and light on foraging ability may vary among different sizes and types of fish; some groups of fish such as planktivores and fish larvae may benefit from turbid conditions (Wilber and Clarke 2001, Utne-Palm 2002).

Turbidity is a significant contributor to declines in aquatic organisms and is associated with trophic cascades and community changes due to alterations between predator–prey interactions, mortality, reduced physiological function and avoidance, and primary productivity (Henley et al. 2000, Chivers et al. 2013). Additionally, high sediment transport loads can have an abrasive quality and can scour periphyton, (a combination of algae, cyanobacteria, microbes and detritus attached to submerged surfaces, serving as a food source for various taxa), resulting in a reduced abundance of this resource (Henley et al. 2000). Sediment transport may carry polluted sediments downstream (Federal Interagency Stream Restoration Working Group 1998). Construction activities may result in resuspension of contaminated particulates.

Turbidity is considered the most important factor limiting fish habitat according to fishery biologists (Henley et al. 2000). Increases in turbidity will have negative effects on both benthic organisms and fish populations. Suspended solids can affect fish species at all stages of their life history, including breeding, spawning, and hatching of fish eggs. Severe turbidity can suffocate

eggs and aquatic insect larvae, fill in the pore space between bottom cobbles used by fish for reproduction (Federal Interagency Stream Restoration Working Group 1998), and reduce primary production. Increased turbidity and sedimentation can bury sediments utilized for spawning, delay hatch time of eggs (Schubel and Wang 1973) and can result in suffocation due to coating or abrasion of fish gills (O'Connor et al. 1976). Sedimentation may also result in the loss of specific substrate types required by species for reproduction.

Spawning horseshoe crabs could also be disturbed or disrupted by activities associated with future NNBF construction. Construction activities or vessels that create a wake could also disrupt horseshoe crab eggs.

XII. Cumulative Impacts

There are a number of other federal, state, and local projects within or adjacent to the Study Area that have recently occurred, are ongoing, or that are proposed that have had or will likely have adverse or beneficial impacts on habitats and fish and wildlife resources. Taken together, these projects will likely have cumulative impacts on fish and wildlife resources within and beyond the Study Area. The Service did not undertake a cumulative impacts analysis for the TSP, partly due to the lack of details, however, the abundance of projects within or adjacent to the Study Area that impact fish and wildlife resources underscores the importance of the Corps, as the federal action agency, in undertaking a comprehensive cumulative effects analysis. If this information has already been developed, we request that the Corps share it with us so that we can review it and include it in our final FWCA report.

XIII. Service Planning and Mitigation Recommendations

The mitigation planning recommendations given below are provided as measures related to the formulation and direction of the Study. As the project advances through the Corps' planning process, the Service considers on-going FWCA consultation as essential to our efforts to integrate fish and wildlife conservation into the planning process.

The Service's Mitigation Policy (Policy) (USFWS 1981) was developed to guide our preparation of recommendations on mitigating the adverse impacts of land and water developments on fish, wildlife, their habitats, and uses thereof. It assists both the Service and Corps by assuring consistent and effective recommendations, outlining policy for the levels of habitat mitigation needed, and the various methods for accomplishing mitigation for habitat losses associated with such projects. Overall, it allows federal action agencies to anticipate Service recommendations and to assist in preparation of mitigation measures early, thus avoiding delays and assuring equal consideration of fish and wildlife resources with other project features and purposes (Fish and Wildlife Coordination Act 16 USC 661-667[e]).

The Service's Policy instructs us to evaluate the habitat that may be adversely impacted and to determine whether it is of: 1) high value for evaluation species and is unique and irreplaceable on a national basis or in the eco-region; for which our goal would be no loss of existing habitat value, because these one-of-a-kind areas cannot be replaced; 2) high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the eco-region section; for which our goal is no net loss of in-kind habitat value; 3) high to medium value for evaluation species and is relatively abundant on a national basis; for which our goal would be no net loss of habitat value, while minimizing loss of in-kind habitat value; or 4) medium to low value for evaluation species; for which our goal would be to avoid or minimize losses of habitat value.

The habitats we would identify for mitigation purposes are fresh and saltwater wetlands, riparian habitats, and other open spaces that provide significant wildlife habitat value for impacts resulting from structural elevations or dry floodproofing. Our recommendations at this time do not apply to compensating for impacts to residential "backyard habitats" or commercial properties directly.

Below is a tentative resource category evaluation for existing Study Area habitats:

Vegetated saltmarshes: high value; no net loss of existing habitat value.
Riparian habitats – high value; no net loss of existing habitat value
Intertidal Mud and Sand flats – high value, no net loss of existing value
Open water wetlands – high to medium value, minimize loss

We anticipate that as the TSP is further developed, we will be better able to recommend the appropriate level of mitigation for these resource categories.

We provide the following mitigation planning recommendations to the Corps and NYSDEC:

1. **Sensitive Habitats**

As habitats in the Study Area have been lost and modified due to human development, we recommend that the Corps coordinate with the Service to identify and evaluate areas that could enhance habitat and address localized impacts of coastal flooding. Overall, we recommend that the Corps create fish and wildlife habitat as mitigation where appropriate throughout the Study Area and incorporate adequate monitoring and maintenance of these habitats to ensure that they remain high quality fish and wildlife resources for the life of the project. Suggested focus areas could include existing unbulkheaded shorelines and riparian habitats, saltmarsh habitat, and pond and lakes in the Study Area.

