# APPENDIX B

## ENDANGERED SPECIES ACT COMPLIANCE DOCUMENTS

# APPENDIX B

## USFWS BIOLOGICAL ASSESSMENTS
## &
## NOAA COORDINATION

# B.1 INTRODUCTION

## B.1.1 PURPOSE AND OBJECTIVES OF THE BIOLOGICAL ASSESSMENT

This BA has been prepared in accordance with requirements identified in the Endangered Species Act (ESA) of 1973, to identify and discuss potential impacts to Federally listed threatened and endangered (T&E) species caused by the U.S. Army Corps of Engineers (USACE), New York District activities associated with implementation of alternatives for shore protection and coastal storm risk management for the south shore of Long Island, New York, from Fire Island to Montauk Point (Figure B-1). T&E species include those species Federally listed and protected by the U.S. Department of the Interior, Fish and Wildlife Service (USFWS) under the ESA.

In accordance with Section 7(a)(2) of the ESA, as amended, Federal agencies are required to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of any habitat of such species determined to be critical unless an exemption has been granted. Additionally, a Biological Assessment (BA) must be prepared if listed species or critical habitat may be present in an area to be impacted by a "major construction activity." A major construction activity is defined at 50 CFR §402.02 as a construction project (or an undertaking having similar effects) which is a major Federal action significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332(2)(C)).

### B.1.1.1 OBJECTIVE FOR THIS BA

This BA will facilitate the preparation of the Environmental Impact Statement (EIS) that will identify and evaluate potential environmental impacts associated with the proposed Project and will maintain compliance with Section 7(a)(2) of the ESA. The BA is designed to provide the USFWS with the required information for their assessment of the effects of the proposed Project on Federally listed endangered and threatened species.

Specific objectives of this BA are to:

1. Ensure Project actions do not contribute to the loss of viability of T&E species;

2. Comply with the requirements of the ESA, as amended, that Project actions not jeopardize or adversely modify critical habitat for Federally listed T&E species;

3. Analyze the effects of implementation of Project actions on Federally listed T&E species;

4. Recommend impact avoidance, minimization, and measures to offset impacts to Federally listed T&E species; and,

5. Provide biological input to ensure District compliance with the NEPA and the ESA.


**Figure B-1. EIS Study Area**

## B.2 PROJECT AREA DESCRIPTION

As shown on Figure B-1, the EIS Study Area extends from Fire Island Inlet east to Montauk Point along the Atlantic Coast of Suffolk County, Long Island, New York. The majority of Fire Island lies within the legislative boundaries of the Fire Island National Seashore (FIIS). The Study Area includes the barrier island chain from Fire Island Inlet to Southampton inclusive of the Atlantic Ocean shorelines, and adjacent back-bay areas along Great South, Moriches, and Shinnecock Bays. The Study Area continues to the east including the Atlantic Ocean shoreline along the mainland of Long Island extending from Southampton to Montauk Point. This area includes the entire Atlantic Coast of Suffolk County covering a shoreline length of approximately 83 miles. The Study Area also includes over 200 additional miles of shoreline within the estuary system. The Study Area includes areas on the mainland that are vulnerable to flooding, which generally extend as far landward as Montauk Highway, for an approximate area of 126 square miles.

This Study Area represents a complex mosaic of ocean fronting shorelines, barrier islands, tidal inlets, estuaries, and back bay mainland area (see Section B.4 for a general discussion of the ecosystems and habitats). The Study Area functions as an interconnected system driven by large scale processes with respect to hydrodynamic and sediment exchange, supporting diverse biological and natural resources. Within the Study Area, ocean shoreline sand generally moves east to west alongshore, in response to waves, and currents during normal conditions and during storms. This alongshore movement of sand maintains the prevailing shoreline conditions. In addition to alongshore movement, sediment is also exchanged in the cross-shore direction, through erosion and accretion of the beach and dune, exchange of sand through tidal inlets, and during large storm events through the episodic transport of sand over the island through overwash or breaching.

Over the years, the Study Area has become increasingly developed with extensive development on portions of the barrier island and in the mainland floodplain. As development has increased over the past 75 years, activities have been undertaken, to provide for and protect infrastructure in the area, and to improve navigation in the area. These past activities have included inlet stabilization, construction of jetties and groins, seawalls, and revetments, beachfill, beach scraping, breach closures, channel dredging in the inlets and bays, bayside bulkheading, and ditching of wetlands for mosquito control.

These activities have been undertaken to address localized problems, and often have been implemented without consideration of regional effects. Collectively, these activities have dramatically altered the existing natural coastal processes. As a result, the area is not functioning as a natural, sustainable system. This leaves over 15,000 structures at risk to major damages from coastal storms such as hurricanes and nor'easters. This risk will continue to grow with continued development, continued erosion, and sea level rise.

The Study Area also includes portions of the Towns of Babylon, Islip, Brookhaven, Southampton and Easthampton, as well as 12 incorporated Villages, the entirety of FIIS, the Poospatuck Indian Reservation, and the Shinnecock Indian Reservation. The Study Area contains over 46,000 buildings, including 42,600 homes and more than 3,000 businesses. There are 60 schools, 2 hospitals, and 21 firehouses and police stations in the Study Area. Of the buildings within the Study Area, more than 9,000 fall within the modeled 100-yr floodplain (storm with a 1 percent probability of occurring in any given year, based upon current modeling). It is estimated that over 150,000 people reside in the coastal 100-year floodplain of the South Shore of Suffolk County, which represents 10 percent of the population of Suffolk County (USCB 2010). The Study Area is also a popular summer recreation area. In addition to the residential population, there is a large seasonal influx of tourists who recreate in this area, and businesses which support the year round and seasonal population of the area.

Commercial, residential, public and other infrastructure in the Study Area are subject to economic losses (or damages) during severe storms. The principal problems are associated with extreme tides and waves that can cause extensive flooding and erosion both within barrier island and mainland communities. Breaching and/or inundation of the barrier islands also can lead to increased flood damages, especially along the mainland communities bordering Shinnecock, Moriches and Great South Bays.

## B.3 PLANNING OBJECTIVES AND RECOMMENDED ALTERNATIVE

The New York District (District) is conducting a comprehensive analysis of the environmental impacts of alternatives for shore protection and risk management for the south shore of Long Island, New York, from Fire Island to Montauk Point. In support of the preparation of the Fire Island to Montauk Point Environmental Impact Statement (FIMP EIS), the District, in cooperation with Federal, state and local agencies, conducted a study to evaluate several risk management plans for the Study Area (USACE 2009). That Study focused on identifying a long-term solution to reduce the risk of coastal storm damages in the Study Area in a manner which considers the risks to human life and property, while maintaining, enhancing, and restoring ecosystem integrity and coastal biodiversity.

Following Hurricane Sandy on October 29-30, 2012, the New York District has continued to work collaboratively to refine the proposed action that was identified in the Reformulation Study to address the agency missions and respond to lessons learned during Hurricane Sandy. Participating agencies have coordinated their response to storm impacts and the breaches that occurred, to implement the stabilization efforts, and to advance the overall Reformulation Study. Through that process, the New York District and the cooperating agencies have collectively recognized that adjustments to the proposed action identified in the 2009 Study were necessary. The District has prepared a General Reevaluation Report (USACE 2016) to document the post-Sandy proposed action for the EIS.

### B.3.1 ALTERNATIVES

FIMP EIS evaluates the reasonable alternatives that would help define a long-term solution to the risk imposed by coastal storms and their associated damage to human life and property, while maintaining, enhancing, and restoring the ecosystem integrity of coastal biodiversity. The EIS for the Project evaluated four alternatives, the No Action Alternative (FWOP), the Tentatively Selected Plan (TSP), Alternative 1 (Plan 2B), and Alternative 2 (Plan 3A). The TSP is the recommended alternative.

### B.3.1.1 NO ACTION ALTERNATIVE (FWOP)

Under the No Action Alternative (or future without project condition [FWOP]) is by definition, the projection of the most likely future condition if no Federal actions are to be taken as a result of this EIS. Without the project, natural processes as well as anthropogenic factors would continue to have an impact on the existing condition. The FWOP serves as the base condition for all the analyses, including the engineering design, and economic evaluation and comparison of alternatives, as well as environmental, social and cultural impact assessments. The FWOP is a forecast based on what has occurred and what is likely to occur in the Study Area during the project's life (i.e., 50 years) in the absence of implementation of any of the reasonable alternatives considered in this EIS. The FWOP represents the most likely future scenario based on reasoned, documentable forecasting using historic data, current practices, and trends.

### B.3.1.2 PREFERRED ALTERNATIVE (TENTATIVELY SELECTED PLAN)

The TSP has been identified as the plan that reasonably balances the policies of the USACE and the Department of the Interior, as well as meets the needs from and engineering and economic point of view to restore and enhance the coastal zone of the Study Area. The vulnerable breach locations are shown in Figure B-2. The components of the TSP, which provide a comprehensive plan as shown in Figure B-3, are further described below.

**Inlets: Fire Island, Moriches, Shinnecock**

At Fire Island Inlet, Moriches Inlet, and Shinnecock Inlet, the TSP would authorize the continuation of current management along with ebb shoal dredging, outside the navigational channel, with downdrift placement. The deposition basin is a dredged area designed to capture sediment so that shoaling in navigable regions (e.g., the channel) would be minimized. Placement of a +13 foot dune and berm would occur in identified placement areas, as needed.

**Mainland Non-Structural**

The mainland non-structural plan consists of non-structural building retrofits, flood proofing, relocation, acquisition of approximately 4,400 structures (consisting of approximately 44 in Shinnecock Bay, 857 in Moriches Bay, and 3,110 in Great South Bay), and road raising in four locations. The non-structural plan involves a 100-year level of protection for all structures inside the 10-year floodplain. Building retrofit measures are proposed, and could include limited relocation or buyouts based upon structure type and condition. The proposed TSP provides protection to each building identified as having a ground elevation below the baseline condition 10-year flood elevation. For each building identified for protection, the design flood elevation is the baseline condition 100-year flood elevation plus two foot of freeboard.

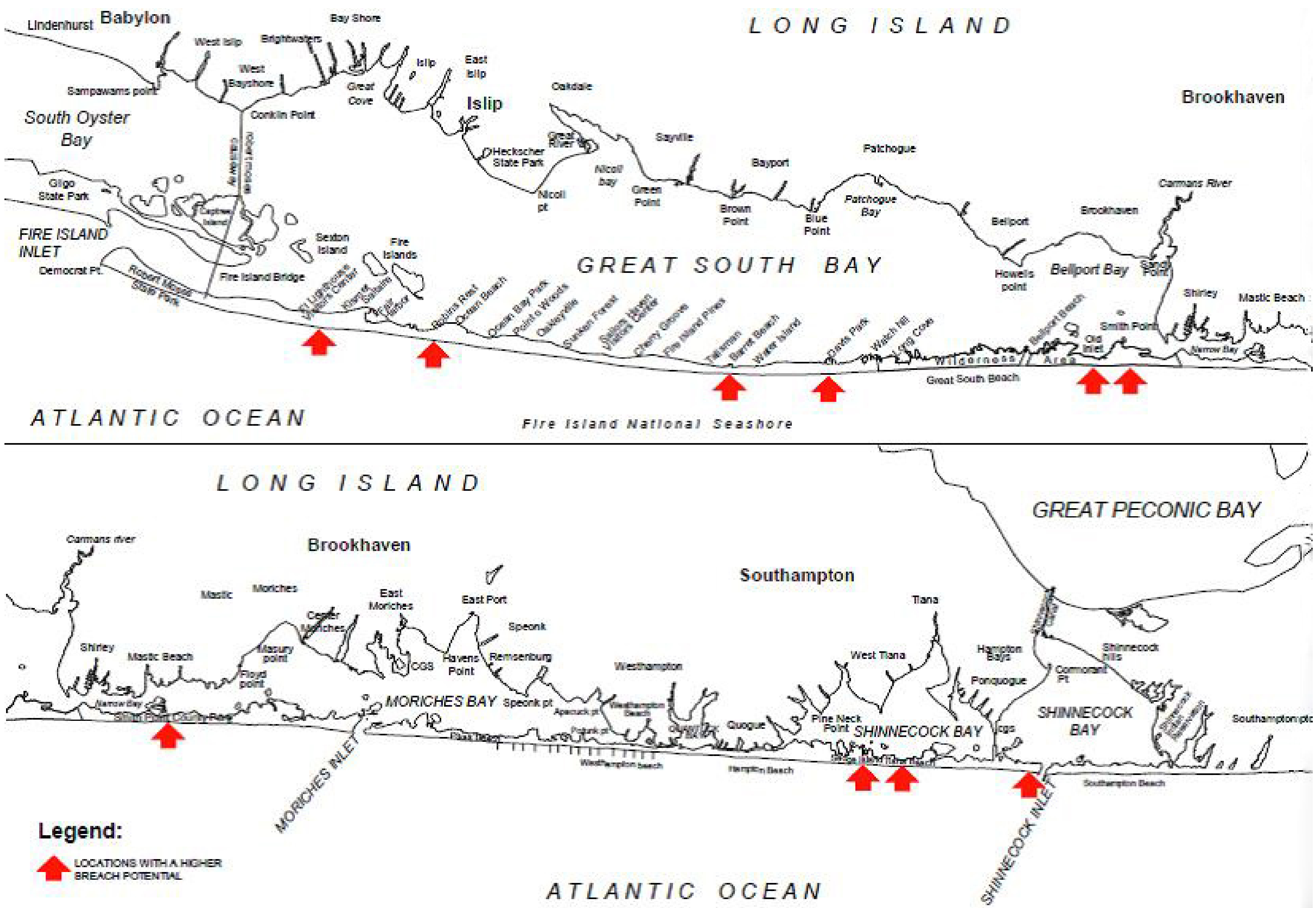


**Figure B-2. Vulnerable Breach Locations in the Study Area**

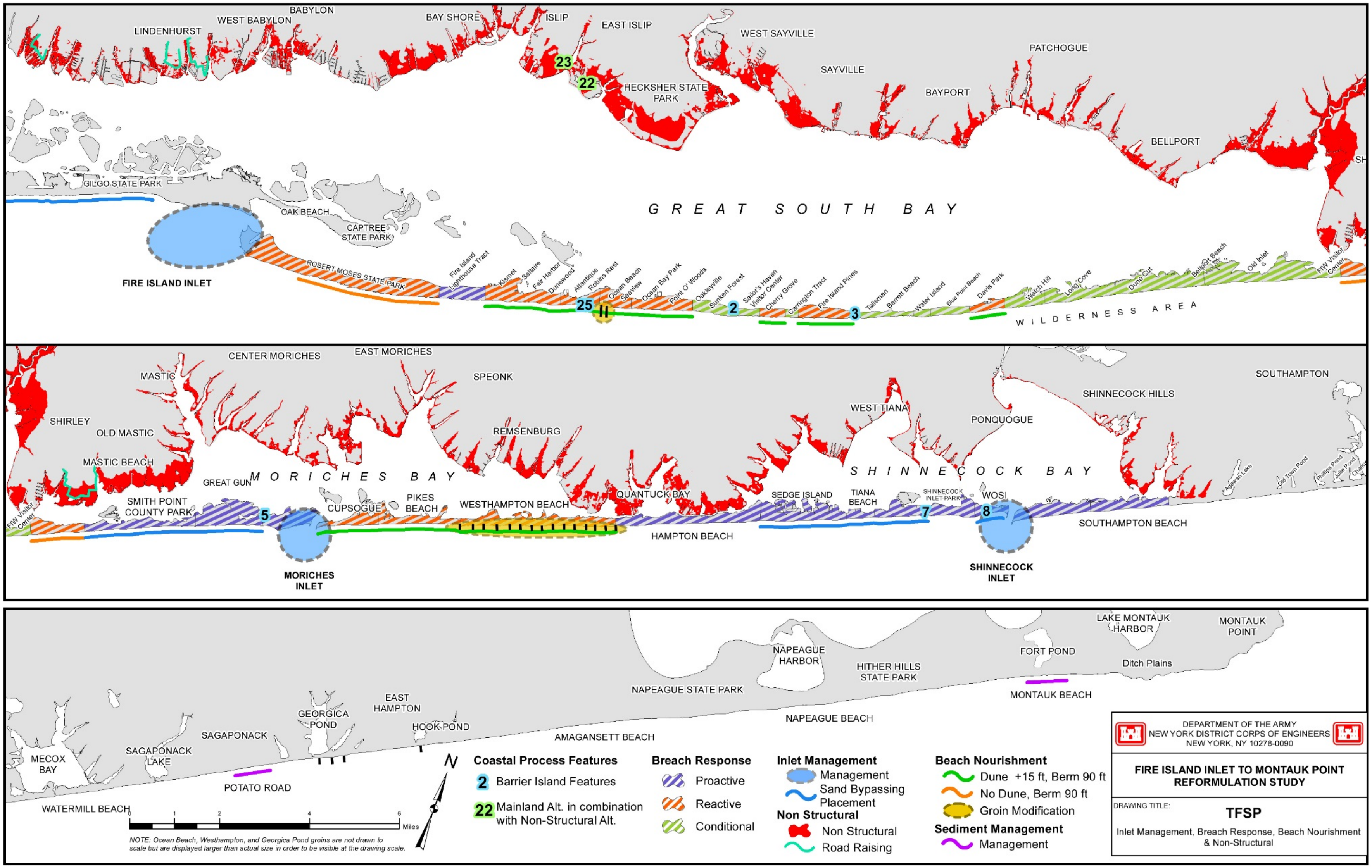


**Figure B-3. Overview of the TSP**

Included in the non-structural plan is road raising, as a means to achieve risk management for a greater number of buildings at a reduced cost compared to individual-building nonstructural protection plans for a given area. In addition to reducing damage to structures, road raising would reduce outside physical costs such as the flooding of cars, and non-physical costs such as clean up and evacuation. Raised roads would also offer enhancements to local evacuation plans and public safety by reducing the risk of inundation of local roads within the protected area, and providing safer evacuation routes out of the area. Road raising may also be more acceptable to residents in some communities since it reduces the need for alterations to individual buildings that may disrupt the owners' lives. Four locations have been identified for road raising, totaling 5.9 miles in length. This road would enhance protection to 1,054 houses (see Table B-1). Also included would be the long-term relocation of facilities in Smith Point County Park to minimize renourishment requirements.

**Table B-1. Road Raisings**

| Site | Town | Community | Approximate Length of Raised Road (feet) | Structures Protected |
|---|---|---|---|---|
| 4a | Babylon | Amityville | 6,600 | 97 |
| 8c | Babylon | Lindenhurst | 5,300 | 240 |
| 8d 8e | Babylon | Lindenhurst | 9,000 | 362 |
| 52a | Brookhaven | Mastic Beach | 10,500 | 355 |

Source: USACE 2016.

**Site 4a Description**. _The area protected is a residential area along the waterfront of the Village of Amityville, west of Robert Moses Causeway. Houses are generally medium quality, in good condition. The canals in Bayside Park extend all the way to the roadways. The average roadway elevation above the existing roadway would be approximately 2 feet, with a range of elevation from 0.5 to 4 feet.

**Site 8c Description**. The area protected is a peninsular residential area on the waterfront of the Village of Lindenhurst, west of Robert Moses Causeway. Houses are generally medium quality, in good condition. Houses along the canals south of the proposed line of protection are custom, multi-level structures. Shore Road runs along a canal, which has been bulkheaded to allow boat moorings. The area between the Shore Road and the canal is relatively narrow, roughly the width of a sidewalk. This will require a sheetpile wall due to the limited access. Average roadway elevation above the existing roadway would be approximately 2 feet, with a range of elevation from 1.0 to 4.0 feet.

**Site 8d 8e Description**. The area protected is a peninsular residential area on the waterfront of the Village of Lindenhurst, west of Robert Moses Causeway. Houses are generally medium quality, in good condition. A few houses along the waterfront, east of Venetian Blvd are in average to fair condition, most likely the result of frequent flooding. The Harding Avenue Elementary School in located on the peninsula, as is Green Park, a recreational facility consisting of lighted ball fields and restrooms.

Average roadway elevation above the existing roadway would be approximately 2 feet, with a range of elevation from 2.0 to 4.5 feet. Elevation of the roadway to 7 feet NGVD would provide approximately a 50-year level of protection. East Shore Road runs along the Neguntatogue Creek. The creek sides have been bulkheaded for boat moorings. The roadway is relatively wide, with a dirt/grass shoulder between the creek and the roadway. A few houses have been constructed along the creek on the west side of the roadway; however, these are generally elevated on fill. A 1,600-foot levee is included around the Harding Avenue Elementary School. Extension of the line of protection around the school would provide protection to the school, while reducing the structural plan costs, as the levee would costs significantly less than raising the roadway to a comparable level.

**Site 52a Description**. The area protected is a large, low-lying peninsular residential area on the waterfront of the Mastic Beach, between Johns Neck Creek and Pattersquash Creek. Houses in this area are generally medium quality, in average to fair condition. The western side of the peninsula is wooded; the eastern side has much fewer trees. The southeast portion of the peninsula is overgrown with Phragmites. Average roadway elevation above the existing roadway would be approximately 2.0 feet, with a range of elevation from 1.0 to 4.0 feet. Riviera Road on the east side of the peninsula runs along a Pattersquash Creek. There is a relatively wide, grassy area between the roadway and the creek. There are no houses on the creek side of the roadway.

**Barrier Islands**

A variety of measures are proposed for the barrier islands, as described below.

**Beach Work (Beach and Dune Fill, Berms, and/or Sand Bypassing)**. The TSP would include a nearly continuous beach and dune fill area along the developed shorefront areas that front Great South Bay and Moriches Bay. The MREI baseline is proposed as the layout of TSP beachfill plan. This beach fill alignment closely follows the "natural" dune alignment and includes a realignment of the dune farther seaward in areas where multiple structures would need to be relocated or acquired in a more landward alignment. These areas include most of the developed communities in Fire Island with the exception of Cherry Grove and Water Island. Beachfill, berms, and sand bypassing are proposed as follows:

Fire Island at Developed Locations:
- +15 foot dune with berm, with post-Sandy optimized alignment;

Fire Island at Undeveloped Locations:
- @ Lighthouse (+13 foot dune and berm);
- @ Smith Point County Park East - sand bypassing;
- @ Smith Point County Park West – short-term beachfill in western, developed section; Westhampton:
- Beachfill (+l5 foot dune with berm) fronting Moriches Bay.

Not all design subreaches are appropriate for beach fill. In areas where there is either an insignificant risk of breaching, no oceanfront structures, or relatively few structures, and/or lack of public access, beach fill was not considered. Subreaches where beach fill was not considered include Sailors Haven, Wilderness Area- West, Great Gun, Hampton Beach; and most of the shoreline between Shinnecock Inlet and Montauk Beach. The total initial fill for the TSP would be approximately 6.44 million cubic yards. A 30-year commitment of Federal and non-Federal renourishment is proposed, which recognizes the potential for variable beach conditions between renourishment cycles. After 30 years, the Federal and non-Federal commitment would transition to a BRP for the remainder of the 50 years.

**Breach Response Plan (BRP).** The BRP recommends the Conditional BRP (consisting of a +9.5 foot berm only) in undeveloped areas of Fire Island. For areas along Shinnecock Bay, a Proactive and Reactive BRP (consisting of a +13 foot berm, with dune) is proposed. This plan includes restoring the template to the design condition when the shoreline is degraded to an effective width of 50 feet. This plan is created for areas where a breach is imminent.

**Groin Modification Plan.** Groin modification within the TSP would result in the tapering of the existing Westhampton groins and modifying existing Ocean Beach groins. The shortening of groins 1 through 13 in Westhampton, where 15 groins currently exist. Groins 1-8 would be shortened to 380 feet. Groins 9-13 would be shortened to 386 feet, 392 feet, 398 feet, 402 feet, and 410 feet, respectively. The shortening of 13 groins varying between 70-100 feet could release up to 2 million cubic yards of sand to be transported to the west reestablishing longshore coastal processes. Therefore, this proactive plan could reduce the renourishment requirements for the shoreline downdrift of the groins.

**Sediment Management Plans (including Inlet Modification Plan).** Two high damaged areas, Downtown Montauk and Potato Road, were identified for a sediment management plan over a conventional beach nourishment project due to the lack of economic viability. This sediment management alternative will maintain the current protection and prevent conditions from getting worse by adding fill at each location approximately every four years for 30 years. The material would be placed as advance fill on the seaward side of the berm which would serve as feeder beaches for locations farther to the west. The TSP recommended plan for inlet management includes the continuation of the authorized project at each inlet with increased sediment bypassing from the ebb shoal to offset the downdrift deficit. A long-term, monitoring and adaptive management plan, which is describe below, would allow for future changes or improvements to inlet management, over time.

The TSP includes a variety of project-based features that would contribute to protecting areas from flooding, erosion, and other storm damage, while concurrently maintaining, preserving, or enhancing the natural resources. Specifically, USACE identified conceptual habitat coastal process feature opportunities for 6 sites. Appendix K of this EIS identifies these sites and includes detailed descriptions and photographs (when available), based on the site conditions observed/documented during field visits. The objective in evaluating conceptual designs with the Habitat Evaluation Procedure (HEP) was to assess a broad spectrum of conceptual ideas that could be carried out at locations across the barrier island, to evaluate extremes of alternatives (e.g., full feature versus reduced area), and to present a range of possible options.