2. **Invasive Species**

In addition to recommendation #1, we recommend the removal of invasive species to create healthy stream and canal buffers that can properly absorb and assist in reduction of effects of

flood waters. We recommend that the Corps include in the TSP invasive species removal, as well as a plan to prevent the colonization or recolonization of invasive species over the life of the project. Measures should address the proper revegetation of disturbed habitat and the cleaning and inspection of construction equipment and machinery to aid in invasive species control. This effort should be incorporated into the next phase of feasibility planning that identifies areas for invasive species management, monitoring, and maintenance.

3. Environmental Contaminants

As noted previously, dredging and upland ground disturbance related to structural elevation and NNBF construction creates the possibility of remobilizing or introducing environmental contaminants into the environment. As a result, we recommend a pre-construction evaluation for potential sediment contaminants at these locations. If contamination is suspected testing and/or remediation may be necessary.

4. Time-of-Year Restrictions

As mentioned earlier, a number of shorebird, seabird, and neotropical migratory land bird species breed in the Study Area and many of these species have experienced population declines in recent decades, including the saltmarsh sparrow, which has been identified as an "at-risk" species. Time of year restrictions are often necessary to avoid direct mortality or other effects to these species resulting from construction activities. Therefore, the TSP should incorporate time of year restrictions when vegetation is going to be removed or altered such that the risk of mortality of eggs or chicks is present. As the project further develops, we recommend the Corps consider the time of year restrictions for non-structural and NNBF construction activities provided in the Appendix for bird species that occur in the Study Area (Appendix – Time of Year Restrictions). These were developed by the NYSDEC to assist potential applicants in designing their project timelines

The Service recommends that the Corps consult with the NOAA Fisheries and the NYSDEC to determine if time-of-year construction windows are warranted to protect migrating, overwintering, and/or spawning fish species or their habitats.

5. Improvements for Habitat Diversity and Value

In addition to controlling invasive plant species within the Study Area, the Corps should consider using native vegetation for residential remediation or replanting. Additionally, planting native pollinator-friendly plants during remediation may benefit imperiled pollinator species in the Study Area by restoring important pollinator habitat (see https://www.fws.gov/pollinators/).

The Corps should also consider working with homeowners and contractors to reduce or prevent home bird collisions by exploring use of bird friendly glass or glass retrofitting products that provide visual clues to birds. Up to 1 billion birds are killed annually due to collisions with

buildings, especially windows (see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/buildings-and-glass.php).

The Corps is also considering including NNBF as a component of the TSP to address coastal storm risks. NNBF are landscape features that are used in an integrated approach to flood risk management that can deliver a broad array of ecosystem services to local communities. By incorporating NNBF with the nonstructural measures of this project, the Corps can improve coastal resilience and address degraded back bay habitat within the Study Area with an ecosystem-based approach.

6. Turbidity and Suspended Sediment

Silt fence should be properly installed between disturbed areas and adjacent wetlands or other sensitive habitats. At least 6 in. (15 cm) of the toe of the silt fence should be buried parallel to the ground surface on the upslope side of the fence. The silt fence should be inspected following installation and after significant storm events to ensure that it is functioning properly. Silt fence is preferable to hay or straw bales as the bales represent a potential undesirable seed source in maritime shrubland or grassland habitats.

The use of soil erosion control measures, as approved by the local Soil Erosion Control District, should be installed prior to the grading of any projects. The use of jute matting, or other biodegradable natural material, is recommended for stabilizing all project construction areas. The matting should be maintained until the site has recovered sufficiently to avoid any soil movement within or off the proposed project site(s). The matting will also aid in improved stabilization of any planted materials.

The Service recommends that the temporary access routes and staging areas for all construction activities be restricted from sensitive habitat areas, including wetlands and riparian zones.

7. Threatened and Endangered Species Recommendations

Section 7(a)(2) of the ESA, requires all federal agencies, in consultation with the Secretary of the Interior, to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species. In consultation with the Service, the Corps shall utilize its authority to further the purposes of the ESA in the conservation and recovery of listed species and the ecosystems on which they depend. Further, 50 CFR 402.02 states that the "effects of an action" to be considered during consultation include "direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action...."

The Service will continue to coordinate with the Corps in their section 7(a)(2) ESA consultation process for this project, and recommendations for endangered and threatened species under the jurisdiction of the Service will be described in the Biological Opinion.

XIV. Service Conclusions

Section 2(b) of the FWCA requires that the final report of the Secretary of the Interior: 1) determine the magnitude of the impacts of the proposed projects on fish and wildlife resources; and 2) make specific recommendations as to measures that should be taken to conserve those resources. The Service has reviewed the current literature on the biological and physical processes influencing the marine, estuarine, and terrestrial communities of the Study Area. Since aspects of TSP planning will continue, we will have additional comments and input into the potential impacts and benefits of the project on fish and wildlife resources. We have made some planning recommendations at this time to help guide the Corps in identifying fish and wildlife enhancement opportunities and approaches to mitigation. Accordingly, as the Corps moves from feasibility level designs to final designs, they should continue to the coordinate with the Service as project designs are further developed so that the Service can provide revisions or supplements to this 2(b) report, as necessary.

XV. References

Atlantic Coast Joint Venture. 2020. Eastern Black Rail Conservation Plan for the Atlantic Coast. < https://www.acjv.org/documents/BLRA_Plan.pdf>. Accessed 31 August 2021.

_____. 2019. Salt Marsh Bird Conservation Plan for the Atlantic Coast. < https://www.acjv.org/documents/salt_marsh_bird_plan_final_web.pdf>. Accessed 9 August 2021.

_____. 2005. North American Waterfowl Management Plan: Atlantic Coast Joint Venture Waterfowl Implementation Plan. <https://acjv.org/planning/waterfowl-implementation-plan/>. Accessed 19 July 2021.

Atlantic Flyway Shorebird Initiative. 2015. Atlantic Flyway Shorebird Initiative Business Plan. <https://atlanticflywayshorebirds.org/documents/AFSI_Business_Plan_11_2017.pdf>. Accessed 19 July 2021.

Auld, A.H., J.R. Schubel. 1978. Effects of suspended sediment on fish eggs and larvae: a laboratory assessment. Estuarine and Coastal Marine Science 6(2):153-164.

Bayard, T.S., and C.S. Elphick. 2011. Planning for sea-level rise: quantifying patterns of Saltmarsh Sparrow (*Ammodramus caudacutus*) nest flooding under current sea-level conditions. The Auk 128(2):393-403.

Benfield, M.C., and T.J. Miniello. 1995. Relative effects of turbidity and light intensity on reactive distance and feeding of an estuarine fish. Environmental Biology of Fishes 46(2):211-216.

Benoit, L.K., and R.A. Askins. 1999. Impact of the spread of *Phragmites* on the distribution of birds in Connecticut tidal marshes. Wetlands 19:194-208.

Breitburg, D.L. 1988. Effects of turbidity on prey consumption by striped bass larvae. Transactions of the American Fisheries Society 117:72-77.

Burghardt, K.T., D.W. Tallamy, and W.G. Shriver. 2009. Impact of native plants on bird and butterfly biodiversity in suburban landscapes. Conservation Biology 23(1):219-224.

Cameron Engineering & Associates, LLP. 2015. Long Island Tidal Wetlands Trends Analysis. Prepared for the New England Interstate Water Pollution Control Commission. Woodbury, NY.

Charles, H., and J.S. Dukes. 2007. Impacts of invasive species on ecosystem services. Pages 217- 237 in W. Nentwig, editor. Biological Invasions. Springer, Berlin, Germany.

Chivers, D.P., F. Al-Batati, G.E. Brown, and M.C. Ferrari. 2013. The effect of turbidity on recognition and generalization of predators and non-predators in aquatic ecosystems. Ecology and evolution 3(2):268-277.

Colden, A., and R.N. Lipcius. 2015. Lethal and sublethal effects of sediment burial on the eastern oyster, *Crassostrea virginica*. Marine Ecology Progress Series 527:105-117.

Dunne, P., editor. 1989. New Jersey at the crossroads of migration. New Jersey Audubon Society, Franklin Lakes, NJ.

eBird. 2021. eBird: An Online Database of Bird Distribution and Abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, NY. <http://www.ebird.org>. Accessed 6 August 2021.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero, editors. 2014. Ecological communities of New York State. 2nd Edition. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Eggleton, J., and K.V. Thomas. 2004. A review of factors affecting the release and bioavailability of contaminants during sediment disturbance events. Environment International 30:973-980.

Fairchild, T.P., W.G. Bennett, G.S. Smith, B. Day, M.W. Skov, I. Möller, N. Beaumont, H. Karunarathna, and J.N. Griffin. 2021. Coastal wetlands mitigate storm flooding and associated costs in estuaries. Environmental Research Letters 16: 074034.

Federal Interagency Stream Restoration Working Group. 1998. Stream Corridor Restoration: Principles, Processes, and Practices. GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3.

Feinberg, J.A., and R.L. Burke. 2003. Nesting ecology and predation of diamondback terrapins, *Malaclemys terrapin*, at Gateway National Recreation Area, New York. Journal of Herpetology 37(3):517-526.

Gjerdrum, C., K. Sullivan-Wiley, E. King, M.A. Rubega, and C.S. Elphick. 2008. Egg and chick fates during tidal flooding of Saltmarsh Sharp-tailed Sparrow nests. The Condor 110(3):579-584.

Greene, K. 2002. Beach nourishment: a review of the biological and physical impacts. ASMFC Habitat Management Series No. 7. Atlantic States Marine Fisheries Commission, Washington, D.C.

Hartley, M.J. and A.J. Weldon, eds. 2020. Saltmarsh Sparrow Conservation Plan. Atlantic Coast Joint Venture. < https://www.acjv.org/documents/SALS_plan_final.pdf>. Accessed 6 August 2021.

Hejda, M., P. Pyšek and V. Jarošík. 2009. Impact of invasive plants on the species richness, diversity, and composition of invaded communities. Journal of Ecology 97: 393-403.

Henley, W.F., M.A. Patterson, R.J. Neves, and A. Dennis Lemly. 2000. Effects of sedimentation and turbidity on lotic food webs: a concise review for natural resource managers. Reviews in Fisheries Science 8(2):125-139.

Herrera, A.M., and T.L. Dudley. 2003. Reduction of riparian arthropod abundance and diversity as a consequence of giant reed (*Arundo donax*) invasion. Biological Invasions 5:167-177.

Holmes, R.T. 2007. Understanding population change in migratory songbirds: long-term and experimental studies of Neotropical migrants in breeding and wintering areas. Ibis 149(2):2-13.

Hurme, A.K., and E.J. Pullen. 1988. Biological effects of marine sand mining and fill placement for beach replenishment. Marine Mining 7:123-136.

Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II, and III to the Fourth Assessment. IPCC, Geneva, Switzerland.