The project-based features for coastal processes include the following:

- Enhance upper beach/dune width/slope/height
- Close some access roads and trails
- Remove sand fence

- Enhance salt marsh by restoring hydrologic connection
- Remove parking lot, re-grade to natural contours
- Enhance the existing salt marsh through the use of herbicides to control *Phragmites*
- Ditch plugging and pool creation
- Convert disturbed areas to salt marsh
- Reconfigure existing tidal channels
- Remove bulkhead, re-grade shoreline, and restore marsh through plantings
- Enhance submerged aquatic vegetation (SAV) beds
- Create sand spits in the bay

**Integration of Adaptive Management**

The adaptive management plan would formalize mechanisms for reviewing and revising the life cycle management of elements of the project. Currently proposed adaptive management measures include:

- Period of renourishment for 30 years, subject to adaptive management considerations and local land use regulations; to be adjusted to BRP, following 30 years.
- Provisions to continually adjust components of the Project to improve effectiveness;
- Applies to all plan features, developed to address climate change concerns (e.g., sea level rise).

### B.3.1.3 *Alternative 1*

Alternative 1 would involve similar actions as the TSP; the major differences between Alternative 1 and the TSP would involve: (1) the amount of beachfill that would occur in the Barrier Islands (Fire Island at developed locations) and Westhampton (fronting Moriches Bay), and (2) changes in the adaptive management approach (there would be no set renourishments; instead, renourishment would only occur when cross-section falls below the design level of 25-years). Based on these differences to the TSP, Alternative 1 is defined as follows.

**Beach and Dune Fill Component**

Alternative 1 include changes in alignment of +13 feet NGVD dune, plus a 90 foot berm with a +9.5 feet NGVD in developed areas and minor Federal tracts. Alternative 1 includes a +13 feet NGVD dune, plus a 90 foot berm along the Lighthouse tract to also be constructed. Under Alternative 1, no set renourishments would occur. Instead, renourishment would only occur when cross-section falls below the design level of 25-years.

Sediment Management Plans (including Inlet Modification Plan). Same as TSP.

Groin Modification Plan. Same as TSP.

Breach Response Plan. Same as TSP.

Coastal Process Features. Same as TSP.

Non-Structural Plan. Same as TSP.

**Adaptive Management**

Similar to TSP, but there would be no set renourishments; instead, renourishment would only occur when cross-section falls below the design level of 25-years. Other aspects of adaptive management would be the same as the TSP.

#### B.3.1.4 *Alternative 2*

Alternative 2 would involve similar actions as the TSP; the major differences between Alternative 2 and the TSP would involve: (1) differences in non-structural plans; (2) adaptive management would not be integrated; and (3) land use regulations and management would not be integrated. Based on these differences to the TSP, Alternative 2 is defined as follows.

**Beach and Dune Fill Component**

Alternative 2 would be the same as the TSP except: (1) at the Fire Island undeveloped locations there would be a +13 feet NGVD dune with berm, and (2) no renourishments.

Sediment Management Plans (including Inlet Modification Plan). No ongoing sediment management.

Groin Modification Plan. Same as TSP.

Breach Response Plan (BRP). Same as TSP.

Coastal Process Features. Same as TSP.

**Non-Structural Plan**

The non-structural plan considers the net excess benefits to a combined building retrofit plan and a road-raising plan focusing on the mainland backbay shores, which includes 3,200 structures. This plan involves a 100-year level of protection for all structures inside the 6-year floodplain. Building retrofit measures are proposed, but no relocation or buyouts would occur. Included in the non-structural plan is road raising, as discussed for the TSP. There would be no relocation of facilities in Smith Point County Park. Instead, there would be a +13 feet NGVD dune with berm.

## B.4 DESCRIPTION OF HABITATS, THREATS AND SPECIES

### B.4.1 ECOSYSTEM AND HABITAT DESIGNATIONS

The Study Area is a complex array of marine, estuarine, coastal, and terrestrial ecosystems. To facilitate a thorough description of conditions, the Study Area has been partitioned into a series of defined ecosystems and habitats. The ecosystems and habitats defined and studied in the previous Conceptual Model and Habitat Evaluation Procedures (HEP) have been combined as presented in this section, and as defined in Table B-2.

**Table B-2. FIMP Ecosystem and Habitat Designations**

| Ecosystem/Habitat | Definition |
|---|---|
| Atlantic Shores and Inlets Ecosystem | |
| Marine Nearshore | MLW to depth of 30 feet; includes pelagic and benthic zones |
| Marine Intertidal | Extends from mean low water (MLW) to mean high water (MHW) with a sandy and/or rocky substrate |
| Marine Beach | Extends from MHW on the ocean side to the boundary of the primary dunes and swales habitat within the barrier island ecosystem; sandy substrate |
| Inlets | Areas of water interchange between bay and ocean zones (e.g., Fire Island Inlet, Moriches Inlet, and Shinnecock Inlet) |
| Barrier Island Ecosystem | |
| Dunes and Swales | Extends from the seaward toe of the primary dune through the most landward primary swale system; includes freshwater ponds, wetlands, and sparsely-vegetated shrub or forested communities found within this zone |
| Terrestrial Upland | Extends from the landward boundary of the primary dunes and swales habitat on the ocean side to MHW of the bay intertidal habitat; includes all upland as well as any freshwater wetland habitats within this zone; bayside beach and maritime forested habitats are included in this habitat |
| Maritime Forest | Forested communities found within the terrestrial upland habitat. These areas are defined by salt tolerant vegetation, high salinity and salt spray adapted soils and vegetation assemblages such as trees, shrubs, and herbaceous species (e.g., Sunken Forest) |
| Bayside Beach | Unvegetated sandy areas between MHW and the bayside limit of upland vegetation; included in the terrestrial upland habitat. This habitat is also present in association with the mainland upland habitat where mainland shoreline is adjacent to backbay areas. |
| Backbay Ecosystem | |
| Bay Intertidal | Extends from MHW to MLW on the bay side of the barrier island. Habitats such as sand shoals, mud flats, and salt marsh are included in bay intertidal habitat |
| Sand Shoal and Mud Flat | Unvegetated areas within the bay intertidal habitat exposed at low tide. Sand shoals and mud flats differ on the basis of sediment texture and grain size, providing separate but potentially overlapping infaunal and epifaunal habitats. |
| Salt Marsh | Bayside vegetation communities found within the bay intertidal habitat that are dominated and defined by salt-tolerant species, predominantly salt marsh cordgrass (*Spartina alterniflora*) and salt meadow cordgrass (*Spartina patens*). Occurs from |

| | |
|---|---|
| | the landward limit of the high marsh vegetation, sometimes also MHW or slightly landward, to the seaward limit of the intertidal marsh vegetation |
| Bay Subtidal | Bayside aquatic areas below MLW, including channels and deeper areas of the bay that are always inundated. |
| Submerged Aquatic Vegetation (SAV) | Bayside submerged aquatic vegetation (SAV) communities found within the bay subtidal habitat |
| Mainland Upland Ecosystem | |
| Mainland Upland | Area generally extends from the landward limit of the bay intertidal MHW line to the landward limit of the Study Area (i.e., +16 feet NGVD), which generally correlates with Montauk Highway (Route 27). This habitat also includes mainland wetlands and coastal ponds (e.g., Mecox Bay). Along the Atlantic shorefront, mainland upland begins at the landward toe of the primary dune. Along the mainland shoreline adjacent to backbay areas, this habitat also includes bayside beach. |

Source: Tetra Tech 2008.

#### B.4.1.2 Atlantic Shores and Inlets Ecosystem

The Atlantic shores and inlets ecosystem includes all oceanic habitats from 30 feet deep to the seaward toe of the primary dune, and includes the Fire Island, Moriches, and Shinnecock inlets. Habitats within the Atlantic shores and inlets ecosystem include the marine nearshore, marine intertidal, marine beach, and inlets.

#### B.4.1.3 Marine Nearshore and Marine Intertidal

The marine nearshore is define as the oceanic area from the mean low water (MLW) level to a depth of 30 feet and includes pelagic and benthic zones. The marine intertidal habitat is defined as the oceanic area from MLW to mean high water (MHW) typically having a sandy and/or rocky substrate. There are an estimated 1,192 acres of marine nearshore and marine intertidal habitat within the Study Area (USACE 2005d).

#### B.4.1.4 Marine Beach

Within the barrier island ecosystem the marine beach habitat extends from the MHW line, or upper bound of the marine intertidal habitat, to the seaward toe of the primary dune. The marine beach habitat consists of sand and is typically unvegetated or only sparsely vegetated, and not subject to regular inundation. Of the 330 acres of the barrier island cover type mapped by the USACE in 2001–2002, 22percent was represented by the marine beach habitat (USACE 2003a). There is an estimated 1,638 acres of marine beach habitat within the Study Area (USACE 2005d).

Although the dry sandy substrate of the marine beach habitat excludes establishment of typical marine benthic invertebrates, other less water dependent invertebrates have adapted to spending at least a portion of their life cycle on the beach, particularly within the wrack line. Densities of all forms of beach invertebrates generally are relatively lower in comparison to other surrounding habitats, with the wrack line providing the primary source of food and cover for a myriad of invertebrates and saprophagous, scavenger, and predatory insects, and a variety of oligochaetes and nematodes typically found in this habitat type. No representative invertebrate species have been identified in the FIMP Conceptual Model for the marine beach habitat, however, a review of a invertebrate study conducted within the marine beach, and dunes and swales habitat of the Study Area identified amphipod beach fleas (*Talorchestia longicornis*, *T. megalopthalma* and *Orchestia grillus*) as the dominant invertebrate type collected (USACE 2005c). Other common invertebrate types collected within these zones include flies belonging to the families Dolichopodidae and Ephydridae, beetles belonging to the families Carabidae, Staphylinidae, and Histeridae, the ant *Lasius neoniger*, and mites (class Arachnida).

### B.4.1.5 INLETS

The inlets ecosystem includes the area below MHW within the three barrier island inlets: Fire Island Inlet, Moriches Inlet, and Shinnecock Inlet. These inlets are aligned generally perpendicular to the barrier island and mainland shorelines. The inlets are typically rocky at their perimeter edges at the MHW line.

### B.4.1.6 BARRIER ISLAND ECOSYSTEM

The barrier island ecosystem includes all habitats of the barrier islands from the landward limit of the marine beach habitat to MHW of the bay intertidal habitat. Habitats within the barrier island ecosystem include dunes and swales, and terrestrial upland (which encompasses maritime forest and bayside beach).

### B.4.1.7 DUNES AND SWALES

The dunes and swales habitat is located between the landward edge of the marine beach and terrestrial upland habitat of the barrier island ecosystem. The dunes and swales habitat typically has a sand substrate and is not regularly inundated by tides. Freshwater ponds, wetlands, and sparsely-vegetated shrubby or forested communities are included in this habitat designation. Of the 330 barrier island acres cover type mapped by the USACE in 2001–2002, 21 percent was represented by dunes and swales habitat (USACE 2003a). A comprehensive vegetation mapping study for the FIIS found that approximately 33 percent of the 4,075 vegetated acres analyzed was represented by dune habitat associations (e.g., Northern Beach Grass Dune, Northern Dune Shrubland) (Conservation Management Institute [CMI] 2002). Approximately 1,142 acres of the barrier islands is characterized as dunes and swales habitat (USACE 2005d).

### B.4.1.10 BAYSIDE BEACH

The bayside beach extends from MHW on the bay side landward to the upland habitat and is included in the terrestrial upland habitat. Bayside beach habitat is also present in association with the mainland upland habitat where mainland shoreline is adjacent to backbay areas. It is generally characterized as narrow beach areas devoid of vegetation and comprising mostly sand.

Within the Study Area, much of the bayside beach has been eliminated due to bulkhead construction, immediate upland development, and/or severe erosion (USACE 2009).

### B.4.1.12 BAY INTERTIDAL (INCLUDING SALT MARSH, SAND SHOAL, SAND AND MUD FLATS)

The bay intertidal habitat extends from MHW to MLW on the bay side of the barrier island and includes salt marsh, sand shoal, and mud flat habitat areas. The substrate is periodically exposed and flooded by semidiurnal tides (two high tides and two low tides per tidal cycle), resulting in alternating periods of inundation and dryness and fluctuating salinity, making this a naturally stressed habitat suitable only for biota that are adapted to these conditions. Sand shoals and mud flats are generally distinguishable from each other on the basis of sediment texture and grain size, providing separate but potentially overlapping infaunal and epifaunal habitats.

Bay intertidal habitat is influenced by hydrology and sediment transport, and includes natural and hardened shoreline areas, such as those associated with bulkheads and riprap revetments. There are an estimated 3,700 acres of bay intertidal habitat within the Study Area (USACE 2005d).

### B.4.1.13 BAY SUBTIDAL (INCLUDING SAV)

The bay subtidal habitat extends from the MLW boundary of the bay intertidal habitat and includes the channels and deeper areas of the bay that are always inundated. There are an estimated 80,000 acres of bay subtidal habitat within the Study Area (USACE 2005d). Most subtidal areas are unvegetated. However, some vegetated subtidal areas exist in the form of SAV habitat, where the dominant submerged plant species is eelgrass (*Zostera marina*). SAV habitat areas are included in the bay subtidal habitat definition because SAV generally occurs below MLW. Mean depths of the bays in the Study Area range from 3 to 10 feet MLW. There are an estimated 3,326 acres of SAV habitat within the Study Area (USACE 2005d).

### B.4.1.14 MAINLAND UPLAND ECOSYSTEM

The mainland ecosystem extends from the landward limit of the backbay intertidal MHW line to the landward limit of the Study Area. In the eastern portion of the Study Area, where the barrier island and backbay habitats do not occur, mainland ecosystem begins at the landward toe of the primary dune. This habitat also includes mainland wetlands and coastal ponds (e.g., Mecox Bay). Along the mainland shoreline adjacent to backbay areas, this habitat also includes bayside beach.

The mainland ecosystem contains various upland and wetland habitats occurring in a mosaic with largely residential and commercially developed lands. Natural vegetation on the mainland primarily consists of various pine-oak forests on upland slopes and ridgetops and forested swamps and emergent marsh along stream channels, pond margins, and in low lying depressional areas. Also included in the mainland ecosystem are areas of residential and commercial development. Disturbed and densely developed areas generally increase in presence and extent from east to west on Long Island. Historically, much of the shoreline of the mainland has been subject to extensive clearing and filling to support the development of homes and commercial facilities. Along with this development, ornamental plants and exotic faunal species have been introduced, which compete with native flora and faunal species.

### B.4.2 LISTED SPECIES AND HABITATS

The following sections provide a description of the invertebrate, bird and species/communities that are expected to be associated with the ecosystems and habitats described in Section B.4.1

#### B.4.2.1 LISTED SPECIES

The Federally and state-listed Piping Plover, seabeach amaranth, and roseate tern, as well as the state-listed common tern and least tern, and the state species of special concern black skimmer, all nest or carry out a major portion of their life cycle activities (i.e., breeding, resting, foraging) within essentially the same habitat (Table 4 ). This habitat encompasses areas located between the high tide line and the area of dune formation and consists of sand or sand/cobble beaches along ocean shores, bays and inlets and occasionally in blowout areas located behind dunes (Bent 1929, NatureServe 2002, NJDEP 1997, USFWS 2004a).

**Table B-3. Protection Status of Species that Utilize Habitats Similar to those in the Project Area.**

| Common Name | Federal Status | State Status |
|---|---|---|
| Common Tern | Not Listed | Threatened |
| Least Tern | Threatened | Threatened |
| Piping Plover | Endangered | Endangered |
| Roseate Tern | Endangered | Endangered |
| Seabeach Amaranth | Endangered | Imperiled |

**List of Species**

The USFWS, through its consultation with the District regarding implementation of the Project has identified four T&E species as being present on or near the Project Area (see Table 4.). Based on habitat and life history assessments, recommendations from the USFWS and a site assessment conducted by the USACE, the District has determined that the following Federally-listed species (with their respective recent population numbers below them) are likely to occur in the FIMP Project Area and warrant a Biological Assessment (These numbers represent the oceanside populations):

- Piping Plover (*Charadrius melodus*),
- Seabeach Amaranth (*Amaranthus pumilus*)

2015: Piping plovers: 89 nesting pairs,

Seabeach amaranth: 45 individuals

2014: Piping plovers: 81 nesting pairs

Seabeach amaranth: 54 individuals

2013: Piping plovers: 85 nesting pairs

Seabeach amaranth: 83 individuals

2012: Piping plovers: 92 nesting pairs

Seabeach amaranth: 54 individuals

2011: Piping plovers: 81 nesting pairs, 13 fledglings

Seabeach amaranth: 130 individuals

https://irma.nps.gov/App/Portal/Home

The state-listed common tern (*Sterna hirundo*) and the least tern (*Sterna antillarum*) and roseate tern (*Sterna dougallii*), which utilize beach habitat similar to that of the Piping Plover and Sea Beach Amaranth, have been identified as species that may occur in the Project Area. Additionally, the state species of special concern, black skimmer (*Rynchops niger*), also is known to nest on coastal beaches and frequently nests in or near tern nesting areas. None of these species have yet been identified by the USFWS as species requiring further ESA consultation or Biological Assessment. However, measures taken to avoid and protect plover and seabeach amaranth habitats would benefit and protect these species as well.

**Life Stages of Listed Species**

**Piping Plover**

On January 10, 1986, the Piping Plover was listed as threatened and endangered under provisions of the ESA. Protection of the species under the ESA reflects its precarious status range-wide. Three distinct populations were identified by the Service during the listing process: Atlantic Coast (threatened), Great Lakes (endangered), and Northern Great Plains (threatened). The Atlantic Coast population, which is the focus of this biological opinion, breeds on coastal beaches from Newfoundland to North Carolina (and occasionally in South Carolina) and winters along the Atlantic Coast from North Carolina southward, along the Gulf Coast, and in the Caribbean. No critical habitat, as defined by the ESA, has been designated for the Atlantic Coast population (U.S. Fish and Wildlife Service 1996a). The "Piping Plover *(Charadrius melodus*) Atlantic Coast Population Revised Recovery Plan" (hereafter referred to as the "Piping Plover Recovery Plan") found in U.S. Fish and Wildlife Service (1996a) delineates four recovery units, or geographic sub-populations, within the Atlantic Coast population: Atlantic Canada, New England (including Massachusetts, Maine, New Hampshire, Rhode Island, and Connecticut), New York-New Jersey (NY-NJ), and Southern (including Delaware, Maryland, Virginia, and North Carolina).

**Life History**

The piping plover is a small robin-sized shorebird 17–18 cm (7.25 in) in length, a wingspan of 47 cm (19 in), and an average weight of 55 g (1.9 oz) (Sibley 2000). Piping plover breed and nest on coastal beaches from Newfoundland and southeastern Quebec to North Carolina and winter primarily on the Atlantic coast from North Carolina to Florida. Along the Atlantic coast, plover nest mainly on gently sloping foredunes above the high tide line, in blow-out areas behind primary dunes of sandy coastal beaches, and on suitable dredge spoil deposits (USFWS 1988, Cashin Associates 1993, NPS 1994). Nests are usually found in sandy areas with little or no vegetation. Vegetation, when present, consists of beach grass, sea rocket, and/or seaside goldenrod.

Plover begin northward migration to breeding grounds from southern U.S. wintering areas in March, and arrive on nesting grounds from March – May; males arrive prior to females. Fall migration to southern wintering grounds begins in mid- to late summer. Juvenile plover may remain on breeding grounds later but are generally gone by mid- to late August (Cuthbert and Wiens 1982). Atlantic coast breeders migrate primarily to Atlantic coast sites located farther south of breeding areas (i.e., Virginia to Florida, Bahamas) (Haig and Oring 1988, Haig and Plissner 1993).

The breeding season begins when adult plover reach the breeding grounds in early April or in mid-May in northern parts of the range. The adult males arrive earliest, select beach habitats, and defend established territories against other males (Hull 1981). When adult females arrive at the breeding grounds several weeks later, the males conduct elaborate courtship rituals including aerial displays of circles and figure eights, whistling song, posturing with spread tail and wings, and rapid drumming of feet (Bent 1929, Hull 1981).

Plover typically return to the same general nesting area in consecutive years (but few return to natal sites). Plover are known to shift breeding location by up to several hundred kilometers between consecutive years. However, Wilcox (1959) has shown that only 20 percent settle at a nest site farther than 1,000 ft from the previous year's locality. Adult females tend to choose new nest sites within the same geographic area with over 50 percent choosing a new nest site over 1,000 ft from the previous year. Previous reproductive success apparently does not increase the probability of returning to specific breeding sites (NatureServe 2002).

Nest sites are simple depressions or scrapes in the sand (Bent 1929, Wilcox 1959). The average nest is about 6 to 8 cm in diameter, and is often lined with pebbles, shells, or driftwood to enhance the camouflage effect. Males make the scrapes and may construct additional (unused) nests in their territories, which may be used to deceive predators or may simply reflect over-zealousness (Wilcox 1959, Hull 1981). Occupied nests are generally 50 to 100 meters apart (Wilcox 1959, Cairns 1977, Cuthbert and Wiens 1982).

Egg-laying commences soon after mating (Hull 1981, Cuthbert and Wiens 1982). Eggs are laid every second day. The average clutch size is four eggs (Wilcox 1959) and three-egg clutches occur most commonly in replacement clutches. The average number of young fledged per nesting pair usually is two or fewer. The young hatch about 27 to 31 days after egg laying. Incubation is shared by both adults (Wilcox 1959, Hull 1981).

Young plover leave the nest about two hours after hatching and immediately are capable of running and swimming. The young usually remain within about 200 meters of the nest, although they do not return after hatching (Wilcox 1959, Johnsgard 1979, Hull 1981). When disturbed or threatened, the young either freeze or combine short runs with freezing and blend very effectively into their surroundings (Wilcox 1959, Hull 1981). Adults will feign injury to draw intruders away from the nest or young (Bent 1929, Wilcox 1959). Adults also defend the nest territory against other adult piping plovers, gulls, and songbirds (Wilcox 1959, Matteson 1980). First (unsustained) flight has been observed at around 18 days, with chicks molting into first juvenile plumage by day 22.

Nest success depends heavily upon camouflage (Hull 1981). Hatching success ranges widely as follows: 91 percent for undisturbed beaches on Long Island (Wilcox 1959), 76 percent for undisturbed beaches in Nova Scotia (Cairns 1977), 44 percent on relatively undisturbed beaches at Lake of the Woods (Cuthbert and Wiens 1982), and 30 percent maximum at disturbed Michigan beaches (Lambert and Ratcliff 1979).

Plover diet consists of worms, fly larvae, beetles, crustaceans, mollusks, and other invertebrates (Bent 1929). In New Jersey, intertidal polychaetes were the main prey of plovers (Staine and Burger 1994). Plover forage along ocean beaches, on intertidal flats and tidal pool edges. Studies by Cuthbert and Weins (1982) indicate that open shoreline areas are preferred and vegetated beaches are avoided. Plover obtain their food from the surface of the substrate, or occasionally will probe into the sand or mud.

In Massachusetts, plover preferred mudflat, intertidal and wrack habitats for foraging (Hoopes et al. 1992a). On Assateague Island, bay beaches and island interiors were much more favorable as brood-rearing habitats than were ocean beaches (Patterson et al. 1992).

**Habitat Use before Breeding**

A growing body of evidence reinforces information presented in the 1996 revised recovery plan regarding the importance of wide, flat, sparsely-vegetated barrier beach habitats for recovery of Atlantic Coast piping plovers. Such habitats include abundant moist sediments associated with blowouts, washover areas, spits, unstabilized and recently closed inlets, ephemeral pools, and sparsely vegetated dunes.

Many Piping Plovers arrive in breeding areas well before the time of most active courtship. During this period, Piping Plovers use bay intertidal zones preferentially (Loegering 1992, Cohen, Houghton, and Keane, unpublished data). This use is tide dependent. During pre-breeding surveys conducted at low tide on Assateague Island, Loegering (1992) observed 9 times as many plovers on bay tidal flats as he did in the ocean intertidal zone. At high tide, however, when the bay intertidal flats were submerged, the number of Piping Plovers on the bay side of barrier islands was similar to the number on the ocean side. On South Monomoy Island, Massachusetts, foraging in sound and tidal pool intertidal zones was not spread uniformly across falling and rising tides. Rather use was most concentrated on the lowest stage of the tide (Keane, unpublished data). This may be because benthic organisms are more abundant in the lower part of the intertidal zone where their habitat is covered by water much of the day (Bertness 1999).

**Habitat use during breeding**

Nest Site Selection – Piping Plovers often select nest sites near moist substrate habitats. Patterson (1991) noted that most plover nesting on Assateague Island, Maryland and Virginia, occurred on beaches adjacent to one of the several types of moist substrate habitats available there. Elias et al. (2000) reported the pattern of nesting on three New York barrier islands. All 1-km beach segments that were adjacent to either beach pools or bay intertidal zone were used for nesting, whereas fewer than half of the beach segments without these habitats were used by nesting Piping Plovers. Beach segments adjacent to these habitats supported 48 % of nesting pairs in that study, despite comprising only 1% of the habitat.

Piping Plovers colonized the Village of West Hampton Dunes, New York, after the island breached and large tidal flats were deposited. Similarly, the plover population on Assateague Island National Seashore increased dramatically after storms overwashed the island, increasing access to bay intertidal habitats (Kumer, unpublished data). On South Monomoy Island, more than 75% of plovers nested <400 m from large sound intertidal flats or a large intertidal pool (Keane, unpublished data).

Cohen et al. (2008) reported that mean vegetative cover around piping plover nests on a recently re-nourished Long Island beach was 7.5%, and all plovers nested in <47% cover. Although almost 60% of nests were on bare ground, nests occurred in sparse vegetation more often than expected based on availability of this habitat type. Plovers also appeared to favor nest sites with coarse substrate over pure sand. At the same study area, piping plover chicks foraged more than expected and exhibited high peck rates in wrack, where arthropod abundance indices were also high (Cohen et al. 2009). Following storm-and human-related increases in nesting and foraging habitat, the population at West Hampton Dunes, New York, grew from five pairs in 1993 to 39 pairs in 2000, and then declined to 18 pairs by 2004 concurrent with habitat losses to human development and vegetation growth (Cohen et al. 2009). Distribution of nests was heavily concentrated on the bayside of the barrier island in the early years following inlet formation and closure, but bayside nests decreased precipitously starting in 2001 and disappeared by 2004 as the study area was redeveloped and the bayside revegetated. The chick foraging rate was highest in bayside intertidal flats and in ocean and bayside fresh wrack. Chicks used the bayside more than expected based on percentage of available habitat, and survived better on the bayside before village construction and the initiation of predator trapping, but not after. In most years, density of nesting pairs adjacent to bayside overwash was 1.5 to two times that at an adjacent reference site, where beach nourishment increased nesting habitat but not foraging habitat. Cohen et al. (2009) concluded that local population growth can be very rapid where storms create both nesting and foraging habitat in close juxtaposition. An increase in local nesting habitat via artificial beach nourishment, however, is not necessarily followed by an increase in the local population if nearby intertidal flats are absent. Cohen et al. (2009) also note similarity between their results and observations by Wilcox (1959) of rapid colonization of habitats created on Westhampton barrier beaches by storms in the 1930s and their subsequent decline following revegetation and redevelopment (see the 1996 recovery plan)

**Brood Habitat Selection**

In New York, when broods had access to beach pools, they spent more than 70% of their time in pool habitat. Compositional analysis, a technique for ranking habitats (Aebischer et al. 1993), showed that pool habitat ranked first in these areas (Elias et al. 2000). In the same study, broods with access to bay tidal flats spent 57% of their time in those habitats, which ranked first among habitats for that set of broods.

**Habitat Use by Adults During Breeding**

Preliminary information from color marked birds in West Hampton Dunes, New York (Cohen, et al. 2008), indicates that breeding adult plovers travel substantial distances to forage on tidal flats in Moriches Bay during incubation and brood rearing. Travel distances approaching 1 km have been recorded.

**Habitat Use after Breeding**

Habitat use immediately following breeding has received little formal study. However, we have observed fledgling Piping Plovers using the intertidal flats at West Hampton Dunes, New York, at the end of the breeding season. When chicks are first capable of flying, they only weigh about 70% of adult weight (Cohen, et al. 2008). Foraging on the intertidal flats, which are rich in polychaetes, mollusks and arthropods (Loegering 1992, Loegering and Fraser 1995, Bertness 1999, Elias et al. 2000) may allow fledglings to put on fat required for successful migration to wintering areas.

***Winter***

On the Alabama coast, Piping Plovers used mudflats or sandflats 93% of the time observed (Johnson and Baldassare 1988). As before breeding, this use is tide-dependent. Johnson and Baldassarre (1988) reported a negative correlation between tide height and foraging activity. Nicholls and Baldassare (1990) Surveyed 1422 km of shoreline from Virginia to Key West, and 1283 km from Everglades National Park to Brownsville, Texas. Using discriminant analysis, they found that percent of habitat classified as mudflat, sand flat and tide pool helped distinguish used from unused habitats on the Atlantic coast, and percent mudflat helped discriminate used from unused areas on the gulf coast. They noted “Piping Plovers were observed foraging most frequently on sandflats and sandy mudflats.” Likewise, Zonick (2000) found that during the winter on the Texas Gulf Coast barrier islands, plover densities were greater in bay side feeding areas than on Gulf side areas. Drake et al. (2001) used radio telemetry and estimated use of algal flats, lower sandflats and mudflats to comprise 74%, 89% and 78 % of habitat use in fall, winter and spring, respectively.

### *Population Dynamics*

Recovery criteria established in the Piping Plover Recovery Plan set population and productivity goals for each recovery unit, as well as for the entire population. The population goals for the Atlantic Canada, New England, NY-NJ, and Southern Recovery Units are 400, 625, 575, and 400 pairs, respectively. The productivity goal for each of the recovery units is to achieve a five-year average productivity of 1.5 chicks fledged per pair. Attainment of these goals for each recovery unit is an integral part of the recovery strategy that seeks to reduce the probability of extinction for the entire population by:

- contributing to the population total;
- reducing vulnerability to environmental variation, including effects of hurricanes, oil spills, or disease;
- increasing the likelihood of genetic interchange among recovery units; and
- promoting re-colonization of any sites that experience declines or local extirpations due to low productivity or temporary habitat succession.

The Piping Plover Recovery Plan identifies a recovery objective to ensure the long-term viability of the Atlantic Coast plover population in the wild, thereby allowing for the de-listing of this species, along with five criteria for meeting the objective, which are listed below:

- The population goal of 2,000 breeding pairs, distributed among four recovery units, and maintained at that level for five years;
- The adequacy of a 2,000-pair population of Piping Plovers has been verified to maintain heterozygosity and allelic diversity over the long-term;
- A five-year average productivity of 1.5 chicks fledged per pair has been achieved in each of the recovery units;
- Long-term agreements have been instituted to assure protection and management sufficient to maintain the population targets and average productivity in each recovery unit; and
- Long-term maintenance of wintering habitat, sufficient in quantity, quality, and distribution has been ensured to maintain survival rates for a 2,000-pair population.

The Piping Plover Recovery Plan further states, “A premise of this plan is that the overall security of the Atlantic Coast Piping Plover population is profoundly dependent upon attainment and maintenance of the minimum population levels for the four recovery units. Any appreciable reduction in the likelihood of survival of a recovery unit will also reduce the probability of persistence of the entire population.” Under Section 7 (a)(2) of the ESA, Federal agencies shall consult with the Service or NMFS to ensure that any activities that they fund, authorize, or carry out do not jeopardize the continued existence of a Federally-listed species. Recovery of the Atlantic Coast Piping Plover population is occurring in the context of an extremely intensive protection effort, since pressures on Atlantic Coast beach habitat from development and human disturbance is continually increasing. Loss and degradation of habitat due to development and shoreline stabilization have been major contributors to the species' decline. Disturbance by humans and pets often reduces the functional suitability of habitat and causes direct and indirect mortality of eggs and chicks. Predation has also been identified as a major factor limiting Piping Plover reproductive success at many Atlantic Coast sites and substantial evidence shows that human activities are affecting types, numbers, and activity patterns of predators, thereby exacerbating natural predation (U.S. Fish and Wildlife Service 1996a).

**Range-wide Status and Distribution of the Atlantic Coast and NY-NJ Recovery Unit Populations**

The Atlantic Coast population breeds on sandy beaches along the east coast of North America, from Newfoundland to South Carolina. The 2010 Atlantic Coast piping plover population estimate was 1,782 pairs, more than double the 1986 estimate of 790 pairs. Discounting apparent increases in New York, New Jersey, and North Carolina between 1986 and 1989, which likely were due in part to increased census effort (USFWS1996), the population posted a net increase of 86% between 1989 and 2010. The largest net population increase between 1989 and 2010 has occurred in New England (266%), followed by New York-New Jersey (56%). In the Southern recovery unit, net growth between 1989 and 2010 was 54%, but almost all of this increase occurred in two years, 2003-2005. Most recently, the total Atlantic Coast population estimate attained 1,890 pairs in 2007 before declining 6% to 1,782 pairs in 2010. Decreases during this period occurred in all recovery units except New England, where the population grew 7% between 2007 and 2010. Abundance in both the Eastern Canada and New York-New Jersey recovery units declined 15%, while the Southern recovery unit population experienced an 8% net decrease. The 64% decline in the Maine population between 2002 and 2008, from 66 pairs to 24 pairs, followed only a few years of decreased productivity and provides another example of the continuing risk of rapid and precipitous reversals in population growth. Thus, optimism about progress towards recovery should be tempered by observed geographic and temporal variability in population growth (USFWS 2012).

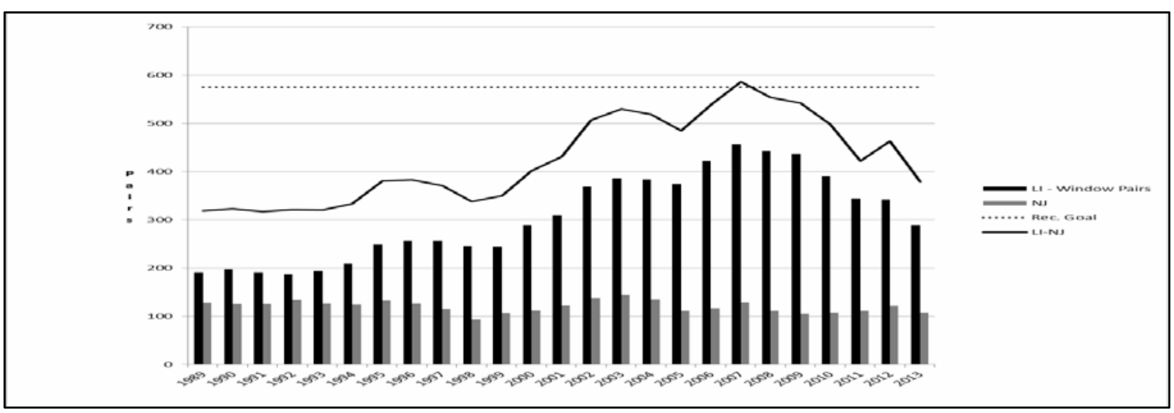


**Figure B-4 Graph showing Long Island and New Jersey piping plover populations in relation to the New York- New Jersey Recovery Unit recovery goal.**

**Piping Plover Habitat Utilization History along the Long Island Coast**

Overwash habitats, bayside flats, unstabilized and recently closed inlets, ephemeral pools (areas on the beach where sea and/or rain water pool during storm overwashes and rains), and moist, sparsely vegetated barrier flats are especially important to Piping Plover productivity and carrying capacity in the New England, NY-NJ, and Southern Recovery Units (*e.g*., Wilcox 1959; Strauss 1990; Massachusetts Division of Fisheries and Wildlife 1996; Jones 1997; Houghton *et al*. 2000; Cohen *et al.* 2003). In New York, Wilcox (1959) described the effects on Piping Plovers from storms in 1931 and 1938 that breached the Long Island barrier islands, forming Moriches and Shinnecock Inlets and leveling dunes across the south shore. Only three to four pairs of Piping Plovers nested on 17 mi. (27.4 km.) of barrier beach along Moriches and Shinnecock Bays in 1929. Following the natural opening of Moriches Inlet in 1931, plover abundance increased to 20 pairs in 2 mi. (3.2 km.) of beach habitat by 1938. In 1938, a hurricane opened Shinnecock Inlet and also eroded dunes along both Shinnecock and Moriches Bays. In 1941, plover abundance along the same 17 mi. (27.4 km.) of beach peaked at 64 pairs. Abundance then gradually decreased, a decline that Wilcox (1959) attributed to loss of habitat due to beach nourishment to rebuild dunes, the planting of beach grass, and the construction of roads and summer homes. Elias *et al.* (2000), in a study of nest site selection on 55.8 mi. (90 km.) of beach, stretching from Jones Beach Island to Westhampton Barrier Island, New York, found that Piping Plover use of ephemeral pools and bay tidal flats was greater than expected based on habitat availability. Arthropod abundances (a prey base for Piping Plovers), plover foraging rates, and brood survival were highest in these habitats. Ephemeral pools and tidal flats produced 51 of 81 surviving broods (63 percent), although they accounted for only 12 percent of the habitat surveyed. The authors observed that these “superior habitats” were rare in their study area and that this may be due, in part, to beach development and management practices, including attempts to stabilize beaches by means of jetty construction, breach filling, and beach renourishment. They concluded that the retention of adequate high quality habitats is important to raising Piping Plover productivity rates to levels that will allow the species’ recovery. Fire Island has a history of sporadic overwashes and formation and closures of inlets (Leatherman and Allen 1985) which have renewed habitats important to Piping Plovers (Elias-Gerken 1994). Compared to the baseline for the last several hundred years, the frequency of overwashes and breaches on Fire Island has decreased since the 1938 hurricane, apparently due to anthropogenic barrier island stabilization (Elias-Gerken 1994). However, overwash habitat formed in Old Inlet in the early to mid-1990s and early 2000s. Fire Island would probably be covered with more overwashes, more open vegetation, and perhaps more inlets if humans had not begun to counter natural geologic processes and storm-related changes to barrier island morphology following the 1938 hurricane (Leatherman and Allen 1985). On Fire Island, where ephemeral pools, bayside overwash fans, and sandspits were absent and where broods had access only to oceanic foraging habitats, Elias-Gerken (1994) found that the majority of Piping Plovers tended to cluster near the barrier island tips at Moriches Inlet (Smith Point County Park and Cupsogue County Park) and Democrat Point (Robert Moses State Park).

**Predation of Piping Plovers**

Predators of piping plover eggs and chicks within the New York-New Jersey Recovery Unit include, but are not limited to, red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), herring gull (*Larus argentatus*), great black-backed gull (*Larus marinus*), and crow (*Corvus brachyrhyncos*), as well as feral and domestic cats. Beach stabilization may be exacerbating natural predation on Piping Plover adults, eggs, and chicks by promoting human use which introduces pets and other natural predators of the Piping Plover (U.S. Fish and Wildlife Service 1996a). For example, unleashed domestic dogs destroyed at least two nests within the Corps' Westhampton Interim Project Area, a nourished beach, in 2003 (Cohen, Virginia Tech, pers. comm., 2003); Raithel (1984) reported that the availability of trash at beach homes led to an increase in local populations of raccoons. Wilcox (1959) observed 92 percent hatching success of nests between 1939 and 1958 in Long Island, New York (a period of less beach development and stabilization), with loss of only two percent of nests to crows. Elias-Gerken (1994) observed crows perching and nesting in Japanese black pines (*Pinus thunbergii*) that were planted to stabilize the beaches and provide wind breaks on Jones Island, New York, and hypothesized that this vegetation and other perches, such as electric light poles, exacerbated depredation by crows on Piping Plovers, as the author reported the loss of 21 percent of nests in her study area to crows in 1992 and 1993. Gulls and crows are also major predators at other vital Long Island nesting areas (Kiesel, pers. comm., 2000; Davis, *unpublished report*, 2002). Avian predators such as crows and blackbirds (Icteridae sp.) were a significant source of predation during the 2003 breeding season at the Corps' Westhampton Interim Project Area, Westhampton, New York (Cohen, Virginia Tech, pers. comm., 2003). A variety of techniques are employed to reduce nest predation. Predator exclosures have reduced predation on Piping Plover eggs and increased hatching success at many nesting sites on the Atlantic Coast (Rimmer and Deblinger 1990; Melvin *et al.* 1992; Canale, New Jersey Department of Environmental Protection, *in litt*., 1997). The use of predator exclosures has been associated with increased mortality due to entanglements of adult birds in the exclosure netting, attraction of predators, and vandalism. Vandalism of exclosures (and symbolic fencing) may influence a land managers' decision to deploy exclosures (Davis, *unpublished report*, 2002). Exclosures may also be an attractant to predators. In 1995, foxes keyed in on exclosures causing high rates of Piping Plover nest abandonment and low productivity in 1995 (Houghton *et al.* 1997).

### B.4.2.2 LIFE HISTORY RED KNOT

The red knot (*Calidris canutus*) was added to the list of Federal candidate species in 2006. A proposed rule to list the rufa subspecies (*C. c. rufa*), the subject of this Opinion, as threatened under the Endangered Species Act (ESA) was published on September 30, 2013, and a final decision is expected in the fall of 2014. Red knots are federally protected under the Migratory Bird Treaty Act, and are New Jersey State-listed as endangered. The red knot is currently listed as endangered or threatened in New York State.

Red knots were heavily hunted for both market and sport during the 19th and early 20th centuries in the Northeast and the mid-Atlantic. Red knot population declines were noted by several authors of the day, whose writings recorded a period of intensive hunting followed by the introduction of regulations and at least partial population recovery.

*Calidris canutus* is classified in the Class Aves, Order Charadriiformes, Family Scolopacidae, Subfamily Scolopacinae. Six subspecies are recognized, each with distinctive morphological traits (i.e., body size and plumage characteristics), migration routes, and annual cycles. Each subspecies is believed to occupy a distinct breeding area in various parts of the Arctic but some subspecies overlap in certain wintering and migration areas (FWS BO 2014).

*Calidris canutus canutus, C. c. piersma,* and *C. c. rogersi* do not occur in North America. The subspecies *C.c. islandica* breeds in the northeastern Canadian High Arctic and Greenland, migrates through Iceland and Norway, and winters in western Europe (Committee on the Status of Endangered Wildlife in Canada. *C. c. rufa* breeds in the central Canadian Arctic (just south of the *C. c. islandica* breeding grounds) and winters along the Atlantic coast and the Gulf of Mexico coast (Gulf coast) of North America, in the Caribbean, and along the north and southeast coasts of South America including the island of Tierra del Fuego at the southern tip of Argentina and Chile (FWS BO 2014).

The rufa red knot is a medium-sized shorebird about 9 to 11 inches (in) (23 to 28 centimeters (cm)) in length. The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed (FWS BO 2014).

The red knot is a large, bulky sandpiper with a short, straight, black bill. During the breeding season, the legs are dark brown to black, and the breast and belly are a characteristic russet color that ranges from salmon-red to brick-red. Males are generally brighter shades of red, with a more distinct line through the eye. When not breeding, both sexes look alike – plain gray above and dirty white below with faint, dark streaking. As with most shorebirds, the long-winged, strong-flying knots fly in groups, sometimes with other species. Red knots feed on invertebrates, especially small clams, mussels, and snails, but also crustaceans, marine worms, and horseshoe crab eggs. On the breeding grounds, knots mainly eat insects (FWS BO 2014).

Small numbers of red knots may occur in New Jersey year-round, while large numbers of birds rely on New Jersey's coastal stopover habitats during the spring (mid-May through early June) and fall (late-July through November) migration periods. Smaller numbers of knots may spend all or part of the winter in New Jersey. Red knots also rely on New York’s coastal stopover habitats during the spring and fall migration periods. As stated above, several stopover habitats in New York are being proposed for critical habitat designations (FWS BO 2014).

The primary wintering areas for the rufa red knot include the southern tip of South America, northern Brazil, the Caribbean, and the southeastern and Gulf coasts of the U.S. The rufa red knot breeds in the tundra of the central Canadian Arctic. Some of these robin-sized shorebirds fly more than 9,300 miles from south to north every spring and reverse the trip every autumn, making the rufa red knot one of the longest-distance migrating animals. Migrating red knots can complete non-stop flights of 1,500 miles or more, converging on critical stopover areas to rest and refuel along the way. Large flocks of red knots arrive at stopover areas along the Delaware Bay and New York/New Jersey's Atlantic coast each spring, with many of the birds having flown directly from northern Brazil. The spring migration is timed to coincide with the spawning season for the horseshoe crab (*Limulus polyphemus*). Horseshoe crab eggs provide a rich, easily digestible food source for migrating birds. Mussel beds on New Jersey's southern Atlantic coast and intertidal/wrack line areas on New York’s coast are also important forage habitats for migrating knots. Birds arrive at stopover areas with depleted energy reserves and must quickly rebuild their body fat to complete their migration to Arctic breeding areas. During their brief 10- to 14-day spring stay in the mid-Atlantic, red knots can nearly double their body weight.

Major spring stopover areas along the Atlantic coast include Río Gallegos, Península Valdés, and San Antonio Oeste (Patagonia, Argentina); Lagoa do Peixe (eastern Brazil, State of Rio Grande do Sul); Maranhão (northern Brazil); the Virginia barrier islands (United States); and Delaware Bay (Delaware, New Jersey and New York, United States) (Cohen *et al*.. 2009, p. 939; Niles *et al*.. 2008, p. 19; González 2005, p. 14). However, large and small groups of red knots, sometimes numbering in the thousands, may occur in suitable habitats all along the Atlantic and Gulf coasts from Argentina to Massachusetts (Niles *et al*.. 2008, p. 29). In Massachusetts, red knots use sandy beaches and tidal mudflats during fall migration. In New York and the Atlantic coast of New Jersey, knots use sandy beaches during spring and fall migration (Niles *et al*.. 2008, p. 30).

From geolocators, examples of spring migratory tracks are available for three red knots that wintered in South America. One flew about 4,000 mi (6,400 km) over water from northeast Brazil in 6 days. Another flew about 5,000 mi (8,000 km) from the southern Atlantic coast of Brazil (near Uruguay) over land and water (the eastern Caribbean) in 6 days. Both touched down in North Carolina, and then used Delaware Bay as the final stopover before departing for the arctic breeding grounds (Niles *et al*.. 2010a, p. 126). A third red knot, which had wintered in Tierra del Fuego, followed an overland route through the interior of South America, departing near the Venezuela-Colombia border. This bird then flew over the Caribbean to Florida, and finally to Delaware Bay (Niles 2011a).

In Delaware Bay, red knots preferentially feed in microhabitats where horseshoe crab eggs are concentrated, such as at horseshoe crab nests (Fraser *et al.*. 2010, p. 99), at shoreline discontinuities (e.g., creek mouths) (Botton *et al.*. 1994, p. 614), and in the wrack line (Nordstrom *et al.*. 2006a, p. 438; Karpanty *et al.*. 2011, pp. 990, 992). (The wrack line is the beach zone just above the high tide line where seaweed and other organic debris are deposited by the tides.) Wrack may also be a significant foraging microhabitat outside Delaware Bay, for example where mussel spat (i.e., juvenile stages) are attached to deposits of tide-cast material. Wrack material also concentrates certain invertebrates such as amphipods, insects, and marine worms (Kluft and Ginsberg 2009, p. vi), which are secondary prey species for red knots (see Migration and Wintering Food, below).

For many shorebirds, the supra-tidal (above the high tide) sandy habitats of inlets provide important areas for roosting, especially at higher tides when intertidal habitats are inundated (Harrington 2008, pp. 4–5). Along the Atlantic coast, dynamic and ephemeral features are important red knot habitats, including sand spits, islets, shoals, and sandbars, often associated with inlets (Harrington 2008, p. 2). From South Carolina to Florida, red knots are found in significantly higher numbers at inlets than at other coastal sites (Harrington 2008, pp. 4–5).

The District is not aware of comprehensive monitoring of red knots on Long Island, New York. Some data is available from individual birders or associated with horseshoe crab monitoring. At Plum Beach in Brooklyn, NY, recorded red knot abundances during horseshoe crab surveys in 2009 and 2010 decreased from 31 (peak of 28 on May 29) in 2009 to 2 (on May 31) in 2010 (New York City Audubon 2010). Individual birders have documented red knot presence at Overlook County Park (May 2013 – 5 red knots) and Cupsogue County Park (June 2007 – 150 red knots) (Ebird website- http://ebird.org/ebird/subnational2/US-NY-103/hotspots).

**Threats to Red Knot**

Much of the U.S. coast within the range of the red knot is already extensively developed. Direct loss of shorebird habitats occurred over the past century as substantial commercial and residential developments were constructed in and adjacent to ocean and estuarine beaches along the Atlantic and Gulf coasts. In addition, red knot habitat was also lost indirectly, as sediment supplies were reduced and stabilization structures were constructed to protect developed areas.

Sea level rise and human activities within coastal watersheds can lead to long-term reductions in sediment supply to the coast. Damming of rivers, bulkheading highlands, and armoring coastal bluffs have reduced erosion in natural source areas and, consequently, the sediment loads reaching coastal areas. Although it is difficult to quantify, the cumulative reduction in sediment supply from human activities may contribute to the long-term shoreline erosion rate. Along coastlines subject to sediment deficits, the amount of sediment supplied to the coast is less than that lost to storms and coastal sinks (inlet channels, bays, and upland deposits), leading to long-term shoreline recession.

Red knots require open habitats that allow them to see potential predators and that are away from tall perches used by avian predators. Invasive species, particularly woody species, degrade or eliminate the suitability of red knot roosting and foraging habitats by forming dense stands of vegetation. Although not a primary cause of habitat loss, invasive species can be a regionally important contributor to the overall loss and degradation of the red knot's nonbreeding habitat.

Commercial harvest of horseshoe crabs has been implicated as a causal factor in the decline of the rufa red knot by decreasing the availability of horseshoe crab eggs in the Delaware Bay stopover (Niles *et al.*. 2008, pp. 1-2). Notwithstanding the importance of the horseshoe crab and Delaware Bay, other lines of evidence suggest that the rufa red knot also faces threats to its food resources throughout its range.

About 40 percent of the U.S. coastline within the range of the red knot is already developed, and much of this developed area is stabilized by a combination of existing hard structures and ongoing beach nourishment programs. In those portions of the range for which data are available (New Jersey and North Carolina to Texas), about 40 percent of inlets, a preferred red knot habitat, are hard-stabilized, dredged, or both. Hard stabilization structures and dredging degrade and often eliminate existing red knot habitats, and in many cases prevent the formation of new shorebird habitats. Beach nourishment may temporarily maintain suboptimal shorebird habitats where they would otherwise be lost as a result of hard structures, but beach nourishment also has adverse effects to red knots and their habitats. Demographic and economic pressures remain strong to continue existing programs of shoreline stabilization and to develop additional areas, with an estimated 20 to 33 percent of the coast still available for development. However, we expect existing beach nourishment programs will likely face eventual constraints of budget and sediment availability as sea level rises. In those times and places that artificial beach maintenance is abandoned, the remaining alternatives would likely be limited to either a retreat from the coast or increased use of hard structures to protect development. The quantity of red knot habitat would be markedly decreased by a proliferation of hard structures. Red knot habitat would be significantly increased by retreat, but only where hard stabilization structures do not exist or where they get dismantled. The cumulative loss of habitat across the nonbreeding range could affect the ability of red knots to complete their annual cycles, possibly affecting fitness and survival, and is thereby likely to negatively influence the long-term survival of the rufa red knot.