Intergovernmental Panel on Climate Change. 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the IPCC. Cambridge University Press, Cambridge, United Kingdom and New York, NY.

International Union for Conservation of Nature. 2021. The IUCN Red List of Threatened Species. Version 2021-31. <www.iucnredlist.org>. Accessed 19 July 2021.

Knott N.A., J.P Aulbury, T.H. Brown, and E.L. Johnston. 2009. Contemporary ecological threats from historical pollution sources: impacts of large-scale resuspension of contaminated sediments on sessile invertebrate recruitment. Journal of Applied Ecology 46:770–781.

Latimer, J.S., W.R. Davis, and D.J. Keith. 1999. Mobilization of PAHs and PCBs from in-place contaminated marine sediments during simulated resuspension events. Estuarine Coastal and Shelf Science 49:577- 595.

Narayan, S., M.W. Beck, P. Wilson, C.J. Thomas, A. Guerrero, C.C. Shepard, B.G. Reguero, G. Franco, J.C. Ingram, and D. Trespalacios. 2017. The value of coastal wetlands for flood damage reduction in the Northeastern USA. Scientific Reports 7: 9463.

National Audubon Society. 2021. Important Bird Areas: West Hempstead Bay/Jones Beach West. <https://www.audubon.org/important-bird-areas/west-hempstead-bayjones-beach-west>. Accessed 15 July 2021.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991. Recovery Plan for U.S. Population of Atlantic Green Turtle. National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service, U.S. Fish and Wildlife Service, and SEMARNAT. 2011. Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), Second Revision. National Marine Fisheries Service. Silver Spring, MD.

NatureServe. 2021. iMapInvasives: NatureServe's online data system supporting strategic invasive species management. Version 3.0. <http://www.imapinvasives.org>. Accessed 6 August 2021.

Nayer, S., B.P. Goh, and L.M. Chou. 2004. Environmental impact of heavy metals from dredged and resuspended sediments on phytoplankton and bacteria assessed in in situ mesocosms. Ecotoxicology and Environmental Safety 59(3):349-369.

Nelson, D.A., and J.L. Wheeler. 1997. The Influence of Dredging-Induced Turbidity and Associated Contaminants Upon Hatching Success and Larval Survival of Winter Flounder, Pleuronectes americanus, a Laboratory Study. Final Report, Grant CWF No. 321-R, to Connecticut Department of Environmental Protection, by National Marine Fisheries Service, Milford, CT.

Newcombe, C.P., and D.D. Macdonald. 1991. Effects of suspended sediments on aquatic ecosystems. North American Journal of Fisheries Management 11(1):72-82.

New York State Department of Environmental Conservation. 2021. Diamondback Terrapin – Watchable Wildlife. < https://www.dec.ny.gov/animals/59652.html>. Accessed 5 August 2021.

_____. 2018. Northern Long-eared Bat Occurrences by Town. < https://www.dec.ny.gov/docs/wildlife_pdf/nlebtowns.pdf>. Accessed 11 August 2021.

_____. 2015. New York State Species of Greatest Conservation Need. <http://www.dec.ny.gov/animals/9406.html>. Accessed 19 July 2021.

_____. 2007a. New York State Amphibian and Reptile Atlas (1990-1999 or 1990-2007). < https://www.dec.ny.gov/animals/7140.html>. Accessed 5 August 2021.

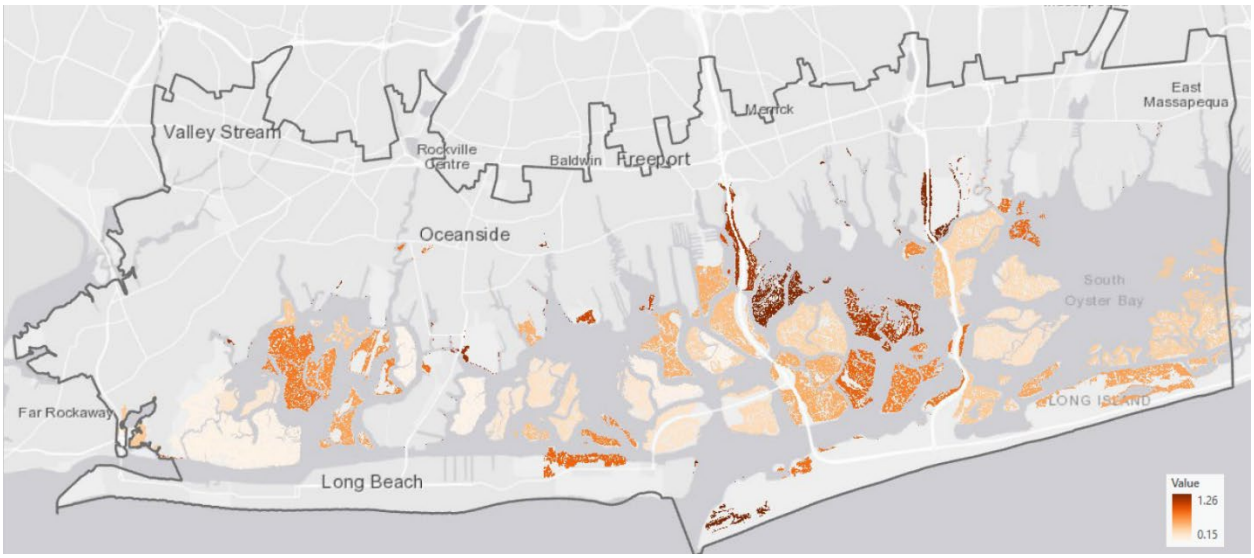
_____. 2007b. New York State Breeding Bird Atlas 2000. 2000 - 2005. Release 1.0. Albany, NY. < http://www.dec.ny.gov/animals/7312.html.> Accessed 31 August 202.