In wintering and migration areas, the most common predators of red knots are peregrine falcons (*Falco peregrinus*), harriers (*Circus* spp.), accipiters (Family Accipitridae), merlins (*F. columbarius*), shorteared owls (*Asio flammeus*), and greater black-backed gulls (*Larus marinus*) (Niles *et al.* 2008, p. 28). In addition to greater black-backed gulls, other large gulls (e.g., herring gulls (*Larus argentatus*)) are anecdotally known to prey on shorebirds. Predation by a great horned owl (*Bubo virginianus*) has been documented in Florida Nearly all documented predation of wintering red knots in Florida has been by avian, not terrestrial, predators (2014 FWS BO). However, in migration areas like Delaware Bay, terrestrial predators such as red foxes (*Vulpes vulpes*) and feral cats (*Felis catus*) may be a threat to red knots by causing disturbance, but direct mortality from these p redators may be low (Niles *et al.* 2008, p. 101).

Red knots' selection of high-tide roosting areas on the coast appears to be strongly influenced by raptor predation, something well demonstrated in other shorebirds (Niles *et al.*. 2008, p. 28). Red knots require roosting habitats away from vegetation and structures that could harbor predators (Niles *et al.*. 2008, p. 63). Red knots' usage of foraging habitat can also be affected by the presence of predators, possibly affecting the birds' ability to prepare for their final flights to the arctic breeding grounds (Watts 2009) (e.g., if the knots are pushed out of those areas with the highest prey density or quality). In 2010, horseshoe crab egg densities were very high in Mispillion Harbor, Delaware, but red knot use was low because peregrine falcons were regularly hunting shorebirds in that area (Niles 2010a). Growing numbers of peregrine falcons on the Delaware Bay and New Jersey's Atlantic coasts are decreasing the suitability of a number of important shorebird areas (Niles 2010a). Analyzing survey data from the Virginia stopover area, Watts (2009) found the density of red knots far (greater than 3.7 mi (6 km)) from peregrine nests was nearly eight times higher than close (0 to 1.9 mi (0 to 3 km)) to peregrine nests. In addition, red knot density in Virginia was significantly higher close to peregrine nests during those years when peregrine territories were not active compared to years when they were (Watts 2009).

The quantity and quality of red knot prey may also be affected by the placement of sediment for beach nourishment or disposal of dredged material. Invertebrates may be crushed or buried during project construction. Although some benthic species can burrow through a thin layer of additional sediment, thicker layers (over 35 in (90 cm)) smother the benthic fauna. By means of this vertical burrowing, recolonization from adjacent areas, or both, the benthic faunal communities typically recover. Recovery can take as little as 2 weeks or as long as 2 years, but usually averages 2 to 7 months (Burlas et al 2001; Peterson and Manning 2001, p. 1). Although many studies have concluded that invertebrate communities recovered following sand placement, uncertainty remains about the effects of sand placement on invertebrate communities and how these impacts may affect red knots.

### B.4.2.3 ATLANTIC SHORES PIPING PLOVER AND RED KNOT PREY SPECIES

**Atlantic Shore Invertebrates Communities**

The benthic community of the marine nearshore environment includes a variety of benthic invertebrates, several of which are commercially and recreationally important. Within the marine nearshore habitat of the Study Area, there is a high degree of spatial and seasonal uniformity in both species composition and abundance (USACE 2004a). Benthic invertebrate communities in the marine nearshore habitat are generally similar in distribution and composition to that of the marine offshore habitat and consist of a variety of taxa common to generally clean, well-oxygenated, coarse, sandy, subtidal marine habitats. Indicator benthic invertebrate species that characterize the marine nearshore environment of the Study Area include polychaetes, amphipods, sea stars, and *Yoldia* species of bivalves (USACE 2006a). Epibenthic invertebrates include numerous shrimp species, and indicator pelagic species include jellyfish and zooplankton. Commercial and recreationally indicator species include several species of clams including surf clam and ocean quahog, horseshoe crab, American lobster, and long-finned and short-finned squid (USACE 2006a).

A review of USACE studies conducted within the marine nearshore habitat of the Study Area in 2000 and 2001 (USACE 2004a), identified the dominant invertebrates collected as segmented worms (phylum Annelida), snails, clams and squid species (phylum Mollusca), crabs, American lobster, various shrimp species (phylum Arthropoda), and sea urchins and sea stars (phylum Echinodermata).

Commercially important benthic species such as surf clams, and long- and short-finned squid are harvested within the marine nearshore habitat of the Study Area. The greatest concentrations of surf clams are associated with depths less than 65 feet (USFWS 1997b), however this species is not commercially significant throughout the Study Area due to its recent decline in population.

NOAA defines the marine intertidal zone as the area that is periodically flooded with tidal waters (NOAA 2008a), which would include those areas inundated and exposed approximately twice per month during the spring and neap tidal cycles associated with the new and full phases of the moon. Because of the alternate inundation and drying of this zone, the species richness of the benthic community of the marine intertidal region tends to be lower in comparison to that of other marine habitats discussed. Representative benthic invertebrate species identified in the FIMP Conceptual Model for marine intertidal habitats of the Study Area include the polychaete species *Scolelepsis*, amphipods, isopods (phylum Isopoda), *Donax* species of bivalves, and mole crab (*Emerita* sp. [USACE 2006a]). Attached and sessile forms of benthic invertebrates identified as indicator species within the marine habitat include barnacles (*Balanus* spp.), limpets (phylum Mollusca, class Gastropoda), mussel species (phylum Mollusca, class Bivalvia), chitons (phylum Mollusca, class Polyplacophora), hermit crabs, and numerous snail species (phylum Mollusca, class Gastropoda). Barnacles, blue mussel, common eastern chitons (*Chaetopleura apiculata*), hermit crabs, and snails (e.g., *Littorina littorea*) are especially adapted to live within the rocky intertidal zone located in the eastern portion of the Study Area [USFWS 2007d]). Benthic invertebrate surveys conducted within the marine intertidal zone of the Study Area revealed that the abundance and diversity of the benthic infauna increases from west to east, with the highest biomass attributed to polychaete worms (USFWS 2007d). One exception to the biomass results were associated with the rocky intertidal areas associated with the Montauk Headlands, which were dominated by mollusks, especially periwinkle (*Littorina littorea*).

Although the dry sandy substrate of the marine beach habitat excludes establishment of typical marine benthic invertebrates, other less water dependent invertebrates have adapted to spending at least a portion of their life cycle on the beach, particularly within the wrack line. Densities of all forms of beach invertebrates generally are relatively lower in comparison to other surrounding habitats, with the wrack line providing the primary source of food and cover for a myriad of invertebrates and saprophagous, scavenger, and predatory insects, and a variety of oligochaetes and nematodes typically found in this habitat type. No representative invertebrate species have been identified in the FIMP Conceptual Model for the marine beach habitat, however, a review of a invertebrate study conducted within the marine beach, and dunes and swales habitat of the Study Area identified amphipod beach fleas (*Talorchestia longicornis*, *T. megalopthalma* and *Orchestia grillus*) as the dominant invertebrate type collected (USACE 2005c). Other common invertebrate types collected within these zones include flies belonging to the families Dolichopodidae and Ephydridae, beetles belonging to the families Carabidae, Staphylinidae, and Histeridae, the ant *Lasius neoniger*, and mites (class Arachnida).

Due to similarities in tidal inundation and salinity levels, the benthic community of the inlets is similar to that of the marine nearshore environment, and represents important feeding areas for crabs and American lobster within the Study Area. Indicator benthic invertebrate species identified by the FIMP Conceptual Model prepared for the Study Area include polychaetes, horseshoe crabs, amphipods, sea stars, *Yoldia* spp., eastern mudsnail (*Nassarius obsoleta*), Say mud crab (*Dyspanopeus sayi*), hermit crabs of the Paguridae family, green crab (*Carcinus maenas*), and other species of crab as well as isopods and zooplankton. Epibenthic indicator invertebrates include numerous shrimp species and barnacles. Pelagic invertebrates such as jellyfish, and commercially and recreationally important species including the ocean quahog, American lobster, squid species, blue crab, blue mussel, Atlantic ribbed mussel (*Geukensia demissa*), surf clam, and softshell clam (*Mya arenaria*) have also been identified as indicator species for the inlet habitat of the Study Area.

**Barrier Island Invertebrates**

As with the marine beach habitat, the dryness of the dune and swale habitat excludes establishment of aquatic benthic invertebrates. It is likely that insects similar to those collected from the marine beach habitat described in Section 4.2.2 are also present on the adjacent dune and swale habitats. Although invertebrate densities are generally low within this habitat type, a variety of beetles, ants, and flying insects are present within this community. Historically, northeastern beach tiger beetles (*Cincindela dorsalis dorsalis*) were known to inhabit dune areas, but are believed to have been extirpated from Long Island (USFWS 1997b). Extirpation of this species has been largely attributed to destruction and disturbance of natural beach habitats as a result of shoreline development, beach stabilization structures, and the high rate of recreation use of the beaches. Further contributing to the extirpation of this species from the Long Island area is the high mortality rate of northeastern beach tiger beetle larvae that has been linked to those areas with a high rate of human activity.

Invertebrates of the terrestrial upland habitats of the barrier island habitat include a variety of insects and spiders, including beetles (order Coleoptera), wolf spiders (family Lycosidae) and jumping spider (family Salticidae). Ants (family Formicidae) and burrowing spiders (family Theraphosidae) are common as they are able to construct deep underground tunnels to escape hot summer temperatures. USACE (2006a) identified amphipods and isopods as the indicator benthic invertebrate species likely to inhabit the wrack zone and upland habitats of the bayside beach.

### B.4.2.3 SEABEACH AMARANTH DESCRIPTION

#### Listing

On April 7, 1993, seabeach amaranth was added to the List of Endangered and Threatened Wildlife and Plants as a threatened species. The listing was 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 (U.S. Fish and Wildlife Service 1993). No critical habitat, as defined under the ESA, has been designated for this species.

#### Life History

Seabeach amaranth (family *Amaranthaceae*) is an annual plant native to the barrier island beaches of the Atlantic Coast from Massachusetts to South Carolina. The original range of this species extended from Cape Cod, Massachusetts, to central South Carolina, a stretch of coast approximately 994 mi. (1,600 km.). The range of seabeach amaranth is characterized by islands developed by highwave energy, low tidal energy, frequent overwash, and frequent breaching by hurricanes with resulting formation of new inlets (Weakley and Bucher 1992). Within its range, the species' primary habitat consists of overwash flats at accreting ends of barrier islands, and lower foredunes and upper strands of non-eroding beaches. Seabeach amaranth is never found on beaches where the foredune is scarped by undermining water at high storm tides (Weakley and Bucher 1992).

Occasionally, small, temporary, and casual populations are established in secondary habitats such as blowouts in foredunes, and sand or shell dredge spoil or beach nourishment material (Weakley and Bucher 1992). Upon germination, the plant initially forms a small, unbranched sprig. Soon after, it begins to branch profusely into a low-growing mat.

Seabeach amaranth's fleshy stems are prostrate at the base, erect or somewhat reclining at the tips, and pink, red, or reddish in color. The leaves of seabeach amaranth are small, rounded, and fleshy, spinach-green in color, with a characteristic notch at the rounded tip. Leaves are approximately 1.3 to 2.5 cm. in diameter and clustered towards the tip of the stem (Weakley and Bucher 1992). Plants often grow to 30 cm. in diameter, consisting of 5 to 20 branches, but occasionally reach 90 cm. in diameter, with 100 or more branches. Flowers and fruits are inconspicuous, borne in clusters along the stems. Seeds are 2.5 mm. in diameter, dark reddish-brown, and glossy, borne in low-density, fleshy, iridescent utricles (bladder-like seed capsules or fruits), 4 to 6 mm. long (Weakley and Bucher 1992). The seed does not completely fill the utricle, leaving an air-filled space (U.S. Fish and Wildlife Service 1996b). Many utricles remain attached to the parent plant and are never dispersed, leading to *in situ* planting. This phenomenon has also been observed in sea rocket (*Cakile edentula*) and may be an adaptation to dynamic beach conditions. If conditions remain favorable at the site of the parent plant, then seed source for retention of that site is guaranteed. When habitat conditions become unsuitable, other seeds have been dispersed to colonize new sites (Weakley and Bucher 1992). Individual plants live only one season with only a single opportunity to produce seed. The species overwinters entirely as seeds.

Germination of seedlings begins in April and continues at least through July. In the northern part of the range, germination occurs slightly later, typically late June through early August. Reproductive maturity is determined by size rather than age and flowering begins as soon as plants have reached sufficient size. Even very small plants can flower under certain conditions. Flowering sometimes begins as early as June in the Carolinas but more typically commences in July and continues until the death of the plant. Seed production begins in July or August and reaches a peak in most years in September. Seed production likewise continues until the plant dies. Senescence and death occur in late fall or early winter (U.S. Fish and Wildlife Service 1996b). While seabeach amaranth seems capable of essentially indeterminate growth (Weakley and Bucher 1992), predation and weather events, including rainfall, hurricanes, and temperature extremes, have significant effects on the length of the species' reproductive season. As a result of one or more of these influences, the flowering and fruiting period can be terminated as early as June or July (U.S. Fish and Wildlife Service 1993).

Seabeach amaranth does not occur on well-vegetated beaches, particularly where perennials have become strongly established (Weakley and Bucher 1992). Pauley *et al*. (1999) documented a negative correlation between seabeach amaranth and several dominant foredune species. A particularly strong negative association has been reported between seabeach amaranth and beach grasses (*Ammophila* sp.) (U.S. Fish and Wildlife Service 1996b). A positive correlation has been observed between seabeach amaranth and sea rocket, an annual plant (Hancock 1995). Historic records of seabeach amaranth are known from nine states. Largely due to human activities such as trampling during recreation and beach stabilization, the species was eliminated from seven of these states in the 1980s, remaining only in the North and South Carolinas. Seabeach amaranth is still considered extirpated from Massachusetts and Rhode Island. Since 1990, the species has reoccupied five states from which it had previously been extirpated. The current known range of naturally occurring seabeach amaranth is Water Mill Beach on Long Island, New York, to Debidue Beach, South Carolina (Young 2003; Hamilton 2000a).

The plant is eliminated from existing habitats by competition and erosion and colonizes newly-formed habitats by dispersal and (probably) long-lived seed banks. A poor competitor, seabeach amaranth is eliminated from sites where perennials have become established, probably because of root competition for scarce water and nutrient supplies (Weakley and Bucher 1992). The same physical forces (*e.g*., storms and extreme high tides) that create the plant's very specific and ephemeral coastal habitat also destroy it. Existing habitats are eroded away but new habitats are created by island overwash and breaching. Therefore, seabeach amaranth requires extensive areas of barrier island beaches and inlets, functioning in a relatively natural and dynamic manner. Such conditions allow the plant to move around in the landscape, occupying suitable habitats as they are formed (U.S. Fish and Wildlife Service 1996b). Seeds are dispersed by a variety of mechanisms involving transport via wind and water. Seeds retained in utricles are easily blown about, deposited in depressions, the lee behind plants, or in the surf. Naked seeds are also commonly encountered in the field and are also dispersed by wind, but to a much lesser degree than seeds retained in utricles. Naked seeds tend to remain in the lee of the parent plant or get moved to nearby depressions (Weakley and Bucher 1992). Observations from South Carolina indicate that seabeach amaranth seeds are also dispersed by birds through ingestion and eventually deposited with their droppings (Hamilton 2000b).

**Population Dynamics**

Density of seabeach amaranth is extremely variable within and between populations. The species generally occurs in a sparse to very sparse distribution pattern, even in the most suitable habitats. A typical density is 100 plants per linear km. of beach, though occasionally on accreting beaches, dense populations of 1,000 plants per linear km. of beach can be found. Island-end sand flats generally have higher densities than oceanfront beaches (Weakley and Bucher 1992). Seabeach amaranth has been found to have a strongly clumped distribution (Hancock 1995). On Long Island, New York, however, dense assemblages and high abundances have been recorded on central barrier island locations (Young 2002). Within its primary habitats, seabeach amaranth concentrations can be found in the wrackline (Mangels 1991; Weakley and Bucher 1992; Hancock 1995; MacAvoy 2000). In 2001, a study by Pauley *et al.* (1999) suggested that organic litter may be an advantageous microhabitat for seabeach amaranth when it contains higher levels of organic material and moisture than bare sand.

**Range-wide Status and Distribution**

Because of the species vulnerability to threats and the fact that it has already been eliminated from two-thirds of its range, the species was Federally-listed as threatened by the Service in 1993. Weakley and Bucher (1992) completed range-wide surveys of seabeach amaranth at known historical sites in 1987 and 1988. In 1987, 39 populations contained a total of 11,740 plants. In 1988, 45 populations contained a total of 43,651 plants, representing a one-year increase of 372 percent. A survey in 1990 revealed 43 populations with a total of 11,075 plants in the Carolinas plus an additional 13 populations with 357 plants which reappeared on Long Island, New York (Clements and Mangels 1990). Even with the addition of the New York populations, the 1990 survey documented a range-wide reduction of 74 percent from the 1988 census. Due to the limited number of surveys, consecutive data over the last three years (2000-2002) was only available for the states of Delaware, New Jersey, and New York. In New York State, the New York State Natural Heritage Program (NYSNHP) has collected data over those years. The 2000 population of seabeach amaranth had an uneven geographic distribution, with almost 99 percent of the plants located on Long Island, New York. A single site on Long Beach Island, New York, comprised 75 percent of the total plants range-wide. Of the 39 extant sites documented in 2000, eleven had 100 or more plants (seven in New York, two in New Jersey, and two in North Carolina), and four had 1,000 or more plants (all in New York). Seventeen sites had fewer than ten plants (three in New York, one in Maryland, eleven in North Carolina, and two in South Carolina) (Young 2003; MacAvoy 2000; National Park Service 2001a and 2001b; Jolls and Sellers 2000; U.S. Army Corps of Engineers 2001b; Hamilton 2000a). Historically, seabeach amaranth occurred in nine states from Massachusetts to South Carolina.

The populations which have been extirpated are believed to have succumbed as a result of hard shoreline stabilization structures, erosion, tidal inundation, and possibly as a result of herbivory by webworms (U.S. Fish and Wildlife Service 1994). The continued existence of the plant is threatened by these activities (Elias-Gerken 1994; Van Schoik and Antenen 1993) as well as the adverse alteration of essential habitat primarily as a result of “soft” shoreline stabilization (beach nourishment, artificial dune creation, and beach grass plantings), but also from beach grooming and other causes (Murdock 1993). Populations of seabeach amaranth at any given site are extremely variable (Weakley and Bucher 1992) and can fluctuate by several orders of magnitude from year to year. The primary reasons for the natural variability of seabeach amaranth are the dynamic nature of its habitat and the significant effects of stochastic factors such as weather and storms on mortality and reproductive rates. Although wide fluctuations in species populations tend to increase the risk of extinction, variable population sizes are a natural condition for seabeach amaranth and the species is well adapted to its ecological niche.

**Recreational and Off Road Vehicle (ORV) Impacts to Seabeach Amaranth**

Intensive recreational use and ORV traffic on beaches can threaten seabeach amaranth populations, both through direct damage and mortality of plants and by impacting their habitats. Light pedestrian traffic, even during the growing season, usually has little effect on seabeach amaranth (U.S. Fish and Wildlife Service 1993). Problems generally arise only on narrow beaches or beaches which receive heavy recreational use. In such areas, seabeach amaranth populations are sometimes eliminated or reduced by repeated trampling. Off-road vehicle use on the beach during the growing season can have detrimental effects on the species, as the fleshy stems of this plant are brittle and easily broken. Plants generally do not survive even a single pass by a truck tire (Weakley and Bucher 1992). In some cases, winter ORV traffic may actually provide some benefits for the species by setting back succession of perennial grasses and shrubs with which seabeach amaranth cannot successfully compete. But, extremely heavy ORV use, even in winter, may have some negative impacts, including pulverization of seeds (Weakley and Bucher 1992).

**Herbivory**

Predation by webworms (caterpillars of small moths) is a major source of mortality and lowered fecundity in the Carolinas, often defoliating plants by early fall (U.S. Fish and Wildlife Service 1993). Defoliation at this season appears to result in premature senescence and mortality, reducing seed production, the most basic and critical parameter in the life cycle of an annual plant. Webworm predation may decrease seed production by more than 50 percent (Weakley and Bucher 1992). In New York, herbivory by saltmarsh caterpillars (*Estigmene acraea*) has been observed (U.S. Fish and Wildlife Service 1996b). Webworm herbivory of seabeach amaranth has not been documented in Delaware or Maryland. Overall, webworm herbivory is probably a contributing, rather than a leading factor, in the decline of seabeach amaranth. In combination with extensive habitat alteration, severe herbivory could threaten the existence of the species (Weakley and Bucher 1992).

**New Threats**

New threats (mammalian and avian herbivores and disease) to seabeach amaranth have been documented since the species was listed in 1993. These factors are lesser threats than habitat modification, but may increase the risk of extinction by compounding the effects of other, more severe threats. Several additional herbivores of seabeach amaranth have been observed including white-tailed deer (*Odocoileus virginianus*), rabbits (*Sylvilagus floridanus*), and migratory songbirds (Van Schoik and Antenen 1993).

The first known disease of seabeach amaranth was documented in South Carolina in 2000. During the 2000 growing season, an oomycete (*Albugo* sp.) was observed on seabeach amaranth in several South Carolina sites (Strand and Hamilton 2000). This pathogen is a white rust or water mold. Effects on infected individuals were significant, resulting in death of the plants two to four weeks after lesions were first observed. Anecdotal observations suggest that isolated plants tended to avoid infection (Strand and Hamilton 2000).

**Direct Impacts to Affected Species**

The definition of "Take" of beach species (i.e. piping plover and amaranth) from construction and other beach activities includes harm or harassment to individuals from construction or other project related activities such as disturbance to animals and their habitat. For the plant species, this includes amaranth mortality and burial of its seed bank due to fill placement.

Seabeach amaranth, red knot and piping plover could be directly impacted under this alternative, as sand would be placed on sections of beach involving manipulation of the beach area by construction equipment. However, historical and current distribution of these species has not been in the community areas where part of the project is proposed. There are six recorded locations of seabeach amaranth on Fire Island. Historically the largest concentrations of the plant have been recorded at Democrat Point and Smith Point. Most of the piping plover and nest occurrences have been recorded outside of the Wilderness area, however birds and nests have been located in or around communities in front but mainly flanking the communities' boarders to the east or west. In the areas of active plover nesting the project would be constructed outside of the April 1 – September 1 window or a 100 meter buffer put in place to protect the species.

Therefore, direct impacts on listed species are not anticipated for two reasons. First, listed species are not expected to occur in the community areas since existing beach profiles and human disturbance conditions are for the most part unsuitable. Second, the projects activities will restrict activity to the time of year when species are not present to avoid and minimize direct impacts. Plovers are expected to leave the area by August, and amaranth, although presence is unlikely, is expected to have peaked in seed production by September.

A requirement of beach nourishment is to conduct surveys for both species (per USFWS conservation measures protocol) prior to and during such activities so that species status is accurately determined. If active breeding plovers are present, then no sand placement will be conducted. If amaranth is present, then protective fencing (per USFWS conservation measure protocol) will be used as a protective buffer and monitored until natural annual mortality occurs. In the unlikely event of amaranth presence and construction activities unable to avoid plants physically or time of year, plants could be transplanted to similar nearby project site habitat and protected through fencing and educational signs and monitored. Burial of seed bank with sand placement on the beach is also a potential adverse impact. An additional measure to minimize and compensate for any amaranth direct take, seeds would be collected and germinated and replanted in the project site and protected through natural senescence (per USFWS protocol, USFWS 2002).

**Potential Indirect Impacts to the Affected Species**

Potential indirect impacts are anticipated to plovers, red knot and amaranth and their habitat. Beach nourishment could have both beneficial and adverse effects on these beach-dependent species. If the result of the sand placement produces a higher, wider beach and more available, suitable habitat for both amaranth and plovers, there can be potential positive habitat impacts. This could reduce flooding and potential loss of individuals and progeny (young and seed bank) and provide additional habitat for more colonization.

On the other hand, creating additional habitat in heavily disturbed community areas could result in sub-optimal or nonfunctional habitat, which could also result in a population sink. Wider, higher beaches could attract and result in higher recreational use and an increase in predation with additional habitat available for predators. Numerous studies have documented the direct and indirect adverse effects of human disturbance on piping plovers (Burger 1987, Melvin et. al. 1992, Howard et. al. 1993, Elias-Gerken and Fraser 1994, and Strauss 1990).

Since the ocean beaches already receive high public use and have protected areas for rare flora and fauna, no shift or change in existing use is expected. This is also the case with human induced predator impacts, as both beach conditions and predator populations fluctuate and cycle.

Further, construction activities would temporarily impact beach invertebrates and prey base of plovers as well as the potential habitat and seed bank of amaranth. Intertidal zone prey base would be affected, as project activities would place material below the high tide line. These impacts will be short term and minimal due to time of year placement and the amount of intertidal are along LI.  Placement of sand on the dune could also bury amaranth seeds and affect the integrity of the plant community.

The construction of the beach and dune building could preclude natural overwash processes and early successional habitat formation in the short term within the footprint of the project, but also noting that majority of the coastline will not be effected by this project. Nourishment would also bury or remove established beach vegetation and temporarily retard vegetative growth. It would provide a gently sloping beach and wider intertidal areas for increased plover breeding and foraging and invertebrate amaranth colonization. The project could also bury or temporarily remove the wrack line, an important source of prey for plovers.

Nourishment of the beach towards more stabilized conditions can preclude natural habitat formation, including overwash and back-bay foraging sites. The habitat resulting from the activities will be temporarily changed, as well as available prey base (potential removal of wrack/beach invertebrates). These conditions may be positive or negative, as more beach will be available as breeding habitat, but natural habitat formation of overwash areas could be precluded. These manipulated conditions are expected to be temporary and localized and quickly recover and recolonize with prey. Effects of this project are recognized to not last through the dynamic winters the shoreline will returned to its natural configuration within few years. The project will allow for overwash in all the other areas outside the project area along Fire Island.

The District has identified the following potential indirect adverse effects to listed species resulting from implementation of the project:

- Disturbance to prey base and temporarily reduced prey availability (destruction of beach invertebrates and wrack line);
- Reduction of potential for formation and maintenance of overwash or bayside breeding and foraging habitat;
- Disturbance through enhancing beaches to attract increased recreational activities on oceanside beaches;
- Increased potential predator populations/activity that could utilize habitat created by the project;
- Changes in existing habitats on FIIS (could be positive or negative);

The District coordinated with the Department of Interior (NPS and USFWS), NYSDEC and Suffolk County and developed a consensus-based modifications to the proposed beach fill component of the TSP that would provide increased protection and improved productivity for listed species, including the piping plover. In addition, the District will conduct pre-construction field surveys for active piping plover nesting areas. Beach fill would not be placed within 1000 m of active populations of piping plover or other state or Federally-listed shorebirds/seabirds during the breeding season.

The proposed activities would cause short-term impacts to amaranth by potentially covering the seeds or plants. However, as noted above, amaranth is limited to inhabit the Project area. In addition, similar to the recommendations provided by NYSDEC and USFWS for the piping plover, the District will implement several measures in an effort to minimize potential adverse impacts to existing seabeach amaranth populations (USACE 1998, USFWS 1999). These impact minimization measures include the following: pre and post-construction surveys of the Project area to determine the presence/absence of seabeach amaranth; education of residents, landowners, beach visitors, and beach managers; and the use of physical deterrents to deter human use of potential seabeach amaranth habitat. Because seabeach amaranth has not been identified as occurring in the majority of the Project area and because measures will be taken to minimize access to areas that are shown to have amaranth, No Effect determination was made on populations of seabeach amaranth related to the implementation of these actions.

Construction of the Project is likely to increase overall habitat suitability for seabeach amaranth along the affected beachfront. Although the planned beach berm is designed for an elevation of 9.5 ft NGVD, which is slightly higher than seabeach amaranth's preferred elevation, as the beach berm slopes toward the ocean, there will be a zone that falls within the plants preferred elevation range. Expanding the beach and particularly the zone most suitable for amaranth would likely provide habitat for seabeach amaranth.

A summary of Project activities and their effects on populations of seabeach amaranth are presented in Table 5.

**Table 4. Summary of Project Effects on Populations of Red Knot Piping Plover.**

| Activities | Potentially Beneficial | Not Likely to Adversely Affect | Likely to Adversely Affect | No Effect |
|---|---|---|---|---|
| **No-Action** | X | | | |
| **Project** | | | | |
| Staging Area Construction and Use | | X | | |
| Beach Fill/Dune Construction | | X | | |
| **Cumulative** | | | | |
| Beach Fill/Dune as Coordinated with DOI | X | X | | |

**Table 5. Summary of Project Effects on Populations of Seabeach Amaranth.**

| Activities | Potentially Beneficial | Not Likely to Adversely Affect | Likely to Adversely Affect | No Effect |
|---|---|---|---|---|
| **No-Action** | X | | | |
| **Project** | | | | |
| Staging Area Construction and Use | | X | | |
| Beach fill/Dune Creation | X | X | | |
| **Cumulative** | | | | |

| | | | | |
|---|---|---|---|---|
| Beach fill/Dune Creation | X | X | | |

### B.4.2.4 BACK BAY ECOSYSTEM

**Back bay Invertebrates**

The bay intertidal habitat of the Study Area extends from MHW to MLW on the bay side of the barrier island, and includes sand shoals, sand flats, mud flats, and salt marsh habitats. Benthic invertebrates of the bay intertidal habitat must be adapted to life in regularly changing conditions of alternating submersion in salt water and then exposure to air. Benthic invertebrates of the bay intertidal habitat can be attached to hard structures or live on top of sediment (epifauna), or live in association with sediments (infauna). Epifauna typically feed on particulate matter associated with the attached biota. Examples of attached forms of epifauna include barnacles, mussels and limpets, and free-living forms include amphipods and other crustaceans such as crabs, and sea stars. Benthic invertebrates of the bay subtidal habitat are those adapted to fine-grained sediments typical of this habitat.

Invertebrate indicator species identified in the FIMP Conceptual model for the bay intertidal habitat include horseshoe crab, barnacles, eastern mudsnail, Say mud crab, hermit crab, green crab and other crab species, amphipods, isopods, sea stars and zooplankton (USACE 2006a).

Commercially and recreationally important invertebrates of the bay intertidal habitat include blue mussel, Atlantic ribbed mussel, blue crab, and softshell clam. Great South Bay and Moriches Bay are important spawning grounds for blue crab (USFWS 1991). Blue crab also spawns in the shallow salt marsh areas located along the fringes of the Study Area estuaries.

Two invertebrate surveys have been conducted by USACE in both marine intertidal and bay intertidal areas of the Study Area. In general, a higher density of invertebrates within the bay intertidal habitat was found in comparison to samples collected from similar marine intertidal habitats (USACE 1999d and 2005c). Sediment cores collected within the bay intertidal habitat were dominated by oligochaete worms and nematode representatives, with blue mussel dominating one of the wrack line samples in the 1998 study (USACE 1999d). Pitfall fall traps set out within the bay intertidal habitats generally had a higher catch per unit effort in comparison to pitfall traps located within similar marine intertidal habitats.

Sand shoal and sand/mud flat habitats support many of the species described for the bay intertidal habitat, and include horseshoe crab, fiddler crabs (*Uca pugilator* and *U. pugnax*), and the commercially and recreationally important blue mussel, Atlantic ribbed mussel, and softshell clam (USACE 2006a).

Invertebrate indicator species of the salt marsh habitat of the Study Area include horseshoe crab, barnacles, eastern mudsnail, Say mud crab, blue crab, hermit crab, other crab species, amphipods, and isopods (USACE 2006a). Indicator invertebrates of the salt marsh habitat that are considered commercially and recreationally important are the blue mussel and Atlantic ribbed mussel.

Several invertebrate species have been identified in the FIMP Conceptual Model as indicator species for the bay subtidal habitat of the Study Area. These include the crab species Say mud crab, green crab, and other crab species, comb jelly (phylum Ctenophora), sea star, polychaetes, jellyfish, shrimp species, and zooplankton (USACE 2006a). Indicator invertebrates of the bay subtidal habitat that are considered commercially and recreationally important include hard clam (*Mercenaria mercenaria*), blue crab, and scallop. Great South Bay and Moriches Bay are important spawning grounds for hard clam (USFWS 1991).

Beds of submerged aquatic vegetation (SAV) are one of the most important features of the bay subtidal habitat, because they provide nursery areas for finfish and a niche for colonization of epiphytic algae and invertebrates. Epiphytic algae attach to other algae, plants, and rocks, and can outcompete certain SAV species such as eelgrass for light (Bradley et al. 2002). They also provide unique habitat for a diverse assemblage of invertebrates, including habitat for the commercially and recreationally important blue mussel, Atlantic ribbed mussel and blue crab (USACE 2004c), all of which have been identified in the FIMP Conceptual Model as indicator species for the SAV habitat of the Study Area (USACE 2006a). Other indicator invertebrate species identified for SAV habitats of the Study Area include horseshoe crab, barnacles, eastern mudsnail, Say mud crab, hermit crab, green crab, other crab species, amphipods, isopods, softshell clam, hard clam, sea star, comb jelly, scallop, polychaetes, jellyfish, and shrimp species.

Beach seine surveys were conducted by USACE in 2004 and 2005 in Great South Bay, Moriches Bay, and Shinnecock Bay, as part of a SAV investigation in the Study Area. The 2004 survey collected a total of 50 invertebrate species, and overall the dominant invertebrate species collected were marsh grass shrimp (*Palaemonetes vulgaris*), green crab, Atlantic mud crab (*Panopeus herbstii*), comb jelly, eastern mudsnail, golden star tunicate (*Botryllus schlosseri)* and red beard sponge (*Microciona prolifera* [USACE 2004c]). Blue crab also was collected, but this species represented only 5 percent of the total catch. Other crab species collected included lady crab, rock crab, and spider crab, with each species making up 2 percent of the total catch. Similar results were obtained for the same study conducted in 2005 with blue mussel and green crab dominating the catch, and other crab species such as Atlantic mud crab and spider crab commonly collected (USACE 2006d). In addition to the SAV indicator invertebrates described in this section, Appendix C, Table C-6 provides a species list of additional invertebrates collected in the beach seine surveys in 2004 and 2005 as part of the SAV investigation (USACE 2006d). Scientific names that include an asterisk in Table C-6 are indictor invertebrate species for the SAV habitat of the Study Area.

**Back bay Birds**

Based on USACE surveys conducted in 2002 and 2003, relative to the amount of habitat surveyed throughout the FIMP Study Area, sand shoal and mudflats of the bayside intertidal areas had the highest species richness and abundance of all community types surveyed, with an average of 37.6 individuals observed per acre (USACE 2003a). Wading birds, shorebirds, and gulls utilized the narrow bayside intertidal areas, which were on average approximately 10 feet in width. The primary use of the sand shoal and mudflat areas by birds is for foraging activities, but significant numbers of birds also loaf on these areas when exposed during low tides.

Thirty-five (35) species were documented on the sand shoals and mudflats (USACE 2003b). The species most often observed include black-bellied plover (*Pluvialis squatarola*), common tern, dunlin (*Calidris alpina*), herring gull (*Larus argentatus*), and sanderling (*Calidris alba)*, which were using these areas primarily for foraging activities (USACE 2003b). Individuals from these species made up more than 50 percent of the birds observed in this habitat during a one-year period. Other species observed in this habitat include cormorants, American oystercatcher (*Haematopus palliates*), black duck, great egret (*Casmerodius albus*), greater yellowlegs (*Tringa melanoleuca*), spotted sandpiper, least sandpiper (*Calidris minutilla*), ruddy turnstone (*Arenaria interpres*), willet (*Catoptrophorus semipalmatus*), great blue heron (*Ardea herodias*), and great black-backed (*Larus marinus*), herring, and ring-billed (*Larus delawarensis*) gulls.

Forty-one (41) bird species were documented within the bay intertidal salt marsh habitat of the backbay ecosystem, including those marshes dominated by the invasive species common reed (USACE 2003b). Of these, 17 species were documented only in salt marshes with less than 50 percent cover of common reed. Based on habitat availability, salt marsh had one of the lowest numbers of individuals per acre recorded for the study relative to other habitats, with 13.4 individuals per acre. Common reed and common-reed/shrub dominated communities had 25 individuals per acre (USACE 2003b). Osprey, sharp-tail sparrow (*Ammodramus caudacutus*) seaside sparrow (*Ammodramus maritimus*), American oystercatcher, piping plover, and least tern as well as seabirds, egrets, herons, rails, other shorebirds, and migratory and resident passerine species are the FIMP Conceptual Model indicator species/groups for the salt marsh (including sand shoals and sand and mud flats) habitat type (USACE 2006a).

The large, open, relatively shallow waters of the bay subtidal habitat provide resting and staging areas for a variety of bays subtidal FIMP indicator species of waterfowl, cormorants, gulls, and loons, as well as common and least terns. The productive bay waters are known for high concentrations of wintering waterfowl, such as the American black duck and brant (*Branta bernicla)* (USFWS 1991). The black skimmer (*Rhynchops niger*) is another FIMP indicator species for this habitat type and is a common breeder in the Study Area and is often found utilizing bay subtidal areas for foraging. In addition, FIMP indicator species that characterize SAV habitat include recreationally and commercially important duck species (USFWS 1991), as well as wading birds (e.g., herons), shorebirds, and seabirds.

### B.4.2.5 MAINLAND UPLAND ECOSYSTEM

The mainland upland habitat generally extends from the landward limit of the bay intertidal MHW line to the landward limit of the Study Area (i.e., +16 feet NGVD), which generally correlates with Montauk Highway (Route 27). This habitat also includes mainland wetlands and coastal ponds. Along the Atlantic shorefront, mainland upland habitat begins at the landward toe of the primary dune, and along the mainland shoreline adjacent to backbay areas, this habitat also includes bayside beach. Although the FIMP Conceptual Model indicator species described for the coastal pond and freshwater wetland habitat were included in the barrier island upland ecosystem in the conceptual model for modeling purposes (USACE 2006a), these species are discussed in the mainland upland habitat, because it is within this habitat that a majority of the coastal ponds and freshwater wetlands are located.

## B.4.3 SIGNIFICANT HABITATS AND SPECIES

### B.4.3.1 *HABITATS OF CONCERN*

**Essential Fish Habitat**

The NMFS is responsible for enforcing the Magnuson-Stevens Fishery Conservation and Management Act (MFCMA [PL 95-265]), as amended through 2007 by the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act [PL 109-479]), which is intended to promote sustainable fisheries through ecosystem approach management and conservation. To implement the MSA, the NMFS and the eight regional Fishery Management Councils have identified and described Essential Fish Habitat (EFH) for each managed fish species. EFH can consist of both the water column (pelagic) and the underlying surface (seafloor) of a particular area. Areas designated as EFH contain habitat essential to the long-term survival and health of our nation's fisheries and include waters and substrate that are required for breeding, spawning and foraging.

**Significant Habitats**

The USFWS has identified Shinnecock Bay, Moriches Bay, Great South Bay, Montauk Peninsula, and South Fork Long Island Beaches as Significant Habitats and Complexes of the New York Bight Watershed (the large gulf area of the Atlantic Ocean extending generally from New Jersey to Long Island) (USFWS 1997b). These areas have been recognized as regionally significant habitats that support numerous populations of finfish and invertebrate species. In addition, all of the back bay waters, including bay intertidal and bay subtidal habitats within the Study Area have been designated as Significant Coastal Fish and Wildlife Habitats by the New York State Department of State (NYSDOS 2004).

The rocky intertidal zone of Montauk Point has been designated as a rare community by NYSDEC Natural Heritage Program (USFWS 1997b). The rocky intertidal zone is considered a generally rare habitat and has been assigned a rarity rank of S1, indicating that the habitat is very vulnerable in the state. The Montauk Point habitat is one of two large, high quality sites in New York State, which currently only has approximately 40 rocky intertidal habitats sites in New York. To ensure the protection of the rocky intertidal habitat associated with Montauk Point, USFWS has suggested that NOAA designate this area as a National Marine Sanctuary (USFWS 1997b).

The maritime freshwater interdunal swale community occupies certain low-lying and wet areas between the dunes in the barrier island ecosystem, dunes and swales habitat. This community generally supports a variety of plants designated as rare or unique by the NYNHP, and has been designated as a Significant Habitat by NYSDEC. The state listed rare species associated with the unusual maritime/coastal wetland conditions found in these swales include round-leaf boneset (*Eupatorium rotundifolium var. ovatum*) and state listed rare pine-barren sandwort (*Minuartia* *caroliniana*). The Federally threatened and state endangered seabeach amaranth is also known to occupy dune areas (USFWS 2007d).

SAV is considered unique habitat within the subtidal region, and establishment of SAV is dependent on suitable water quality, substrate, depth, and water currents. SAV is one of the most important features of the backbay ecosystem as it provides nursery areas for finfish and a niche for colonization of epiphytic algae and invertebrates.

**Other Potentially Significant Areas**

Although not part of the FIMP Study Area, Captree Island, Captree State Park, Oak Island, Oak Beach, Gilgo State Park, are located north of Fire Island Inlet and may fall within the area of potential affects from proposed Project activities. On Captree Island, several pairs of state threatened northern harrier are known to nest in the dense common reed and poison ivy stands, and seaside (*Ammodramus maritimus*) and sharptailed (*A. caudacutus*) sparrows and clapper rail nest on the marshes (USFWS 1991). The mosaic of tidal pools, marshes and sand/mud flats provides a rich summer feeding area for wading birds, including the snowy egret, great egret, tricolored heron (*E. tricolor*), little blue heron (*E. caerulea*), glossy ibis (*Plegadis falcinellus*), and American oystercatcher, and a migration stopover for shorebirds such as the whimbrel (*Numenius phaeopus*), yellowlegs (*Tringa* spp.), and black-bellied plover (*Pluvialis squatarola*). Migrating raptors, including peregrine falcon and merlin use the Captree Islands as foraging habitat. The Captree Islands have supported breeding least tern, marsh-nesting common tern, and a large mixed heronry (USFWS 1991). The entire area is an important foraging area for these species as well with the short-eared owl and northern harrier being a common winter residents.

The Oak Beach marsh is extremely productive, and is distinctive as one of the few remaining unditched salt marshes in the northeastern U.S. (USFWS 1991). Northern harriers may reach their highest New York State (and possibly northeastern U.S.) breeding densities here (USFWS 1991). There is also evidence that seaside and sharptailed sparrow densities are higher at Oak Beach than on adjacent ditched marshes. This is the only known location on Long Island where black rail (*Laterallus jamaicensis*) are regularly heard or observed (USFWS 1991). The marsh also supports nesting habitat for the American black and mallard ducks, Canada goose, and clapper rail, and is important as a spawning and/or nursery ground for weakfish, blue crab and forage fish species. The extensive tidal sand and mud flats are known for supporting high concentrations of shorebirds during migration especially sanderling (*Calidris alba*), sandpipers, dowitchers (*Limnodromus* spp.) and plover, while the shallow tidal pools are used as a feeding area by resident and migratory waterfowl and wading birds.

The second largest common tern nesting colony (over 4000 pairs in 1990) in the world is found behind the primary dunes at Cedar Beach. Ninety pairs of the Federally listed endangered roseate tern (the fourth largest colony in the northeastern U.S.) also nested at this site in 1990 (USFWS 1991). The colony also supports three pairs of the Federally threatened piping plover (*Charadrius melodus*) and about 200 pairs of state special concern black skimmer. A pair of northern harrier nests adjacent to the nearby salt marsh, and both harriers and short-eared owls use these marshes and dunes as foraging areas during winter. Cedar Beach is an area used by large numbers of nesting northern diamondback terrapins, which also feed and winter in the tidal areas north of the tern colony. A population of seabeach amaranth (*Amaranthus pumilis*), a candidate for listing under the ESA, occurs at Cedar Beach (USFWS 1991).

Gilgo Beach was one of the most productive least tern nesting colonies on Long Island. This area also supports breeding piping plover, seaside sparrow and northern harrier, as well as high concentrations of nesting northern diamondback terrapin (USFWS 1991).

### B.4.3.2 SPECIES OF CONCERN

A list of the Federally listed species that are known or believed to occur in the Study Area was obtained by conducting a search by county on the USFWS website and evaluation of species/habitat associations. Table B-6 provides the listed species that may occur within the Study Area, and their Federal and/or state status. Table B-7 lists each species and presents a summary of the habitats that they may utilize within the Study Area.

**Table B-6. Federally Listed Species That May Be Potentially Affected by the Project**

| Common Name | Scientific Name | Federal Status | New York State Status |
|---|---|---|---|
| ***Plants*** | | | |
| Sandplain gerardia | *Agalinis acuta* | Endangered | Endangered |
| Seabeach amaranth | *Amaranthus pumilus* | Threatened | Threatened [S2] |
| ***Birds*** | | | |
| Least tern | *Sterna antillarum* | Endangered | Threatened |
| Piping plover | *Charadrius melodus* | Threatened | Endangered |
| Red knot | *Calidris canutus* | Threatened | Candidate Species |
| Roseate tern | *Sterna dougallii* | Endangered | Endangered |

Sources: NYSDEC 2015, USFWS 2015, USACE 2014a

**Table B-7. Primary Habitat Associations in Study Area for Federal- and/or State-Listed and Candidate Species Potentially Affected by Project**

| Common Name | Common Associated Habitat |
|---|---|
| ***Plants*** | |
| Sandplain Gerardia | Mainland Upland, Terrestrial Upland, Dunes and Swales |
| Seabeach Amaranth | Marine Beach |
| ***Birds*** | |
| Least Tern | Marine Nearshore, Marine Intertidal, Marine Beach, Terrestrial Uplands, Bayside Beach, Bay Intertidal |
| Roseate tern | Marine nearshore, Marine Intertidal, Marine Beach |
| Piping Plover | Marine Beach, Terrestrial Upland, Bayside Beach, Bay Intertidal |
| Red Knot | Marine Intertidal, Rocky Shores, Marine Beach, Bayside Beach, Bay Intertidal |

Sources: NYSDEC 1993, USACE 1999b, USACE 2003b, NatureServe 2006, NYSDEC 2015, USFWS 2015, USACE 2014a

## Plants

**Sandplain Gerardia.** This plant is a small, pink-blossomed annual related to snapdragons, that grows in native grassland sites along coastal Cape Cod, Massachusetts, Long Island, New York, and in Rhode Island and Maryland (Thomas 2004). This species requires prairie grassland habitat dominated by native bunchgrasses, especially little bluestem (Jordan 2007). It is believed that a hemi-parasitic relationship exists between sandplain gerardia and little bluestem, in which the sandplain gerardia obtains nutrients and moisture from the bluestem roots. Significant remnant populations remain only at Sayville, the Hempstead Plains, and Montauk.

**Seabeach Amaranth.** This is an annual plant, typically found on actively accreting beaches (USACE 1999b). The species requires sparsely vegetated upper beach habitat that is not flooded during the growing season. In New York State, it tends to be found away from well-developed and stable dune systems and has an affinity for inlets, storm washouts, and other rapidly eroding or accreting shorelines, sometimes precariously close to the surf. Seabeach amaranth is usually found growing in nearly pure, unvegetated sand. In the Study Area, this species is visible between May and November. Seabeach amaranth seeds are dispersed by wind and water and are present on the beach year-round.

**Least Tern.** This species is a small, colonial nesting sea bird whose diet commonly consists of fish. McCormick (1975) identifies the least tern as a non-pelagic bird species that has breeding habitats within the Study Area. Least terns generally arrive in the Study Area in April–May (Cashin1994) and nest in open shoreline sites such as beaches, sandbars, and dredged material disposal areas with sparse vegetation, but typically on bare sand areas, sometimes containing shell fragments. Nesting activity continues through July and this species generally departs the Study Area by early September. It is common to see groups of fledged chicks on the beach in August, preparing for the early September migration. Breeding sites within the Study Area include Fire Island Democrat Point, Fire Island Pines, Watch Hill and Long Cove, Fire Island Wilderness, and Smith Point (NYSDEC 1997). During the USACE avian surveys in the Study Area, least terns were observed within beach and primary dune habitats and as flyovers. In May and June of 2002 a mixed colony of nearly 100 common and least tern was documented on the beach/primary dune area just east of Shinnecock Inlet; the colony was again documented at this location during 2003 spring surveys (USACE 2003a).

**Piping Plover.** Piping plovers are small, territorial shore birds that have been observed the Study Area and are known to breed on sandy beaches within Fire Island. Piping plovers frequent intertidal portions of ocean beaches, washover areas, mudflats, sand shoals, wrack lines, and shorelines of coastal ponds, lagoons, or salt marshes to feed predominantly on invertebrates. Wintering plovers on the Atlantic Coast are generally found at accreting ends of barrier islands, along sandy peninsulas, and near coastal inlets. They prefer dry, sandy, open beaches well above the high tide line as breeding sites, although openings in grassy dunes as small as 200 to 300 feet wide may also be used (Wilcox 1959). Mating generally begins in late March and continues through early June. Most nesting activity ceases by mid-August to September, when the birds begin to fly south for the winter.

Suitable nesting habitat within the Study Area includes: 1) a shallow depression in the sand between the high tide line and the foredune area; 2) sandflats at the end of sandpits; 3) blowout areas behind primary dunes; 4) sparsely vegetated dunes; and, 5) washover areas cut into or between dunes (USACE 1999b). Piping plovers may also nest on dredged material areas if sand, pebble, and shell fragments are present.

Piping plovers nest within the Study Area at several locations, including Democrat Point, Robert Moses, Smith Point, Cupsogue, Shinnecock East Hampton. Piping plover nests have been seen along the southern shore of Long Island in grassy areas at the edges of dunes, and sometimes behind dunes in blowout areas. Westhampton Beach is an important nesting beach for piping plover (USFWS 1997b) in the Study Area. During avian surveys conducted by USACE in 2002 and 2003, individuals and pairs of piping plovers were recorded in the beach/primary dune areas and as flyovers in several locations. According to USFWS, Hurricane Sandy created approximately 200 acres of new potential overwash habitat located within the Project Area. Below are the recent figures of piping plovers within the Project Area:

- 2015: Piping plovers: 154 window pairs, 255 fledglings
- 2014: Piping plovers: 155 window pairs, 204 fledglings
- 2013: Piping plovers: 153 window pairs, 134 fledglings
- 2012: Piping plovers: 193 window pairs, 152 fledglings
- 2011: Piping plovers: 187 window pairs, 192 fledglings (NYSDEC 2016).

**Red Knot.** This species has the appearance of a large bulky sandpiper, and is approximately 10 inches in length. Red knots winter along both the Atlantic and Pacific coasts from Massachusetts and California south to South America. This species breeds on the tundra in the Arctic regions of Canada and migrates long distances for the winter. Red knots that migrate to South America can make a round trip of close to 20,000 miles. During migration and in the winter they are typically found in very large flocks in primarily intertidal marine habitats, on tidal flats, rocky shores, and beaches, especially near coastal inlets, estuaries, and bays. On its tundra breeding ground, the red knot eats the seeds of sedges, horsetails and grass shoots, and also may eat invertebrates such as beetles and cutworm larvae. In its winter range, red knots eat horseshoe crabs and their eggs, marine worms, grasshoppers, and other invertebrates. This species was documented in the Study Area during 2003 bird surveys (USACE 2003a).