New York State Department of State. 1987. Significant coastal fish and wildlife habitats program. Habitat narratives for Silver Point Beach, West Hempstead Bay, Middle Hempstead Bay, Nassau Beach, East Hempstead Bay, Cedar Creek County Park, West End (Jones Beach State Park), Storehouse (Jones Beach State Park),

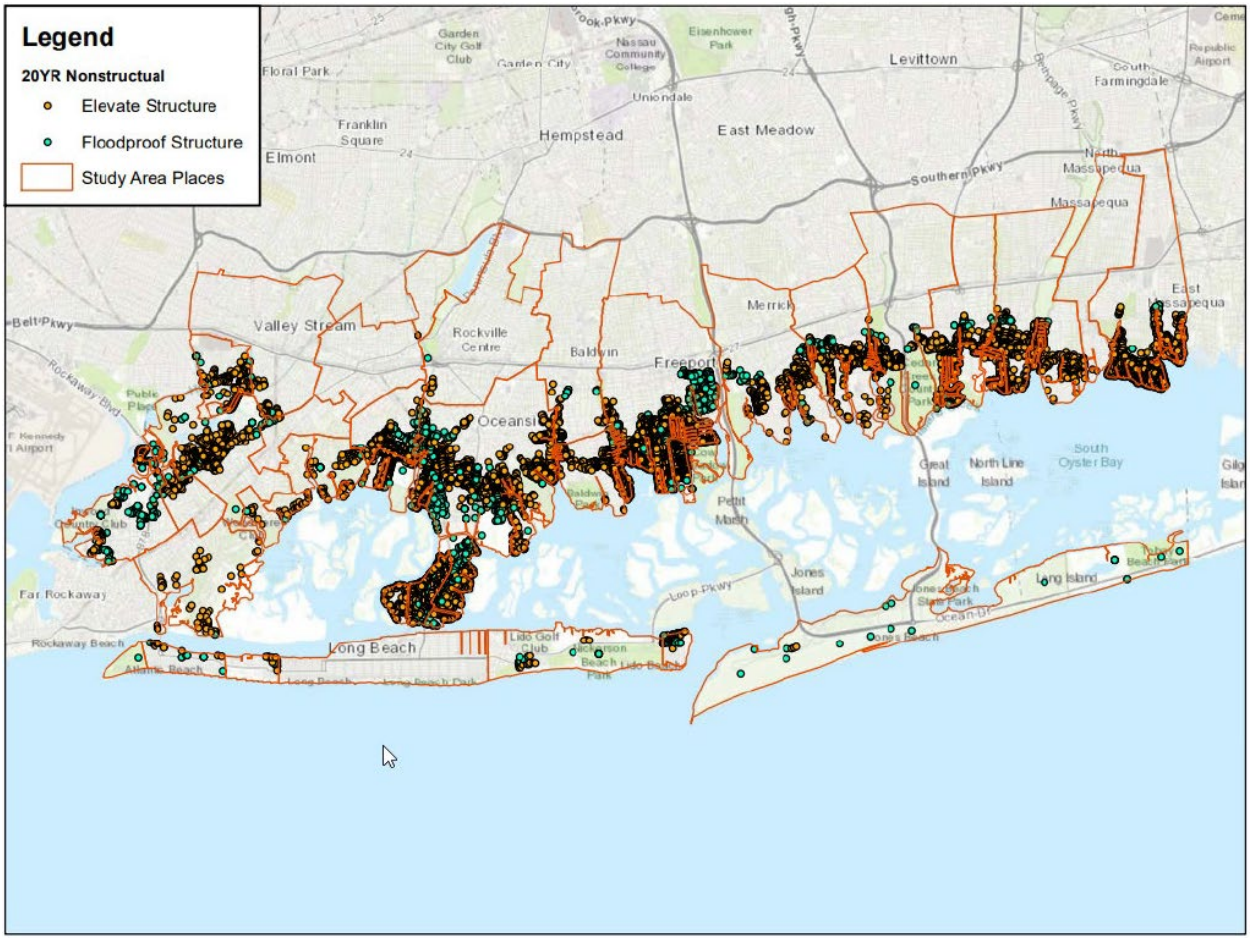
South Oyster Bay, Short Beach (Jones Beach State Park), Parking Lot 9 (Jones Beach State Park), and Tobay Sanctuary. New York State Department of State, Division of Coastal Resources and Waterfront Revitalization, Albany, NY.
O'Connor, J.M., Neumann, and J.A. Sherk, Jr. 1976. Lethal Effects of Suspended Sediments on Estuarine Fish. TP 76-20. U.S. Army Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, VA.
Pataki, G.E., and R.A. Daniels. 2001. Long Island South Shore Estuary Reserve Comprehensive Management Plan. New York State Department of State, Albany, NY.
Profiles and Research Consulting Groups, Inc. 1980. Seasonal Restrictions on Dredging Projects by NMFS in the Northeast. Volume 1. Prepared for the National Marine Fisheries Service under Contract SB 1408(a) -79-C-169.
Raciti, S.M., Marsellos, A.E., and Browne, J.P. 2020. Water Quality Trends in Hempstead Bay, NY from 1968 – 2017: A Historical Data Analysis and Report for Long Island's South Shore Estuary Reserve Western Bays. < https://lirpc.org/wp-content/uploads/2021/02/Historical-Data-Analysis-Hempstead-Bay-FINAL-VERSION-May-2020.pdf>. Accessed 9 August 2021.
Rappole, J.H. 1995. The ecology of migrant birds: a Neotropical perspective. Smithsonian Institution Press, Washington, D.C.
Robbins, C.S., J.R. Sauer, R.S. Greenberg and S. Droege. 1989. Population declines in North American birds that migrate to the Neotropics. Proceedings of the National Academy of Sciences 86:7658-7662.
Sallenger A.H., K.S. Doran, and P.A. Howd. 2012. Hotspot of accelerated sea-level rise on the Atlantic coast of North America. Nature Climate Change 2:884-888.
Sauer, J.R., D. K. Niven, J. E. Hines, D. J. Ziolkowski, Jr, K. L. Pardieck, J. E. Fallon, and W. A. Link. 2019. The North American Breeding Bird Survey, Results and Analysis 1966 - 2019. Version 2.07.2019. USGS Patuxent Wildlife Research Center, Laurel, MD.
Scavia, D., J.C. Field, D.F. Boesch, R.W. Buddemeier, V. Burkett, D.R. Cayan, M. Fogarty, M.A. Harwell, R.W. Howarth, C. Mason, D.J. Reed, T.C. Royer, A.H. Sallenger, and J.G. Titus. 2002. Climate change impacts on U.S. coastal and marine ecosystems. Estuaries 25(2):149-164.
Schubel, J.R., and D.P. Wang. 1973. The effects of suspended sediment in Northern Chesapeake Bay. Powder Technology 6:9-16.
Sea Duck Joint Venture Management Board. 2014. Sea Duck Joint Venture Strategic Plan 2014 - 2018. U.S. Fish and Wildlife Service, Anchorage, AK; Canadian Wildlife Service, Sackville, New Brunswick, Canada.
Shepard C.C., C.M. Crain, and M.W. Beck. 2011 The protective role of coastal marshes: a systematic review and meta-analysis. PLoS One 6(11): e27374.
Sherk, J.A., J.M. O'Conner, and D.A. Neumann. 1974. Effects of Suspended and Deposited Sediments on Estuarine Organisms, Phase II. Reference No. 74-02, National Research Institute, Solomons, MD.
Shriver, G.W., P.D. Vickery, T.P. Hodgman, and J.P. Gibbs. 2007. Flood tides affect breeding ecology of two sympatric sharp-tailed sparrows. The Auk 124(2):552-560.
Silverman, E.D., D.T. Saalfeld, J.B. Leirness, and M.D. Koneff. 2013. Wintering sea duck distribution along the Atlantic Coast of the Unites States. Journal of Wildlife Management 4(1):178-198.
Steimle, F.W., and R.B. Stone. 1973. Abundance and distribution of inshore benthic fauna of southwestern Long Island, NY. Vol. 673. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, WA.
Stern, E.M., and W.B. Stickle. 1978. Effects of Turbidity and Suspended Material in Aquatic Environments. Vicksburg: U.S. Army Corps of Engineers, Waterways Experiment Station. Technical Report D-78-21.
Tetra Tech and Smultea Sciences. 2018. Year 1 Annual Survey Report for New York Bight Whale Monitoring Aerial Surveys March 2017 - February 2018. New York State Department of Environmental Conservation, East Setauket, NY. Tetra Tech Contract C009926.
U.S. Fish and Wildlife Service. 2021a. Birds of Conservation Concern 2021. United States Department of the Interior, U.S. Fish and Wildlife Service, Migratory Birds, Falls Church, VA. <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>. Accessed 19 July 2021.
_____. 2021b. Information, Planning, and Conservation System. Environmental Conservation Online System. U.S. Fish and Wildlife Service, Geospatial Services, Denver, CO. <http://ecos.fws.gov/ipac>. Accessed 9 July 2021.
_____. 2016. Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-Eared Bat. Federal Register Vol. 81, No. 9, 50 CFR Part 17 [Docket No. FWS–R5–ES–2011–0024; 4500030113].

_____. 2015. American Eel Factsheet (*Anguilla rostrata*). U.S. Fish and Wildlife Service, Hadley, MA. < https://www.fws.gov/northeast/americaneel/pdf/American_Eel_factsheet_2015.pdf>. Accessed 6 August 2021.
_____. 2014a. Fish and Wildlife Coordination Act 2 (b) Report for the U.S. Army Corps of Engineers Long Beach Island, NY Coastal Storm Risk Management Study. Prepared for the New York District Corps of Engineers. U.S. Fish and Wildlife Service, Long Island Field Office, Shirley, NY.
_____. 2014b. Rufa Red Knot Background Information and Threats Assessment: Supplement to Endangered and Threatened Wildlife and Plants; Final Threatened Status for the Rufa Red Knot (Calidris canutus rufa) [Docket No. FWS-R5-ES-2013-0097;4500030113]. U.S. Fish and Wildlife Service, New Jersey Field Office, Pleasantville, NJ.
_____. 2007. Planning Aid Letter for the CRP on Corps' Draft Target Ecosystem Characteristics. U.S. Fish and Wildlife Service, New Jersey Field Office, Pleasantville, NJ.
_____. 1998. Roseate Tern Recovery Plan, Northeastern Population. First Update. U.S. Fish and Wildlife Service. Northeast Region, Hadley, MA.
_____. 1997. Significant Habitats and Habitat Complexes of the New York Bight Watershed. Hempstead Bays - South Oyster Bay Complex. U.S. Fish and Wildlife Service, Southern New England – New York Bight Coastal Ecosystems Program, Charlestown, RI.
_____. 1996a. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. U.S. Fish and Wildlife Service, Hadley, MA.
_____. 1996b. Recovery Plan for Seabeach Amaranth (*Amaranthus pumilus*). U.S. Fish and Wildlife Service, Southeast Region, Atlanta, GA.
_____. 1991. Northern Coast Areas Study: Significant Coast Habitats of Southern New England and Portions of Long Island, New York. Final Report. U.S. Fish and Wildlife Service, Southern New England – Long Island Coastal and Estuary Office, Charlestown, RI.
_____. 1981. U.S. Fish and Wildlife Service Mitigation Policy. Federal Register, Friday, January 23, 1981. 46:7644-7663.
Utne-Palm, A.C. 2002. Visual feeding of fish in a turbid environment: physical and behavioural aspects. Marine and Freshwater Behaviour and Physiology 35(1-2):111-128.
Wall and Associates, Inc., International Engineering and Development Corporation, STV Incorporated, P.W. Grosser Consulting, Inc., Long Island Analytical Laboratories, Inc. 2003. Final Environmental Impact Statement for the Arverne Urban Renewal Area (CEQR No. 02HPD004Q). Prepared for New York City Department of Housing Preservation and Development, New York, NY.
Wilber, D.H., and D.G. Clarke. 2001. Biological effects of suspended sediments: a review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries. North American Journal of Fisheries Management 21:855-875.
Wong, P.P., I.J. Losada, J.P. Gattuso, J. Hinkel, A. Khattabi, K.L. McInnes, Y. Saito, and A. Sallenger. 2014. Coastal systems and low-lying areas. Pages 361 – 409 in Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White, editors. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY.
Zarull, M.A., J.H. Hartig, and L. Maynard. 1999. Ecological benefits of contaminated sediment remediation in the Great Lakes Basin. Great Lakes Water Quality Board, Sediment Priority Action Committee. <https://scholar.uwindsor.ca/ijcarchive/542>. Accessed 15 July 2021.