**Roseate Tern.** Roseate terns are medium sized terns that typically select nest sites located in sandy areas with about 80 percent vegetative cover, on small islands or at the ends of barrier beaches. Terns nest on coastal islands in colonies, concealing their nest under grass, rocks, driftwood, or other flotsam. Roseate terns can arrive in the Study Area as early as late April, and typically depart by October, or November at the latest (USFWS 1989). These terns forage for small schooling fish in areas including open ocean waters within approximately 1¼ mile offshore. Roseate terns are commonly found in breeding colonies with common terns and less frequently with Forster’s and arctic terns. Roseates have been reported as utilizing the barrier island to the west of Fire Island Inlet and islands within the backbay portions of the Study Area. A single roseate term was documented during two separate survey events during the 2002–2003 USACE avian surveys (USACE 2003a).

### B.5.1 NO-ACTION ALTERNATIVE (FWOP)

Potential habitats for threatened and endangered species and species of special concern occur within many habitat types in the Study Area, for species of invertebrates, finfish, birds, mammals, reptiles and amphibians. As an important area of coastal refuge for numerous wildlife species of concern, the Study Area will continue to provide critical habitat for threatened and endangered species under the FWOP scenario, as Federal and state protection measures for these species would remain in place. Direct loss of habitat over time poses the greatest potential impact to rare species, and if their habitats are affected in this way, population declines would be expected.

Rare, threatened and endangered species that are currently afforded legal protection would continue to be protected under the FWOP scenario. The FWOP scenario would require the continued compliance with the Endangered Species Act (ESA) of 1973 for local projects, which regulates and prevents the unauthorized "take" of listed species on pubic as well as private lands. Any Federal actions that are proposed within the Study Area will require agency consultations pursuant to Section 7 of the ESA. Non-Federal actions must be coordinated with the USFWS under Section 10 of the ESA regarding any protected or rare species that could potentially be impacted by the action. New York State also provides protection for state listed species under the New York Endangered Species Act. However, the Federal and state review of development projects, and legal protections afforded to threatened/endangered species, typically extend only to development projects for which Federal or state permits are required or public funds are committed. Therefore, certain types of development projects (such as some residential and commercial/industrial development projects) may be constructed without regulatory review and protection of threatened/endangered species.

### B.5.2 PREFERRED ALTERNATIVE (TSP)

The Study Area will continue to provide critical habitat for threatened and endangered species under the TSP, as Federal and state protection measures for these species would remain in place. Rare, threatened and endangered species that are currently afforded legal protection would continue to be protected.

The following potential indirect adverse effects to species of concern resulting from implementation of the TSP include:

- Disturbance to prey base and temporarily reduced prey availability (destruction of beach invertebrates and wrack line);
- Reduction of potential for formation and maintenance of overwash or bayside piping plover breeding and foraging habitat;
- Disturbance to piping plovers through enhancing beaches to attract increased recreational activities on oceanside beaches;
- Increased potential predator populations/activity that could utilize habitat created by the project; and
- Changes in existing plover and amaranth habitats on FIIS (could be positive or negative).
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### B.5.2.1 PLANTS

#### Sandplain Gerardia

Sandplain gerarida thrives in disturbed prairie grassland habitat that is sandy and open (Jordan 2007). Management of this species requires prescribed fires which may be essential for germination (Thomas 2013), and shrub cutting and mowing which rid the habitat of competitor species that would crowd out sandplain gerarida (Jordan 2007). The TSP could reduce the likelihood of coastal erosion and inundation of the upland ecosystem where this species occurs. If the building retrofit plan and a road-raising plan occur on sandplain gerarida habitat it may actually be beneficial to the species since it requires a disturbed habitat. These benefits would likely be outweighed if these plans reduce the amount of habitat available for this species. Since direct sand placement in grasslands is not part of the TSP no impacts from it are expected.

#### Seabeach Amaranth

The TSP could reduce the likelihood of breach formation (and subsequent development of potential habitat), and involves the movement of construction vehicles and placement of fill material within a zone of potential growth for the species and may experience negative impacts from the TSP.

Direct sand placement onto these plant species will result in mortality, with no chance of seed production, which may have a significant impact on the local population. Trampling by workers or construction equipment could also directly destroy the plants. Beach slope is another factor for the species habitat selection and use. The TSP will also indirectly impact these species by limiting new potential habitat areas.

Construction of the TSP is likely to increase overall habitat suitability for seabeach amaranth along the affected beachfront. Although the planned beach berm is designed for an elevation of 9.5 foot NGVD, which is slightly higher than seabeach amaranth's preferred elevation, as the beach berm slopes toward the ocean, there will be a zone that falls within the plants preferred elevation range. Expanding the beach and particularly the zone most suitable for amaranth would likely provide habitat for seabeach amaranth.

### B.5.2.2 *BIRDS*

#### Least and Roseate Tern

While roseate terns prefer breeding on moderately vegetated sandy deposits in isolated island colonies, least and common terns utilize similar nesting habitat as piping plovers. The placement of sand on the barrier beach has the potential to benefit both the least and common terns which show a distinct preference for nesting on open shorelines, barrier beach dunes, and dredge spoils (USACE 1999). Roseate terns usually nest in association with common terns in areas of slightly denser vegetative cover. It is anticipated that the TSP will protect the barrier and back-bay areas from extensive erosion, and would enhance protection of the back-barrier islands. Roseate terns may also benefit from a reduction in breach or washover events, which would allow beachgrass and other herbaceous vegetation to fill in. Conversely, the decrease in potential breaches may result in a reduction of specialized feeding habitat provided by tidal rips, sandbars, and bay inlets that roseate terns require.

**Piping Plover**

This species is known to nest within the Study Area at several locations. Stabilizing the eroding beaches under the TSP may have a positive effect on maintaining or increasing suitable shoreline nesting or feeding habitat in the long term (USACE 1999). If a breach is closed or an overwash area is formed the winter prior to the shorebird breeding season (April 1st - July 1st), piping plovers (in addition to other shorebirds) will immediately use the newly altered area for foraging. Gently sloping overwash fans that extend into the backbay marshes provide prime foraging habitat. Due to routine dynamic changes in washover or breach areas, the vegetation typically remains sparse. This provides optimal nesting habitat. The insects associated with the sparse vegetation (i.e., common ants and flies) also provide a food source for the foraging shorebirds. However, shorebirds that utilize washover areas for nesting may also be subject to increased predation, and to nest failure due to subsequent washovers at the same location. In direct contrast to the benefits derived from overwash deposits, a barrier island breach and continued beach erosion could have negative impacts on piping plovers. A breach occurring during the nesting season could result in the direct loss of eggs, and mortality of chicks and/or adults. Flood tidal deltas resulting from a breach may provide additional foraging areas for piping plovers. However, this benefit must be weighed against the loss of beachfront nesting habitat. Continued erosion of the beach and fore-dune can create erosion scarps, thereby degrading existing or other potential plover habitat.

Potential short term impacts to piping plover habitat could result from proposed filling activities, placement may temporarily decrease the habitat quality of the piping plover’s food source resulting in a decrease in the value of the foraging habitat until the beach is stabilized and its faunal community restored. Beach slope is also a critical factor for piping plover habitat selection and use. In order to maintain existing habitat conditions, the slope of the placement material will be consistent with adjacent existing beaches that contain successful brooding areas.

Conducting the beach fill operations outside of the piping plover nesting season is the easiest way to avoid adverse impacts. To minimize impacts to the species and habitat efforts would be made to artificially create and maintain high quality piping plover habitats, minimize direct disturbance to piping plover breeding on stabilized beaches, and reduce project induced effects of increased recreational disturbance.

**Red Knot**

This species is abundant on beach and dune communities of the similar barrier island during certain parts of the year (USACE 2003a). During migration and in the winter they are typically found in very large flocks in primarily intertidal marine habitats, on tidal flats, rocky shores, and beaches, especially near coastal inlets, estuaries, and bays. This species was documented in the Study Area during 2003 bird surveys (USACE 2003a). Stabilizing the eroding beaches under the TSP may have a positive effect on maintaining or increasing suitable shoreline feeding habitat in the long term (USACE 1999). Potential short term impacts to red knot habitat could result from proposed filling activities, placement may temporarily decrease the habitat quality of the red knot's food source resulting in a decrease in the value of the foraging habitat until the beach is stabilized and its faunal community restored. To minimize impacts to the species and habitat, efforts would be made to artificially create and maintain high quality red knot habitats and reduce project induced effects of increased recreational disturbance.

## B.6 CUMULATIVE IMPACTS

A cumulative impact assessment requires consideration of impacts beyond the site-specific direct and indirect impacts and consideration of effects that expand beyond the geographical extent of the proposed project. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The New York District based the cumulative impact analysis on the TSP and alternatives, other actions associated with the Study Area, and other activities in the surrounding region with the potential to contribute to cumulative environmental impacts.

The barrier beach environment exists in a continually changing state of "dynamic equilibrium" that depends on the size of the waves, changes in sea level relative to the land, the shape of the beach, and the beach sand supply. When any one of these factors changes, the others adjust accordingly. The TSP would partially break the cycle of storm damage in the Study Area that has built up over the years under the cumulative effect of natural processes acting on an environment altered by human' intervention. The additive damages to homes, businesses, the area's recreational resources, and its economy would be reduced. The use of natural and non-renewable resources in the salvage, repair, and reconstruction in the aftermath of storm damage would also be reduced. The discussion below addresses the potential for the TSP to result in cumulative effects on natural resources in the Study Area. It focuses on impacts related to dredging, sand placement, and non-structural actions (relocation, buyouts, and road raisings).

### B.6.1 DREDGING IMPACTS

The portion of borrow areas actively dredged for all the Federal projects located along the south shore represent a very small percentage of the total available habitat. These areas also are spatially distributed so that dredging impacts are not concentrated in any one portion of the Study Area. In addition, the borrow areas are sloped in a manner to prevent anoxic conditions. Finally, the substrate in the borrow areas is similar in composition to pre- and post-construction conditions, allowing for the recolonization of these areas, which should occur within 12 to 18 months following dredging operations. Thus, the cumulative effect of dredging on the ecology of the Study Area would not be significant. Cumulative impacts of dredging on artificial structure/reef communities will not be significant, since surveys will locate the majority of artificial reefs or shipwrecks, which will be avoided to allow, for efficient dredging operations.

### B.6.2 SAND PLACEMENT IMPACTS

Sand placement activities have the potential to directly affect the shoreline communities. These communities are located in dynamic, high energy areas where substrates are continuously shifting, eroding and accreting along the south shore of Long Island. Beach and surf zone, organisms are well adapted to their rigorous environments. Although a temporary loss of shallow nearshore/intertidal habitat would occur, a new sandy bottom will begin to recolonize shortly after construction ceases. Varying nourishment schedules and other project variables (contractor availability, funding, local conditions, etc.) may cause staggering of construction activities so that extensive stretches of the, shoreline are not nourished at the same time. In addition, only a short stretch (typically 500-1,000 feet) of beach is nourished at one time. This practice allows motile species to avoid area where beach fill placement will occur.

Federally listed threatened and endangered species exist in these shoreline communities and include the Federally threatened piping plover; Federally endangered roseate tern and the Federally threatened seabeach amaranth. The New York District has been coordinating and consults with USFWS in accordance with the ESA when projects in the Study Area have the potential of impacting affecting Federally listed species. Section 7 (of the ESA) consultation usually requires that construction occur outside of the breeding/growing season of these species and/or monitoring of these species during construction with the implementation of buffer areas to' minimize project-specific and cumulative impacts to these species.

### B.6.2 NON STRUCTURAL

The mainland non-structural plan consists of non-structural building retrofits, flood proofing, relocation, acquisition of approximately 4,400 structures (consisting of approximately 44 in Shinnecock Bay, 857 in Moriches Bay, and 3,110 in Great South Bay), and road raising in four locations. Building retrofit measures are proposed, and could include limited relocation or buyouts based upon structure type and condition. The proposed TSP provides protection to each building identified as having a ground elevation below the baseline condition 10-year flood elevation. For each building identified for protection, the design flood elevation is the baseline condition 100-year flood elevation plus two foot of freeboard. Varying construction schedules and other project variables (contractor availability, funding, local conditions, etc.) will cause staggering of construction activities so that extensive stretches of the project area are not being disturbed at the same time. It is not anticipated that any of the home will have any endangered species on the individual property. As part of the continuing coordination with the agencies and local government the District will ensure that no endangered species will be impacts by the construction of this project. It is the Districts intent to do a supplemental NEPA documentation per town or village as the non-structural moves forward. Cumulative impacts of the non-structural portion of this project will not be significant.

## B.7 UNAVOIDABLE ADVERSE EFFECTS AND CONSIDERATIONS THAT OFFSET ADVERSE EFFECTS

Some non-motile prey species that inhabit the intertidal and beach areas will unavoidably be lost during the beachfill operations. Those species that are not able to escape the construction area are expected to recolonize after project completion. This would be limited to the immediate areas of the projects footprint.

The FWOP as a baseline would not generate significant impacts and would not require mitigation. The TSP and Alternatives 1 and 2 would have the potential to result in similar impacts on natural resources. Best Management Practices (BMP's) have been developed as described below.

The action alternatives would include efforts to minimize impacts on barrier island vegetation and the sandy habitat of the piping plovers and red knot and the seabeach amaranth, which has been listed as a threatened plant species. For general habitat protection, existing vehicle routes on the barrier island will be used whenever possible, to reduce impacts on barrier island habitat. Impacts of vehicular traffic may cause disaggregation of drift lines, as well as destruction of annual and perennial plant seedlings. By limiting vehicular traffic to the previously established access routes, impacts to these habitats may be avoided or substantially minimized. Implementation of the action alternatives could potentially affect piping plover, red knot habitat and existing seabeach amaranth. The following minimization measures are therefore being proposed:

- During construction, a survey/monitoring effort will be undertaken to ensure adequate protection of these endangered species. Monitoring will be flexible. All findings will be reported to the USFWS for potential consultation to modify any procedures to reflect actual observed impacts and associated responses.

- Excavated sediments shall be placed directly into the disposal site. No side canting (double handling) or temporary storage of dredge material outside of the placement site is authorized.

- The storage of equipment and materials shall be confined to within the construction site and/or upland areas greater than 75 feet from the intertidal zone.

- The USFWS shall be notified of the start and completion date, of the proposed project.

- Symbolic fencing will be installed (under supervision of New York District biologists or designated representatives) on active piping plover nests within 1000 meters of the construction area.

- The contractor and employees shall be adequately informed of Endangered Species Act concerns, and contractor specifications written accordingly. These shall be highlighted prior to construction actions, when possible.

- A biologist will be on site during laying of the pipeline to ensure it is aligned in a practicable manner conducive to minimal adverse impact to plovers and amaranths, as determined by the New York District after consultation with the local, state, and Federal agencies involved with project review. During sand placement operations, the New York District will conduct on site monitoring to ensure that the activity is not impacting nesting and brooding behavior, and will fence habitats of concern for specific nests or plants.

- All fill shall consist of "clean" sand material, to maintain suitable piping plover and seabeach amaranth habitat.

### B.7.1 PIPING PLOVER AND RED KNOT

- Dredging will take place continuously (if practicable) from the time the pipe is laid until placement activities are completed. If practicable, the New York District will limit the operation by restricting dredging during the more sensitive, early nesting period in areas of active piping plover usage (April-August). The noise from sand moving through the pipeline to the placement area would be negligible as a cause of disturbance, since the birds are themselves adapted to louder natural surf sounds. All other sources of loud noise (i.e., earth moving equipment) will be muffled to minimize disturbances.

- The hydraulic pipeline will be placed in the offshore and nearshore zones as much as possible to allow the piping plover chick's access to the shoreline to feed. Pipeline burial or elevation on the beach will be undertaken, wherever practicable and feasible.

- A biologist or designated representative will be present during pipeline construction to ensure the approved alignment is adhered to. If a nest is present prior to pipeline construction, activities will be delayed to allow the plover chicks to fledge.

- Should a pair attempt to nest in close proximity to the pipe, actions would be taken to shield the nest from construction activity in its immediate vicinity until the chicks are fledged. Work would be redirected away from the nest via enclosure erection and fencing, which would also keep any chicks away from the placement area being filled.

### B.7.2 SEABEACH AMARANTH

- Biologist/botanist or designated representative will survey the area immediately prior to any construction activity within the piping plover, red knot and seabeach amaranth growing season (April 1 to November 1). Approximately twice a week the construction area will be surveyed. Records shall include species locations, numbers of individuals, and size of plants. If there is any seabeach amaranth present, seabeach amaranth locations will be recorded. If construction personnel or vehicles are at the site or might transit the site, symbolic fencing will be placed in a 10 foot-diameter ring.

- All construction activities shall avoid all delineated locations of seabeach amaranth where feasible. The New York District will undertake all practicable measures to avoid an incidental take. In the unlikely event that the species appears at the placement area, and there is a very good possibility that the surrounding placed sand will encroach upon and smother the plant, the New York District proposes to transplant the individual plant to a similar habitat near or within the project area to lessen the impact of placement. Transportation will include removal of a sufficiently large enough and intact volume of sand to include the full extent of the roots. This action, when necessary, will occur as soon as possible after the plant is identified, and every attempt will be made to include the entire (undamaged) root system.

- It is understood that this action, when feasible, will be undertaken for individual plants whose destruction could not be avoided. Seed collection or transplants will be attempted as a means of mitigating potential loss; this should not be construed as a long term commitment or research endeavor on the part of the New York District by replanting beyond the current year.

- Placement areas shall be finished to a natural grade with compatible material.

Given the measures summarized above, and the local implementation of existing USFWS protection measures, impacts to either piping plovers, red knot or seabeach amaranth associated with the proposed projects will be minimized. The precautions taken will allow dredging or upland source placement of fill and continuous operation, thereby providing the most cost-effective and expeditious operation, while minimizing long-term endangered species impacts.

## B.8 PROJECT MODIFICATIONS AND CONSERVATION MEASURES

To minimize adverse impacts on listed species, the New York District will continue to coordinate with the Department of the Interior USFWS and NYSDEC to develop modifications to the TSP that would provide increased protection and improved productivity. The New York District will also follow recommendations provided by the NYSDEC and USFWS that would minimize potential adverse indirect impacts on species that may use coastal habitats in the Study Area.

### Conservation Measures

The District will also follow recommendations provided by the NYSDEC and USFWS previously (USACE 1998, USFWS 1999) and are described below. These measures are expected to minimize potential adverse indirect impacts on numerous other species that may use coastal habitats (listed above) in the Project area, including several state-listed shorebird species.

However, due to the critical nature of the FIMP reach, construction activities not will occur during the piping plover breeding and nesting season (unless in the communities). To minimize impacts, the District will conduct surveys during the spring/summer, and prior to construction activities, to identify nesting plover in the Project area and to document all known locations of plover, red knot and seabeach amaranth. In addition, the USACE will document any other Federal or state-listed wildlife species observed in the Project area during survey and will initiate consultation with appropriate state and Federal agencies.

The Proposed Plan includes a number of conservation measures that will be implemented until the project is completed. The intended purpose of these conservation measures is to avoid or minimize adverse effects of this project to Federally-listed species.

**1. Project Design Features**

- Planting endemic vegetation at low densities (18 in. on center) on the dune/upper beach interface, reducing the density of beachgrass plantings on the south face of the dune (Risotto 2008), and developing a variable density planting scheme on the south side of the dune slopes.
- Contacting the Service upon initiation and completion of construction activities. Pre-construction meetings with all project staff will be held to provide all information on resource protection and terms of the project permit. Providing all project personnel, construction staff, etc. with information regarding the conditions of the project (including all conservation measures).
- Time-of-Year Restrictions, which will provide for no activities between April 1 and September 1 to protect piping plovers and May 1 to November 1 to protect seabeach amaranth (except in the communities). The Proposed Plan allows that, if breeding piping plovers are not observed in a proposed project area, or are not within 1000 meters of the project area by July 1, then project activities may commence, following consultation with the agencies.
- Provisions for the project to only undertake low impact construction activities, such as beach surveying or the installation of sand fencing, during the piping plover breeding season, utilizing a 300-ft protective buffer zone.

**2. Surveying, Monitoring, and Management**

- Surveying and monitoring of the action area for threatened and endangered species during the spring and summer nesting seasons. The monitoring will be completed in coordination with the land manager(s) and the Service. Monitoring will include identification of suitable habitats, nesting areas, symbolic fencing, and signage.
- Surveying and Monitoring will be undertaken by a qualified, designated biologist(s). Qualified biologists shall also work on the threatened and endangered species management activities (*e.g.*, coordinating with local communities and agencies, as well as organizing the pre-season planning) in community beach nourishment project areas. The qualified biologist will also recommend and implement changes in the location and configuration of symbolic fencing and warning signs and gauge the effectiveness of management actions. Biologists will

be educated about the biology of listed species and required to attend a piping plover management course organized by the Service, the NYSDEC, and The Nature Conservancy (TNC), prior to undertaking surveying, monitoring or management actions.

- Protection of breeding piping plovers and red knot on all suitable habitats in the action area from human disturbance (*e.g*., Off-road vehicles, hereafter ORVs, and recreational activities) and predation will be undertaken following the conditions outlined below. These conditions are also intended to offset impacts of habitat degradation and to assist in the recovery of the species.

- Suitable habitats within the project area(s) shall be protected through the placement of symbolic fencing and warning signs.

- Symbolic fencing is intended to avoid or minimize accidental crushing of nests and repeated flushing of incubating adults, as well as provide an area where chicks can rest and seek shelter when people are on the beach. Therefore, prior to the piping plover breeding or seabeach amaranth growing seasons, the applicant will coordinate with the land manager(s) and the Service biologists to design a “symbolic fencing plan.” Coordination on the placement of symbolic fencing will incorporate field population and habitat data for the project area and visual assessment of all oceanside and bayside habitats each year.

- Habitats will be deemed suitable if piping plovers, red knot and/or seabeach amaranth were observed at the site in previous years or the beach width, slope, cover material (shell fragments), etc., and are deemed adequate by the Service.

- Consistent with current FWS management measures, breeding and growing areas shall be protected with symbolic fencing using steel or CarsoniteTM fiberglass posts placed approximately 33 ft apart and connected with string or twine. Fluorescent flagging material will be tied to the string every 1.6 ft to increase visibility, and piping plover or seabeach amaranth habitat warning signs shall be placed on every second or third post. Posts stretch from the toe of the dune seaward to about 40 ft south of the toe of dune line. As sand accretes through the season, posts and fences may need to be moved seaward to maintain symbolic fencing at this distance.

- All pedestrian and ORV access into, or through, the active breeding or growing areas shall be prohibited. Walkways may be permitted after an assessment by a qualified biologist and with the permission of the Service. Only persons engaged in monitoring, management, or research activities shall enter the protected areas. These areas shall remain symbolically fenced for piping plovers until at least July 1, and as long thereafter as viable eggs or unfledged chicks are present. If no breeding piping plovers or their chicks are observed in the symbolically fenced areas, the fencing may be removed or reduced in scale provided that the seabeach amaranth is not present or the site is not suitable for seabeach amaranth. Symbolic fencing erected to protect seabeach amaranth shall be in place until the plant dies, or until November 1, whichever comes first.

- An area within each designated community will be allowed to be kept outside of the symbolically fenced area and open to the public for swimming and for visitor use. This area will be the normal area protected by lifeguards, where provided, but in no case will exceed more than two locations per community and will not exceed 1000 ft in width. The final locations for these designated swimming and visitor areas will be identified in the symbolic fence plan submitted by the permittee and approved by the Service.

- Beach access sites (*i.e.*, existing pedestrian dune crossings) will be evaluated each spring to determine if such access sites will be closed to pedestrian use (April 1 to July 1, if no birds are present; and from April 1 until the birds fledge, if there are plovers present). Such closures will be identified in the symbolic fence plan. Pedestrian dune crossings will allow direct community access to designated swim beaches and shall allow access to the beach in response to breeding activities.

- Population survey information shall include the total number of breeding pairs; the total number of piping plovers, paired and unpaired, within the action area; and detailed mapping of breeding (courtship, territorial, scrapes, egg-laying, incubating, and brood-rearing) and foraging use habitats in the action area. Productivity information shall include the total number of nests, the total number of fledged chicks per pair, and quantification of take, if observed, including eggs, chicks, and adults that occurred, including reasons for take and actions that were taken to avoid take.

- Surveys will be recorded and summarized, and plover locations will be recorded on maps, indicating areas surveyed and habitat types. Information collected will include the following:

    - date;
    - time begin/end;
    - weather conditions;
    - tidal stage;
    - area of coverage;
    - ownership of site;
    - number of adults observed;
    - number of pairs observed;
    - habitat type;
    - nearest known plover occurrence;
    - banded plovers; and
    - predator trail indices

- Surveys would be conducted three times weekly with observations evenly distributed over a minimum time period (to be determined). Survey time periods shall be conducted during daylight hours from 30 minutes after sunrise to 30 minutes before sunset and should include a wide range of tidal conditions and habitat types. Areas should be surveyed slowly and thoroughly and should not be conducted during poor weather (*e.g.*, heavy winds greater than 25 miles-per-hour (mph), heavy rains, and severe cold), since birds may seek protected areas during these times.

- *Predator Management:* The applicant is required to submit to the Service, a predator plan(mammalian) for pre-season and in-season predator monitoring program for all project areas. The predator monitoring plan will include measures needed to protect piping plovers, nests, and chicks.

### 3. ORV Management

Sections of intertidal beaches where unfledged piping plover chicks are present shall be temporarily closed to all ORVs. Areas where ORVs are prohibited shall include all dune, beach, and intertidal habitat within the chicks' foraging range, to be determined by either of the following methods:

The vehicle-free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 7,560-ft wide area of protected habitat for plover chicks should extend from the oceanside, low-water line to the farthest extent of dune habitat.

**OR**

If nests and chicks are monitored at least daily, vehicle-free areas may be reduced to not less than 656 ft on each side of the brood location. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, and in some cases, highly mobile broods may require protected areas up to 3,280 ft, even where they are intensively monitored. Protected areas should extend from the oceanside, low-water line to the farthest extent of dune habitat.

Restrictions on the use of ORVs in areas where unfledged plover chicks are present should begin on, or before, the date that hatching begins and continue until the chicks have fledged. For purposes of ORV management, plover chicks are considered fledged at 35 days of age, or when observed in sustained flight for at least 50 ft, whichever occurs first. When piping plover nests are found before the last egg is laid, restrictions on ORVs should begin on the 26th day after the last egg is laid. This assumes an average incubation period of 27 days and provides one day margin of error. When piping plover nests are found after the last egg has been laid, making it impossible to predict the hatch date, ORV restrictions shall begin on a date determined by one of the following scenarios:

**With intensive monitoring**: If the nest is monitored at least twice per day, at dawn and dusk (before 0600 hours [hrs] and after 1900 hrs) by a qualified biologist, ORV use may continue until hatching begins. Nests shall be monitored at dawn and dusk to minimize the time that hatching may go undetected if it occurs after dark. Nests shall be monitored from a distance with spotting scope or binoculars to minimize disturbance to incubating plovers.

OR

**Without intensive monitoring:** Restrictions should begin on May 15 (the earliest probable hatch date). If the nest is discovered after May 15, then restrictions should start immediately. If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on ORVs should begin immediately. If ruts are present that are deep enough to restrict the movements of plover chicks, then restrictions on ORVs should begin at least five days prior to the anticipated hatching date of the plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on ORVs should begin immediately. A corridor that is 25-ft wide shall be permitted along the water's edge, above the MHW line, and will be kept free of symbolic fencing along the entire project area as an ORV and emergency response corridor.

**4. Documentation of Commitments**

The Proposed Plan requires that applicants to the NPS for beach nourishment projects provide written documentation of their commitment(s) to carry out protection and conservation measures for listed species in their project areas.

**5. Access**

The Service and their authorized representatives will be allowed unrestricted access to all project sites within the action area for the purposes of conducting research, monitoring, enforcement, looking for evidence of rare, threatened, or endangered wildlife or plants, preserving or protecting habitat, and erecting symbolic fencing or exclosure fencing for the purpose of protecting wildlife or plants. Access will be permitted from the landward toe of the dune to the water's edge.

**6. Fireworks**

Fireworks shall be prohibited on beaches within 0.75 mi of where piping plovers nest from April 1 to September 1, or the last date of fledging. Guidelines for avoiding adverse effects from fireworks events can be found at:

http://www.fws.gov/northeast/pipingplover/fireworks.html.

**Overview of BMP for Listed Species**

**PIPING PLOVER**

1) The USACE will conduct surveys during the spring/summer, and prior to construction activities, to identify

2) nesting plover in the Project Area and to document all known locations of plover. In addition, the USACE will document any other Federal or state-listed wildlife species observed in the Project Area during survey and will initiate consultation with appropriate state and Federal agencies.
3) Symbolic fence and signs will be placed around all plover nests and brood rearing areas located in the construction area to deter use of the area and to protect sites from incidental disturbance from construction activities.
4) The USACE will conduct construction activities near known plover nesting areas from September 2 through April 1 to avoid the key shorebird nesting period (outside of the communities).
5) Construction activities will avoid all delineated locations of the species during the breeding season and will undertake all practicable measures to avoid incidental taking of the species.
6) The USACE will consult with the USFWS to identify acceptable alternatives should any plover nest sites be identified within the direct construction footprint.
7) The USACE will monitor the Project Area before, during and after construction.
8) The USACE will educate residents, landowners, beach visitors and beach managers on piping plover.
9) The USACE will encourage local agencies to place time restrictions on beach use by vehicles to avoid key nesting and fledging periods.
10) The USACE will conduct follow-up surveys of plover habitat within the Project Area. Surveys will be conducted for three consecutive nesting seasons post-construction and a summary report regarding habitat use and nesting will be provided annually to the USFWS.

**SEABEACH AMARANTH**

1) The USACE will conduct surveys during July/August to determine the presence/absence of seabeach amaranth within the Project Area and to document all known locations of amaranth. In addition, the USACE will document any other Federal or state-listed plant species observed in the Project Area during the survey and will initiate consultation with appropriate state and Federal agencies.
2) Symbolic fence and signs will be placed around all seabeach amaranth plants located in the construction area to deter use of the area and to protect plants.
3) The USACE will restrict construction activities in areas of known populations during the growing season (allow limited activities only, from June through November).
4) Construction activities will avoid all delineated locations of the plant and will undertake all practicable measures to avoid incidental taking of the plant.
5) The USACE will consult with the USFWS to identify acceptable alternatives should any seabeach amaranth plants are identified within the direct construction footprint.
6) The USACE will educate residents, landowners, beach visitors, and beach managers on seabeach amaranth.
7) The USACE will conduct follow-up surveys of amaranth habitat within the Project Area. Surveys will be conducted for three consecutive growing seasons post-construction and a summary report will be provided annually to the USFWS.

### RED KNOT

1) The USACE will conduct surveys during the spring/summer, and prior to construction activities, to identify red knots in the Project Area and to document all known locations. In addition, the USACE will document any other Federal or state-listed wildlife species observed in the Project Area during survey and will initiate consultation with appropriate state and Federal agencies.
2) Symbolic fence and signs will be placed around all red knot nests and brood rearing areas located in the construction area to deter use of the area and to protect sites from incidental disturbance from construction activities.
3) The USACE will conduct construction activities near known red knot nesting areas from September 2 through April 1 to avoid the key shorebird nesting period.
4) Construction activities will avoid all delineated locations of the species during the breeding season and will undertake all practicable measures to avoid incidental taking of the species.
5) The USACE will reinitiate consultation with the USFWS to identify acceptable alternatives should any plover nest sites be identified within the direct construction footprint.
6) The USACE will monitor the Project Area before, during and after construction.
7) The USACE will educate residents, landowners, beach visitors and beach managers on red knot.
8) The USACE will encourage local agencies to place time restrictions on beach use by vehicles to avoid key nesting and fledging periods.
9) The USACE will conduct follow-up surveys of red knot habitat within the Project Area. Surveys will be conducted for three consecutive nesting seasons post-construction and a summary report regarding habitat use and nesting will be provided annually to the USFWS.

## B.9 CONCLUSIONS

When trying to promote conservation goals using iconic species such as Piping Plover, Sea Beach Amaranth, or Red Knot, it is important to keep in mind that there are conflicting uses among stakeholders with competing legitimate goals. When a consensus is meet on the management goals among these stalk holders you will accomplish a more productive public policy to progress the species.

It is essential when formulating this management plan to work within the limitations of our location, rather than create a plan based on management plans for other areas with different characteristics (e.g. Westhampton Dunes). To accomplish this the FWS needs to look at management practices aimed at urban ecosystems, which differ greatly from managing forever wild or rural locations. There are many reports on urban ecosystems that successfully support native wildlife, as well as the active management efforts that accomplish this (DiCicco, 2014, Feinburg et al. 2014, Fisher 2011, Flores et al. 1998,). Central Park is an example of an early a planned construction intended as a naturalistic pastoral design (Brown 2013). Urbanization produces a variety of unprecedented and intense manipulations to an ecosystem. These include changes in disturbance regimes, biota, landscape structure, physiological stresses (e.g. air pollution), as well as include cultural, economic and political factors (McDonnell and Pickett 1990).

Assateague Island, Maryland is another location that should not be compared to this project. A relevant difference between the locations is that Assateague was in a natural state prior to the protective dune construction with a variety of habitats that included foraging and nesting areas inland from the barrier dune (Loegering et al. 1995) and most nests had been located behind and further away from the ocean than the constructed dune (Schupp et al 2013), therefore the creation of notches through the constructed dune that mimicked previously existing paths was logical and successful (Schupp et al. 2013). The Project area, however, has been heavily developed years ago, and majority of the Piping Plover activity for the past decades has been in front of existing dune system in these developed areas. No plover activity is known to have occurred in the much wider, unsuitable developed areaa behind these dunes, so providing access to unsuitable areas would not achieve the success of this listed species.

It is the USACE's determination that implementing the proposed action in accordance with the standards and guidelines recommended by USFWS and NYSDEC, will not jeopardize the continued existence or contribute to the loss of viability of either of the Federally-listed endangered or threatened species listed identified by the USFWS. In addition, the proposed action would not significantly contribute to cumulative impacts associated with piping plover, red knot and seabeach amaranth. Therefore, the USACE requests USFWS concurrence for a May Affect, but Not Likely to Adversely Affect determination for the piping plover, red knot and seabeach amaranth.

Each of the alternatives will affect the project shoreline as well as the species that inhabit them. The No Action Alternative appears to have the most unpredictable short and long-term impacts on natural resources due to the changeable nature of coastal dynamics and inlet/overwash formation. It could create additional overwash and back bay habitat with inlet formation, which may be advantageous to higher plover abundance and productivity. But the ephemeral nature of shoreline dynamics makes it difficult to predict the longevity and morphology of such newly created habitat as seen at Old Inlet. Additionally, though the creation of a new inlet could provide additional beaches suitable for plovers and other beach-dependent species, it is unclear whether the total shoreline within the project would gain or lose suitable habitat due to the changes in sand transport caused by the new inlet. Serious consideration should be given to the existing nesting beach habitat which may be affected by altered sand transport conditions along the coast as a result of a breach. A breach clearly would have significant adverse impacts on both cultural and human resources, due to the potential loss of numerous structures.

The implementation of this long-term proposed beach project is intended to reintroduce sediment that is passing through the system (that would be lost to the inlet) and reestablish it back to the erosive areas in the least intrusive way. It is one of the numerous NY/NJ shoreline coastal storm risk management projects, therefore contributing to the overall loss of natural coastal habitat. However, this project is in response to the adjacent pre-existing man induced changes which threaten the area, and attempts to reestablish the most natural shoreline processes possible through this sand recycling method. Continual replenishment of the beach by recycling smaller quantities of sand on a regular basis through a sand slurry pipeline operation would more closely mimic natural shoreline dynamics while increasing and stabilizing the beach habitat necessary to sustain the area's rare flora and fauna. The potential natural resource loss associated with this alternative is the prevention of overwash and back bay habitat formation which may at some point benefit or limit piping plover nesting populations.

As previously discussed, this proposed action would result in impacts to benthic communities (potential burial and habitat disturbances) and water quality (turbidity and dissolved oxygen) during active construction activities. However, these effects would be short-term, as the benthic communities will naturally begin to re-establish shortly after construction is completed, forming a similar community within a period of 6 months to 2 years (USFWS 1991, Burlas et al 2001, Peterson and Manning 2001). These impacts may result in a short-term reduction of forage material for piping plover in the immediate Project Area. However, plover will utilize nearby undisturbed areas for feeding. In addition, because sediments in the Project Area are sandy, any increased turbidity effects would generally be limited to the period of in-water construction, as this type of substrate tends to settle out of suspension quickly.

The Project would potentially result in direct and/or indirect disturbances to seabeach amaranth, red knot and piping plover and other nesting shorebirds/seabirds, including the Federally and state-listed least tern, roseate tern, and the state-listed common tern, if any are present in the Project vicinity during the time of construction. However, these impacts can largely be avoided if the period of construction is limited to periods outside of the piping plover nesting season which occurs from April 1 through September 1, and outside of the growing season for seabeach amaranth which extends from June through November in the designated historic (past three years) nesting areas. Therefore, the USACE has incorporated these construction window recommendations, as well as other recommendations from the USFWS, into the Project construction plans. In addition, the USACE will conduct a pre-construction survey for the piping plover and seabeach amaranth and will avoid disturbing these species if any are found within the construction area. As a result,
significant adverse impacts to these species are not expected. The USACE is in the process of completing coordination and consultation processes with the USFWS pursuant to the Fish and Wildlife Coordination Act and the ESA.

Because a site-specific survey will be conducted prior to implementation of the Project and NYSDEC and USFWS, standards and guidelines would be followed regarding the protection of species and potential habitat, implementation of the proposed action May Affect but, Not Likely Adversely Affect the piping plover, red knot or seabeach amaranth. Implementation of the proposed action would not contribute to the loss of viability of the piping plover, red knot or seabeach amaranth and thus, no additional measures to offset impacts to these species are necessary. When compared to the No Action alternative, implementation of the proposed action would benefit piping plover, red knot and seabeach amaranth, as well as other shorebird/seabird species, through habitat improvement and an increase in the availability of suitable habitat.

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# ATTACHMENT 1

## COPIES OF AGENCY CORRESPONDENCE REGARDING THREATENED AND ENDANGERED SPECIES

**DEPARTMENT OF THE ARMY**
**NEW YORK DISTRICT, CORPS OF ENGINEERS**
**JACOB K. JAVITS FEDERAL BUILDING**
**NEW YORK, N.Y. 10278-0090**

REPLY TO
ATTENTION OF

Environmental Analysis Branch

Ms. Kim Damon-Randall
Assistant Regional Administrator for Protected Resources
United States Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
Northeast Region
55 Great Republic Drive
Gloucester, MA 01930-2276

SUBJECT: Atlantic Coast of Long Island, Fire Island to Montauk Point (FIMP) Coastal Storm Risk Management Project

Dear Ms. Damon-Randall:

In compliance with our agencies' commitment to streamline Endangered Species Act (ESA) coordination, the U.S. Army Corps of Engineers, New York District (USACE-NYD) is submitting a request for informal Section 7 consultation on the above referenced project.

The New York District determined that the proposed action may affect, but is not likely adversely affect ESA listed species under your jurisdiction that may occur in the project area. Please see the Attachment for our Determination of Effects statement for the FIMP project.

It is requested that your office concur with the USACE-NYD determination. We thank you for your coordination and cooperation on this action. Additional information about the project is located at: www.nan.usace.army.mil/FIMP. If there are any questions or you require clarification on any of our submittals please do not hesitate to contact Jenine Gallo, Regional Technical Specialist at 917-790-8617, Catherine Alcoba, Section Chief at 917-790-8216 or Peter Weppler, Branch Chief at 917-790-8634.

Encl.

Sincerely,

Peter Weppler
Chief, Environmental Analysis Branch

Attachment

Fire Island to Montauk Point

1. *Project Description*

The Fire Island Inlet to Montauk Point, NY, Combined Beach Erosion Control and Hurricane Protection Project (FIMP) was authorized by the River and Harbor Act of 14 July 1960. The authorization provides for beach erosion control and hurricane protection along five reaches of the Atlantic Coast of New York from Fire Island Inlet to Montauk Point, a distance of about 83 miles, by widening the beaches along the developed areas to a minimum width of 100 feet, with an elevation of 14 feet above mean sea level, and by raising dunes to an elevation of 20 feet above mean sea level, from Fire Island Inlet to Hither Hills State Park, at Montauk and opposite Lake Montauk Harbor.

The Fire Island Inlet to Montauk Point, New York Combined Beach Erosion Control and Hurricane Protection Project (FIMP) was authorized by the River and Harbor Act of 1960. The project is being reformulated to identify a long-term solution to manage the risk of coastal storm damages along the densely populated and economically valuable south shore of Long Island, New York in a manner which balances the risks to human life and property, while maintaining, enhancing, and restoring ecosystem integrity and coastal biodiversity, and achieving multiple agency objectives.

There is a long history of damaging storms along the south shore of Long Island, as well as many efforts to mitigate the damages, including construction of several features of the authorized FIMP project that are described later in this chapter. The study area also includes critical coastal habitat and environmentally sensitive areas, such as the Fire Island National Seashore and the Smith Point County Park.

The project need has been demonstrated by repeated storms and breaches in the study area and the most recent impacts of Hurricane Sandy. A coordinated effort is necessary to reduce uncoordinated efforts to reduce vulnerability by various agencies and municipalities.

The Study Area extends from Fire Island Inlet east to Montauk Point along the Atlantic Coast of Suffolk County, Long Island, New York, a distance of about 83 miles (Figure 1.). It includes the barrier island chains from Fire Island Inlet to Shinnecock Inlet, and also the back-bay and lands adjacent too Great South, Moriches, and Shinnecock Bays, which comprise over 200 miles of shoreline that comprises the back bay and estuary system. The study area includes about 126 square miles on the mainland that are vulnerable to flooding.

Within the study area, ocean shoreline sand generally moves east to west alongshore, in response to waves, and currents during normal conditions and during storms. This alongshore movement of sand maintains the prevailing shoreline conditions. In addition to alongshore movement, sediment is also exchanged in the cross-shore direction, through erosion and accretion of the beach and dune, exchange of sand through tidal inlets, and during large storm events through the episodic transport of sand over the island through overwash or breaching.

There has been extensive development on both the barrier islands and the mainland floodplains and significant modifications to the natural systems and coastal processes. These include constructing jetties and providing navigation channels through Fire Island, Moriches, and Shinnecock Inlets and within the bays; constructing of groins, seawalls, revetment, bulkheads and other structures along the ocean and bays, placing fill and sand along the beaches; and ditching of wetlands for mosquito control.

The Study Area includes portions of the Towns of Babylon, Islip, Brookhaven, Southampton and Easthampton and 12 incorporated Villages. The Fire Island National Seashore (FIIS), the Poospatuck Indian Reservation and the Shinnecock Indian Reservation are all within the study area. The study area contains over 46,000 buildings, including 42,600 homes and more than 3,000 businesses. There are 60 schools, 2 hospitals, and 21 firehouses and police stations in the study area. Of the buildings within the study area, more than 9,000 fall within the modeled 100-yr floodplain (storm with a 1% probability of occurring in any given year, based upon current modeling).

Approximately 150,000 people reside within the coastal 100-year floodplain of the South Shore of Suffolk County (2010 U.S. Census). The study area is also includes a popular summer recreation area with a large seasonal influx of beachgoers and visitors, as well as businesses which support the year round and seasonal population of the area.

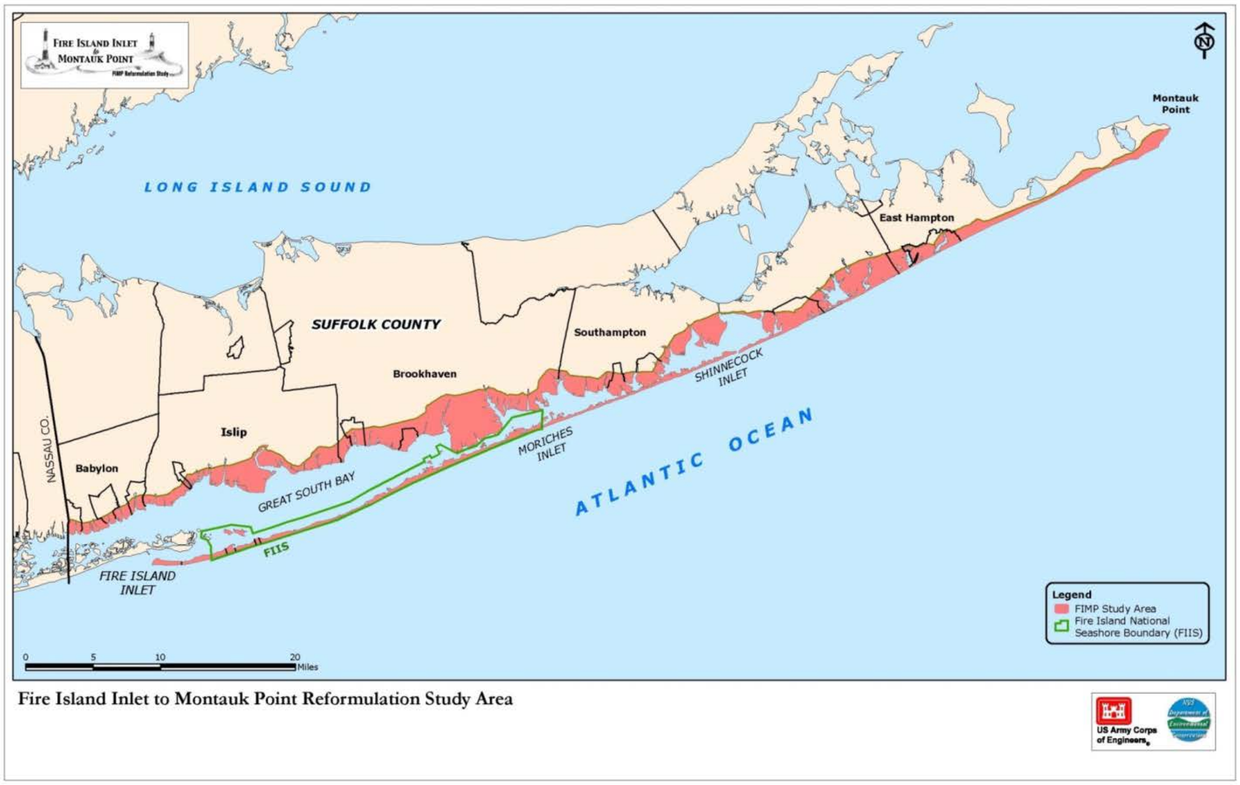


Figure 1. FIMP project area.

2. *Tentatively Selected Plan (TSP)*

The TSP for the FIMP project area is comprised of the following physical components:

Inlets: Fire Island, Moriches, Shinnecock

- Additional dredging of the ebb shoal, outside navigation channel, with downdrift placement;
- Placement of a +13 ft dune and berm, as needed in identified placement areas;

Mainland Non-Structural

- 10-year floodplain non-structural building retrofits, floodproofing, relocation, and acquisition
- Road raising in 4 locations
    - Amityville 6,600 ft
    - Lindenhurst 5,300 ft
    - Lindenhurst 9,000 ft
    - Mastic Beach 10,500 ft

Barrier Islands

Fire Island @ Developed Locations

- Beachfill (+15 ft dune with berm) with post-Sandy optimized alignment

Fire Island @ Undeveloped Locations

- Conditional Breach Response (+9.5 ft berm only)
- @ Lighthouse (+13 ft dune and berm)
- @ Smith Point County Park East - sand bypassing
- @ Smith Point County Park West - short term beachfill in western, developed section

Westhampton Barrier Island:

- Beachfill (+l5 ft dune with berm) fronting Moriches Bay
- Proactive and Reactive Breach Response (+13 ft dune, with berm), fronting Shinnecock Bay

Downtown Montauk and Potato Road

- Feeder beach created by placing sediment on a four year cycle over 50-year span.
- Potato Road feeder beach is contingent upon the implementation of a local pond opening management plan for Georgica Pond

Groin Modification

- Taper existing Westhampton Groins and existing Ocean Beach Groins
- Shortening of groins 1 through 13
- Taper existing Ocean Beach Groins

Natural/Nature-Based Features (Nnbf)

- A variety of NNBFs will be addressed and specifically identified in the EIS, including:
    - Enhance upper beach/dune width/slope/height
    - Close some access roads and trails
    - Remove sand fence
    - Raise boardwalks above dunes
    - Enhance salt marsh by restoring hydrologic connection

- Remove parking lot, re-grade to natural contours
- Enhance the existing salt marsh through the use of herbicides to control *Phragmites*
- Ditch plugging and pool creation
- Convert disturbed areas to salt marsh
- Reconfigure existing tidal channels
- Remove bulkhead, re-grade shoreline, and restore marsh through plantings

### *3. Environmental Conditions*

Oceanfront beach and deepwater ocean habitats constitute the majority of the Project area. The beach community includes upper, intertidal, and nearshore subtidal areas.

The intertidal zone extends from the low tide line to the high tide line and is submerged and exposed according to daily tidal cycles. Species diversity in this zone is relatively low due to limited ability of species to withstand the daily submersion and exposure. Micro and macro-invertebrates known to inhabit this zone include crabs, shrimp, bivalves, and worms.

The affected near shore subtidal zone extends from the low water line down to 25 feet below mean low water (-25' MLW) and is nearly continuously submerged. The area contains a rich diversity of aquatic micro and macro-invertebrates including crabs, shrimp, bivalves, worms, and finfish. In addition, numerous man-made groins extend from the intertidal zone into the subtidal zone from 200 to 600 feet (USACE 1998).

The offshore subtidal zone is located approximately 1.5 miles south of the FIMP project area is between 25 feet MLW and to about 60 feet MLW. The area contains a diversity of benthic organisms and phytoplankton and diverse assemblages of shellfish, gastropods, amphipods, isopods and crustaceans (USACE 2004b). The area also provides a migratory pathway and spawning, feeding and nursery area for many common mid-Atlantic fish species (USACE 2004b).

#### *Habitat and Species that Occur in the Project Area*

Both the nearshore and offshore waters of the Project area support seasonally abundant populations of many recreational and commercial finfish (USFWS 1989, 1995, USACE 1998). Primary fish species include black sea bass (*Centropristis striata*), summer flounder (*Paralichthys dentatus*), winter flounder (*Pseudopleuronectes americanus*), weakfish (*Cynosion regalis*), bluefish (*Pomatomus saltatrix* ), scup (*Stenotomus chrysops*), striped bass (*Morone saxatillis*), and Atlantic mackerel (*Scomber scombrus*). In addition, other common species in near shore waters include tautog (*Tautoga onitis*), northern puffer (*Sphoeroides maculates*), windowpane (*Scophthalmus aquosus*) and American eel (*Anguilla rostrata*).