Appendix



Appendix Figure 6. Marsh Vulnerability Index of study area based on measures of marsh stability (Unvegetated to Vegetated Wetland Ratio (UVVR)), marsh lost (Wetlands Trend Analysis 1978-2008), and marsh projected to be lost (difference in Sea Level Affecting Marshes Model (SLAMM) forecast for future wetlands) calculated at the marsh complex scale.



Appendix Figure 7. Locations of proposed nonstructural measures in study area of Tentatively Selected Plan (not including Long Beach).

Appendix Table 1. Migratory birds on the Birds of Conservation Concern 2021 list (USFWS 2021) that occur in the Study Area as identified by the Information for Planning and Conservation (IPaC) website

Birds of Conservation Concern 2021	Scientific Name	Birds of Conservation Concern 2021	Scientific Name
American Oystercatcher	*Haematopus palliatus*	Least Tern	*Sterna antillarum*
Band-rumped Storm-petrel	*Oceanodroma castro*	Lesser Yellowlegs	*Tringa flavipes*
Black Skimmer	*Rynchops niger*	Long-eared Owl	*Asio otus*
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Manx Shearwater	*Puffinus puffinus*
Bobolink	*Dolichonyx oryzivorus*	Prothonotary Warbler	*Protonotaria citrea*
Buff-breasted Sandpiper	*Calidris subruficollis*	Purple Sandpiper	*Calidris maritima*
Canada Warbler	*Cardellina canadensis*	Red-headed Woodpecker	*Melanerpes erythrocephalus*
Cerulean Warbler	*Dendroica cerulea*	Ruddy Turnstone	*Arenaria interpres morinella*
Common Tern	*Sterna hirundo*	Rusty Blackbird	*Euphagus carolinus*
Cory's Shearwater	*Calonectris diomedea*	Seaside Sparrow	*Ammodramus maritimus*
Dunlin	*Calidris alpina arcticola*	Semipalmated Sandpiper	*Calidris pusilla*
Evening Grosbeak	*Coccothraustes vespertinus*	Short-billed Dowitcher	*Limnodromus griseus*
Golden-winged Warbler	*Vermivora chrysoptera*	Snowy Owl	*Bubo scandiacus*
Gull-billed Tern	*Gelochelidon nilotica*	Whimbrel	*Numenius phaeopus*
Hudsonian Godwit	*Limosa haemastica*	Willet	*Tringa semipalmata*
Kentucky Warbler	*Oporornis formosus*	Wood Thrush	*Hylocichla mustelina*

Appendix – IPaC Resource List

IPaC U.S. Fish & Wildlife Service

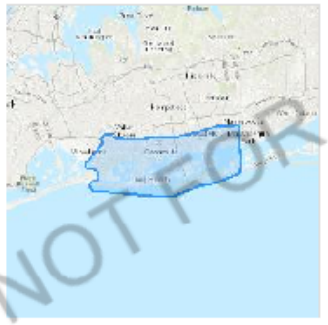
IPaC resource list

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

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

Location

Nassau, Queens, and Suffolk counties, New York



Local office

Long Island Ecological Services Field Office

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

340 Smith Road
Shirley, NY 11967-2258

Appendix – Time of Year Restrictions

Breeding Season Dates

The table on the following pages was compiled by Gordon M. Meade as an aid to Atlasers in their field surveying. The data on which it is based were derived from Forbush (1929), Bull (1974), and Harrison (1978). Additional data submitted by surveyors and Regional Coordinators have been incorporated into it. Information on the Canvasback and Brewer's Blackbird is also added, but the two exotic parakeets are omitted as are the hybrids. This table is still incomplete, however, because data on breeding in New York are minimal or lacking for many species. Species names and taxonomic order were updated according to the Federation of New York State Birds Clubs' 1999 *Checklist of the Birds of New York State*.

The "Egg dates" are the earliest and latest dates within which eggs have been found for each species. The "Incubation period" refers to the period during which each species incubates and hatches its clutch of eggs.

The "Nestling period" is the time during which the young bird is dependent on its parents for survival. Its length varies depending on several factors, including whether the species is altricial or precocial. The young of some species may remain with their parents after fledging and achieving independence. Because severing contact from the parents is a gradual process with many species, the times given for this period are necessarily approximations.

The dates given for "Unfledged juveniles" are those within which young have been found in the nest (altricial), and both in the nest and after they have left it (precocial) but before they are able to fly. Those dates in the table for "Fledglings" are the periods within which young have been found that are able to fly. Dates for "Unfledged juveniles" can be earlier than those for "Egg dates" because some data are incomplete, certain species may have more than one brood during the season, some single-brooded species replace broods if they are lost, and there is often a differential in time within a species as to when it commences egg laying. For some species only single dates rather than a period are known.

Appendix – Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

August 10, 2020

Angie Sowers, Ph.D.
U.S. Army Corps of Engineers
Baltimore District - Planning Division
Civil Project Development Branch
2 Hopkins Plaza
10-E-04
Baltimore, MD 21201

Dear Dr. Sowers:

This is in response to your August 4, 2020, request for comments on the Draft Purpose and Need Statement (Draft Statement; enclosed) for the U.S. Army Corps of Engineers' (USACE) project entitled, *"Nassau County Back Bays, New York, Coastal Storm Risk Management Feasibility Report."* These comments are provided pursuant to the National Environmental Policy Act (42 U.S.C.; 4321 et seq), and in support of the development of a Fish and Wildlife Coordination Act 2(b) Report (FWCAR) pursuant to the Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended; 661 et seq). In regard to the FWCA consultation and preparation of a FWCAR, we anticipate finalizing a transfer of funding agreement with your office in the near future.

U.S. Fish and Wildlife Service Comments

In providing feedback to this request, we were guided by several documents including the USACE's *"North Atlantic Coast Comprehensive Study (NACCS): Resilient Adaptation to Reducing Risk Main Report"* (USACE 2015), National Oceanic and Atmospheric Administration (NOAA) and USACE Infrastructure Systems Rebuilding Principles (NOAA and USACE 2013), the U.S. Fish and Wildlife Service's (Service) report to the USACE NACCS entitled, *"Biological Resources and Habitats Vulnerable to Sea Level Rise and Storm Activity in the Northeast United States: Planning Aid Report"* (USFWS 2014), and the Atlantic Coast Joint Venture's (ACJV) *Salt Marsh Bird Conservation Plan* (https://www.acjv.org/documents/salt_marsh_bird_plan_final_web.pdf).

The Draft Statement currently lists residences, businesses, infrastructure, services, etc., that may be threatened by storms and sea level rise in the planning area. In terms of the natural environment it only mentions, "*…a degraded back bay ecosystem…."* To address this deficit, we recommend that the Draft Statement similarly identify the ecosystems, habitats, and species

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

October 1, 2020

Mr. Scott Sanderson
Project Manager
U.S. Army Corps of Engineers
Philadelphia District
Planning Division-Coastal Section (CENAP–PL–PC)
100 Penn Square East, Wanamaker Building
Philadelphia, PA 19107–3390

Dear Mr. Sanderson:

This is in response to the U.S. Army Corps of Engineers' (USACE or Corps) Notice of Intent (NOI) to prepare an Integrated Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*) (NEPA) for the Corps' project entitled, *"Nassau County Back Bays, New York, Coastal Storm Risk Management (CSRM) Feasibility Study"*[*Federal Register* (FR) Vol. 85, No. 176 dated September 10, 2020] (NCBB Study or Feasibility Study). The NCBB Study is one of nine feasibility studies that are underway by several other Corps' Districts in the Northeast as part of a North Atlantic Coast Comprehensive Study (NACCS; see USACE 2015).

AUTHORITY

The U.S. Fish and Wildlife Service (Service) is commenting on the NOI as part of our statutory responsibilities pursuant to the NEPA. These comments do not preclude additional comments on forthcoming environmental documents. Our comments are also provided pursuant to the Fish and Wildlife Coordination Act (48 Stat.401; 16 U.S.C. 661 *et seq.*) (FWCA), the Endangered Species Act (87 Stat. 884, as amended; l6 U.S.C. 1531 *et. seq.*) (ESA), the Migratory Bird Treaty Act (40 Stat. 755; 16 U.S.C. Section 703-712), the Clean Water Act (86 Stat. 816, 33 U.S.C. 1344 *et seq.*) (CWA), the Emergency Wetlands Resource Act (P.L. 99-645; 100 Stat. 3582), the National Wildlife Refuge System Improvement Act, as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd - ee), Executive Order (EO) 11988, Floodplain Management (May 24, 1977; 42 FR 26951), and EO 11990, Protection of Wetlands (May 24, 1977; 42 FR 26961).