A number of migrant anadromous and catadromous species are found throughout the Project area. Common migrant species include the Atlantic sturgeon (*Acipenser oxyhinchus*), blueback herring (*Alosa aestivalis*), alewife (*alosa pseudoharengus*), American shad (*Alosa sapidissima*), Atlantic silverside (*Menidia menidia*), striped bass, and American eel (Woodhead 1992).

The primary shellfish with important commercial or recreational value in the near shore portion of the Project area are the American oyster (*Crassostrea virginica*), hardshell clam [Quahog] (*Mercenaria mercenaria*), softshell clam (*Mya arenaria*), bay scallop (*Argopencten irradiens*), American lobster (*Homarus americanus*), and blue crab (*Callinectes sapidus*) (MacKenzie 1990). Surf clam

(*Spisula solidissima*), razor clam (*Ensis directus*) and tellin (*Tellina agillis*) occur in the vicinity of the offshore borrow area. Surveys conducted by the USACE in 2003 indicate that the borrow area itself contains very small, to no, localized populations of surf clam (USACE 2004b).

Beginning in 1966, there have been at least 17 major sediment-benthic macrofauna sampling efforts in the region. As reported in these studies, the sediment composition of the Project area consists of a silty sand, medium coarse grain sand, and hard substrate community (USACE 1998, 2004b). The benthic community of the near shore portion of the Project area is dominated by polychaetous annelids, followed by malacostracans, bivalves, and gastropods (Reid et al. 1991,Ray and Clarke 1995, Ray 1996, Way 1998, USACE 2004b). The silty-sand substrates are dominated by bivalves such as the blue mussel (*Mytilis edulis*), and polychaetes such as red-lined worms (*Nephtys incisa*) (Steimle and Stone 1973).

Medium coarse sand substrates are dominated by bivalves (e.g., dwarf tellin [*Tellina agilis]*), echinoidea (e.g., sand dollar [*Echinarachnius parma]*, amphipods (e.g., *Protohaustraius deichmaae* and *Unicola irrorata)*, and polychaetes (*e.g.*, burrowing scale worm [*Sthenelais limicola*], lumbrinerid thread worms [*Lumbrineris fragilis*], and mud worm [*Spiophanes bombyx*]) (Steimle and Stone 1973). Hard substrates such as groins are dominated by blue mussel (Steimle and Stone 1973).

*ESA Listed Species Present in the Project Area; General Information*

*Whales*

The federally endangered North Atlantic right, humpback, and fin whales, are seasonally present in the waters off New York; however, these ESA listed species of whales are not known to occur in the shallow, near shore (i.e., within 1 miles from shore) waters of eastern Long Island, and thus, are not expected to occur in the project area. Based on this information, ESA listed species of humpback, fin, and North Atlantic right whales will not be considered further in our assessment.

*Sea Turtles*

Four species of federally listed threatened or endangered sea turtles under NMFS jurisdiction may be found seasonally (late spring thru early fall) in the coastal waters of New York and New Jersey: the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead, and the endangered Kemp's ridley, green and leatherback sea turtles. In general, listed sea turtles are seasonally distributed in coastal U.S. Atlantic waters, migrating to and from habitats extending from Florida to New England, with overwintering concentrations in southern waters. As water temperatures rise in the spring, these turtles begin to migrate northward. As temperatures decline rapidly in the fall, turtles in northern waters begin their southward migration. Sea turtles are expected to be in the waters of Long Island in warmer months (NMFS 2013)

*Atlantic Sturgeon*

There are five DPSs of Atlantic sturgeon listed as threatened or endangered. Atlantic sturgeon originating from the New York Bight, Chesapeake Bay, South Atlantic and Carolina DPSs are listed as endangered, while the Gulf of Maine DPS are listed as threatened (77 FR 5880; 77 FR 5914; February 6, 2012). The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida.

Atlantic sturgeon are known to occur in the coastal and oceanic waters of the Atlantic Ocean, primarily using these bodies of water throughout the year as a migratory pathway to and from overwintering, and/or foraging grounds throughout their range. As young remain in their natal river/estuary until approximately age 2, and at lengths of 30-36 inches before emigrating to open ocean as subadults (ASSRT 2007), only subadult and adult Atlantic sturgeon will be found in this system. Since Atlantic sturgeon may be present within the coastal waters of the project area, there is the potential that they will be exposed to the direct and indirect effects of dredging operations. Specifically, an aggregation of sturgeon is documented as utilizing an area near Breezy Point, nearly fifty (50) miles west of the nearest project site.

4. *Potential Adverse Effects*

Indirect

Negligible increases in near shore turbidity and suspended solids may result during placement of the beach fill from disturbance of subsurface sediments. But, because the fill material is 100% coarse grain sand, these minor and temporary increases in turbidity will not cause any adverse effects (Naqvi and Pullen 1982).

Direct

The proposed action under analyses for this determination is that of utilizing a cutterhead dredge to dredge three inlets at Fire Island, Moriches and Shinnecock and procuring sand utilizing a hopper dredge from the three borrow areas, and pumping sand utilizing a pipeline from the hopper dredge to the beach. The protected species that is considered for analysis in this determination is the Atlantic sturgeon since sea turtles do not generally occur in the project area during the fall-winter months when dredge operations will occur.

The inlets dredging accounts for approximately 3.4MCY dredged material removal, and the sand mining operations at the borrow areas will collect approximately 3MCY required for the beach repair and nourishment portion. These dredge operations will be divided up into five (5) contracts. The seasonal restriction to protect piping plover, annually, from 1 April to 1 September in all five contract areas, will suspend all inlet dredging and borrow area sand mining fill placement activities at borrow areas and at the placement sites. The six months per year that hopper operations will be permitted to occur, coupled with the fact that the borrow areas are significantly distant, at a minimum over 50 miles from the Breezy Point sturgeon aggregate, justifies our contention that it is unlikely that there would be interaction between hopper dredge operations at the ecologically barren borrow area sites and sturgeon during the brief duration of the hopper dredge operations. Please see Appendix A (Borrow Area [Figure/Plate B-3] and Beach Fill data)

The pipeline operations that deliver the sand from the dredge to the beach pose no risk to protected species since the pipeline connecting the dredge to the shore either is floated upon the surface of the water or is laid on the bottom, presenting no possibility of intake of an individual or adverse interaction with an individual.

5. *Conclusion*

USACE has determined that adverse effects to sea turtles and Atlantic sturgeon resulting from the proposed Federal action at FIMP will be discountable and insignificant since these species occurrence, or utilization of habitat, in the project area for the timeframe proposed for construction is either rare or nonexistent.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

MAR 29 2016

Peter Weppler
Chief, Environmental Analysis Branch
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Dear Mr. Weppler,

We have completed our consultation under section 7 of the Endangered Species Act (ESA) in response to your letter received February 2, 2016, regarding a Coastal Storm Risk Management Project off the Atlantic Coast of Long Island from Fire Island to Montauk Point (FIMP), New York. We concur with your determination that the proposed project may affect, but is not likely to adversely affect, any species listed by us as threatened or endangered under the ESA of 1973, as amended. Our supporting analysis is provided below.

**Proposed Project**

The U. S. Army Corps of Engineers (ACOE) is proposing to provide shoreline protection for five reaches of the south shore of Long Island between Fire Island Inlet and Montauk Point, a distance of approximately 83 miles. It includes the barrier island chains from Fire Island Inlet to Shinnecock Inlet, and also the back-bay and lands adjacent to Great South Bay, Moriches Bay, and Shinnecock Bay, which comprise over 200 miles of shoreline. The beaches will be widened to a minimum width of 100 feet, with an elevation of 14 feet above mean sea level. The project will start in April, 2016, and will be finished in January, 2025. No in-water work will occur from April 1 to September 1 of any year.

The study area also includes approximately 126 square miles on the mainland that are vulnerable to flooding. The land based components of the proposed project will have no effect on ESA-listed species and will not be considered as part of this consultation.

The project will involve use of one hopper dredge and one cutterhead dredge. A cutterhead dredge will be use to dredge three inlets for a total of 3,402,000 cubic yards (cy) of material. Approximately 2,341,000 cy of material will be removed from Fire Island Inlet, 512,000 cy from Moriches Inlet, and 549,000 cy from Shinnecock Inlet. The dredged material will be delivered via a pipeline connected to the dredge to surrounding areas of the Inlets and used for inlet management and beach nourishment.

The proposed project will also extract sand using a hopper dredge from six different borrow areas located less than 1.5 miles south of Long Island. The sand will be used for inlet management and beach nourishment. Approximately 3,038,000 cy will be removed from the borrow areas and delivered to the placement sites via a pipeline connected to the dredge. Depths in the borrow areas are approximately 25 - 60 feet. Additionally, stone groins will be repaired using land based equipment.

Common to all hopper dredging activities are:

- All dredges will be equipped with turtle/sturgeon deflectors that have been properly installed in front of the draghead and will be used at all times.
- Starting immediately upon project commencement, all project vessels will have an on deck observer to monitor for Atlantic sturgeon, sea turtles, and whales. Monitoring requirements include checking for turtles or sturgeon (whole or parts) impinged on the draghead, in the hopper, and swimming/present at or near the surface. If the observer on board observes a whale in the vicinity of the vessel during transit throughout the project area, maximum vessel speeds will be limited to 10 knots. If a right whale is observed, the vessel will maintain a 500 yard buffer from the whale. For all other whale species, a 100 yard buffer will be maintained.
- The draghead will remain on the bottom at all times during a pumping action except when: the dredge is not in pumping operation, or, the pumps are completely shut off; the dredge is being re-oriented to the next dredge line during dredging activities; or the vessel's safety is at risk.
- Upon completion of the dredge track line, the drag tender will throttle back on the RPMs of the suction pump engine to idle speed prior to raising the draghead off the bottom so that no flow of material is coming through the pipe into the hopper. Prior to raising the draghead, no suction will remain in the draghead or the dragarm in order to prevent impingement of listed species during the dragarm lifting phase. Prior to actual lifting of the dragarm from the bottom, the draghead will be held firmly on the bottom for 10 to 15 seconds (with no suction) then lifted rapidly to midwater to further reduce the potential for an interaction with an ESA-listed species. The dredge will then be re-oriented quickly to the next dredge line and the draghead will be firmly repositioned on the bottom before bringing the suction pump up to pumping speed.

**Description of the Action Area**

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR§402.02). For this project, the action area includes the offshore borrow areas, the vessel transit route within the borrow areas, the area of the pipeline from the dredge to the beach nourishment sites, and the underwater areas where the effects of dredging and fill placement (i.e., increases in suspended sediment) will be experienced. In the vicinity of hopper dredging operations, a near-bottom turbidity plume of resuspended bottom material may extend 2,300 to 2,400 feet down current from the dredge (USACE 1983). In the immediate vicinity of the dredge, a well-defined upper plume is generated by the overflow process. Approximately 1,000 feet behind the dredge, the two plumes merge into a single plume (USACE 1983). By a distance of 4,000 feet from the dredge, plume concentrations are expected to return to background levels (USACE 1983). For cutterhead dredging, the maximum distance of increased suspended sediment is likely to be a distance of 1,000 feet from the dredge (ACOE 1983). We anticipate elevated total suspended sediment (TSS) concentrations associated with the active beach nourishment site to be limited to a narrow area of the swash zone (defined as the area of the nearshore that is intermittently covered and uncovered by waves) up to 1,640 feet down current from the discharge pipe (Burlas *et al.* 2001).

Based on this information, the action area consists of the project footprint of the areas that will be dredged, the vessel transit route within the borrow areas, the area of where the pipeline will be, areas within 4,000 feet down current of the dredging operation, as well as the area within 1,640 feet down current from the site where sediments will be deposited. These areas are expected to encompass all of the direct and indirect effects of the operations. The sediments in the areas to be dredged consist of mostly sand and gravel (90% sand). Benthic resources at the borrow area is limited, but does include a diversity of species including those types considered primary prey species for sturgeon and sea turtles (crustaceans and mollusks). There are no sea grasses and only very sparse SAV at the borrow areas.

**NMFS Listed Species in the Project Area**

***Whales***

Federally endangered North Atlantic right, humpback, and fin whales, are seasonally present in the waters off New York. These species use the nearshore, coastal waters of the Atlantic Ocean as they migrate to and from calving and foraging grounds. Humpback and fin whales primarily occur in the waters of New York during the spring, summer and fall months, while the North Atlantic right whale primarily occurs in these waters from November 1 through April 30, although transient right whales can be present outside of this time frame. Although humpback, right, fin whales are not expected to occur in the portions of the action area located in the shallow nearshore waters of New York where sand will be placed, ESA listed species of whales may occur in the vicinity of the borrow areas (i.e., the Atlantic Ocean).

***Sea Turtles***

Four species of federally threatened or endangered sea turtles under our jurisdiction are found seasonally in the coastal waters of New York: federally threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead (*Caretta caretta*), and the federally endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. In general, listed sea turtles are seasonally distributed in coastal U.S. Atlantic waters, migrating to and from habitats extending from Florida to New England, with overwintering concentrations in southern waters. As water temperatures rise in the spring, these turtles begin to migrate northward. As temperatures decline rapidly in the fall, turtles in northern waters begin their southward migration. Sea turtles are expected to be in the waters of New York in warmer months, typically the months of May through November, with the highest concentration of sea turtles present from June through October (Morreale 1999; Morreale 2003; Morreale and Standora 2005; Shoop and Kenney 1992).

Several studies have examined the seasonal distribution of sea turtles in New York waters. In most years, sea turtles begin to arrive in New York waters in June (Morreale and Standora, 1993; Morreale and Burke, 1997). Tracking studies on juvenile Kemp's ridleys demonstrate that all tagged turtles had traveled south from New York coastal waters by the first week in November (Standora *et al.* 1992). In 2002 and 2003, Morreale conducted a study of loggerhead, Kemp's ridley and green sea turtles captured in pound nets fishing in the Peconic Bay area. Sea turtles were not encountered after the last week in October (Morreale 2003). Tracking studies summarized in Morreale and Standora (2005) indicate that loggerhead and Kemp's ridley sea turtles begin leaving New York waters in October and generally by the first week of November, turtles head southward past the Virginia border. Similar migratory patterns are expected for green and leatherback sea turtles (Shoop and Kenney 1992; Morreale 1999). Based on this information, sea turtles may occur in the action area between May through November.

***Atlantic Sturgeon***

There are five DPSs of Atlantic sturgeon listed as threatened or endangered. Atlantic sturgeon originating from the New York Bight, Chesapeake Bay, South Atlantic and Carolina DPSs are listed as endangered, while the Gulf of Maine DPS is listed as threatened. The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida.

At around three years of age, subadults exceeding 2.3 feet in total length begin to migrate to marine waters (Bain et al. 2000). After emigration from the natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters less than 164 feet in depth, using coastal bays, sounds, and ocean waters (ASSRT 2007). In rivers and estuaries, Atlantic sturgeon typically use the deepest waters available; however, Atlantic sturgeon also occur over shallow (8.2 feet), tidally influenced flats and mud, sand, and mixed cobble substrates (Savoy and Pacileo 2003). Occurrence in these shallow waters is thought to be tied to the presence of benthic resources for foraging.

Based on the above information, adult and subadult Atlantic sturgeon from any of five DPSs could occur in the project area; however, as Atlantic sturgeon spawn in freshwater portions of large rivers and early life stages are not tolerant of salinity, no eggs, larvae or juvenile Atlantic sturgeon occur in the action area.

**Effects of the Action**

The primary concerns for loggerhead, Kemp's ridley, and green sea turtles is entrainment and loss of forage, while the primary concern for leatherbacks is vessel collision as the dredge transits the borrow area. Due to their large size, whales are not vulnerable to entrainment in dredges; as such, effects of impingement or entrainment on whales will not be considered in this consultation. The primary concern for listed species of whales is the potential for vessel collisions as the dredge transits the borrow area. The primary concerns for Atlantic sturgeon is entrainment, loss of forage, and vessel collision as the dredge transits the borrow area. The potential effects of a temporary increase in turbidity and sedimentation as a result of dredging and beach nourishment on listed species are also discussed below.

The pipeline connecting the dredge to the shore will float on the surface of the water or will be laid on the bottom, presenting no possibility of intake of an ESA-listed species or adverse interaction with an ESA-listed species, and will not present a barrier to ESA-listed species. These effects will not be discussed further in this consultation.

Below, we discuss the effects of both hopper and cutterhead dredging on ESA-listed species and exposure to: (1) entrainment and impingement of Atlantic sturgeon and sea turtles; (2) alteration of listed species prey items and foraging behavior due to dredging; (3) suspended sediment associated with dredging operations. The potential for interactions (i.e., vessel strikes) between project vessels and individual Atlantic sturgeon, whales or sea turtles is discussed separately.

***Hopper Dredging: Impingement / Entrainment***

*Sea Turtles*

Loggerhead, Kemp's ridley, and green sea turtles are known to be vulnerable to entrainment and/or impingement in hopper dredges.[1] Factors that are believed to contribute to the likelihood of sea turtle entrainment include: 1) dredge duration (e.g., greater number of interactions associated with longer duration dredging); 2) Hydraulic pump operation (i.e., interactions rates increase with hydraulic pumps operating during the placement/removal of draghead); 3) the location, habitat, and geography of the project site (e.g., open estuarine environment versus confined channel areas); and, 4) the species' use of, and behavior within, the affected location (e.g., foraging, brumating, breeding, resting, transiting).

As the draghead of a hopper dredge operates on the bottom, interactions with sea turtles primarily occur when a sea turtle is foraging or resting on the bottom; these interactions occur more frequently in areas where sea turtle forage is abundant, and thus, sea turtle densities are high. Habitat conditions in the borrow areas are not consistent with the areas where brumation has been documented; therefore, we do not anticipate that brumating sea turtles are present in the project area. Sea turtles are not known to concentrate in, or use the waters of the borrow areas affected by dredging operations as an essential foraging or resting ground; instead it is believed that they use these waters to transit to other waterways of New York. Although sea turtle forage exists within the United States coastal waters of the Atlantic Ocean (e.g., crabs, mollusks, submerged aquatic vegetation (SAV)), there is no optimal foraging habitat within the portion of the action area affected by the sand mining operations. The borrow areas have been used previously as a dredge site. As a result, the benthos in the borrow areas are absent of a diverse and abundant benthic invertebrate community and has very sparse SAV. As such, the borrow areas are unsuitable for sea turtle foraging. Based on the best available information, sea turtle species are not expected to be foraging or resting in these portions of the project area and thus, are not expected to be on the benthos where the draghead of the hopper dredge will be operating. Instead, within the project area, these species of sea turtles are expected to be found in the water column, migrating to and from foraging, breeding, or resting grounds found in nearshore coastal bays and estuaries located outside of the borrow areas (e.g., Long Island bays and estuaries). As sea turtles are not expected to occur within the vicinity of the draghead, the likelihood of an interaction between a sea turtle and the dredge head is extremely unlikely.

In addition to the habitat characteristics of the project area, the location and geography of a project may also affect the likelihood of entrainment. The risk of entrainment is believed to be

[1] Due to the large size of leatherback sea turtles, leatherback sea turtles are not vulnerable to entrainment in hopper dredges. To date, this species has never been documented entrained in any dredge operation along the U.S. Atlantic Coast (USACE Sea Turtle Warehouse, 2013).

highest in areas where the movements of animals are restricted (e.g., rivers, narrow confined channels) and therefore, where the animal has limited opportunity to move away from the dredge. If these restricted areas also occur within sites in which species are known to concentrate, the likelihood of an interaction further increases. These characteristics; however, are not present within the project area. The borrow areas are situated within the nearshore waters of the Atlantic Ocean, an area we consider an open environment; that is, an unconfined body of water in which the shorelines of the surrounding land masses do not encroach on the body of water to an extent that narrow waterways are created. The distance from the borrow areas to the shoreline is approximately 1.5 mile or less to the north. As dredging operations will occur in an open environment, sea turtle movements will be unrestricted, with ample space surrounding the dredging area for sea turtles to move and avoid the dredge or dredge site and continue normal behaviors in other waterways of New York. Further, because sea turtles are only expected to transit the project area, and not congregate, the density of sea turtles in any portion of the project area is expected to be low. Based on this information, combined with the fact that sea turtles are not expected to occur on the benthos to forage or rest, the potential for an interaction with a dredge is further reduced.

Based on the information above, and the following factors, we conclude that the risk factors that increase the likelihood for sea turtle entrainment are not present. First, hydraulic pumps will be only turned on once the draghead is on the bottom; thereby, directing and maintaining the suction velocity to the benthos of the borrow areas, and thus, within an area where sea turtles are not expected to occur. Second, prior to the actual lifting of the dragarm from the bottom, the draghead will be held firmly on the bottom for 10 to 15 seconds (with no suction) then lifted rapidly to midwater. Third, a turtle deflector draghead will be properly installed in front of the draghead and used at all times. Based on this information, it is extremely unlikely that there will be any impingement or entrainment of sea turtles. Effects of hopper dredging on sea turtles are discountable.

*Atlantic Sturgeon*

Atlantic sturgeon are known to be vulnerable to entrainment and/or impingement in hopper dredges. Factors that are believed to contribute to the likelihood of Atlantic sturgeon entrainment include: 1) dredge duration (e.g., greater number of interactions associated with longer duration dredging); 2) hydraulic pump operation (i.e., interactions rates increase with hydraulic pumps operating during the placement/removal of draghead); 3) the location, habitat, and geography of the project site (e.g., open estuarine environment versus confined channel areas); and, 4) the species' use of, and behavior within, the affected location (e.g., foraging, overwintering, spawning, resting).

Information suggests that Atlantic sturgeon in the marine environment do not move along the bottom, but instead move further up in the water column during their migratory movements along the coast line. However, Atlantic sturgeon forage on the benthos and as the draghead of a hopper dredge operates on the bottom, an interaction is possible with a foraging Atlantic sturgeon within the area being dredged. Atlantic sturgeon feed on benthic invertebrates (e.g., amphipods, gastropods, annelids, decapods) and occasionally on small fish. Foraging also often occurs at, or near, areas with SAV or shellfish resources. As forage may be present in the project area, opportunistic foraging may occur at the site. If an Atlantic sturgeon is foraging opportunistically within this portion of the project area, there could be a risk of interacting with the dredge. However, because the dredge moves very slowly, and there is ample space for movements (see below), it is likely that subadult or adult Atlantic sturgeon can easily avoid the dredge. This assumption is supported by recent monitoring work, completed in the James River (Virginia) and the Delaware River (New Jersey) (Cameron 2010; ERC 2011), as well as work undertaken on a related species, the white sturgeon, in the Columbia River (Parsley and Popoff 2004). During these studies, the movements of tagged Atlantic, white, and/or shortnose sturgeon were tracked near the dredge (mechanical and hydraulic). No interactions between sturgeon and the dredge occurred. Some tagged sturgeon moved through the area where the dredge was operating multiple times during the study, while others remained within the vicinity of the dredging operation with no incidence. The risk is further increased at overwintering areas because evidence suggests that sturgeon may be less responsive to stimuli while overwintering, which may make it less likely that sturgeon would avoid a dredge during this time period. However, overwintering grounds are not known to exist in the borrow areas and therefore, no overwintering sturgeon were likely to occur in the portion of the project area where dredging operations will occur. As a result, these increased risk factors are not present.

In addition to the habitat characteristics of the project area, the location and geography of a project may also affect the likelihood of entrainment. The risk of entrainment is believed to be highest in areas/environments where the movements of animals are restricted (e.g., rivers, narrow confined channels, small semi-enclosed harbors) and therefore, where the animal has limited opportunity to move away from the dredge. If these restricted areas also occur within sites in which a species is known to concentrate, the likelihood of an interaction further increases. These characteristics; however, are not present within the project area. The borrow areas are situated within the Atlantic Ocean, an area we consider an open ocean environment; that is, an unconfined, body of water in which the shorelines of the surrounding land masses do not encroach on the body of water to an extent that narrow waterways are created. The distance from the borrow areas to the nearest shoreline is approximately 1.5 miles or less to the north. As dredging operations will occur in an open environment, Atlantic sturgeon movements will be unrestricted, with ample space surrounding the project area for sturgeon to move and avoid the dredge, or dredge site and continue normal behaviors in other waterways of New York. Further, because Atlantic sturgeon are expected to be using the borrow areas only as they move to other areas, the density of Atlantic sturgeon in any portion of the project area is expected to be low and thus, if an Atlantic sturgeon occurs in the area to be dredged, there is ample space and ability for the sturgeon to avoid the dredge. Based on this information, combined with the fact that Atlantic sturgeon are not expected to occur at the bottom of the borrow areas, the potential for an interaction with a dredge is further reduced.

Based on the information above, and the following factors, we conclude that the risk factors that increase the likelihood for Atlantic sturgeon entrainment are not present. First, hydraulic pumps will only be turned on once the draghead is on the bottom, thereby, directing and maintaining the suction velocity to the benthos of the borrow areas, and thus, within an area where ESA listed species are not expected to occur. Second, prior to the actual lifting of the dragarm from the bottom, the draghead will be held firmly on the bottom for 10 to 15 seconds (with no suction) then lifted rapidly to midwater. Based on this information, it is extremely unlikely that any impingement or entrainment of Atlantic sturgeon will occur. Effects of dredging on Atlantic sturgeon are discountable.

***Cutterhead Dredging: Impingement / Entrainment***

*Sea Turtles*

Sea turtles are not known to be vulnerable to entrainment in cutterhead dredges, presumably because they are able to avoid the relatively small intake area and low intake velocity. Thus, if a sea turtle were to be present at the dredge site, it would be extremely unlikely to be injured or killed as a result of dredging operations carried out by a hydraulic cutterhead dredge. Based on this information, effects to sea turtles from the hydraulic cutterhead dredge are discountable.

*Atlantic Sturgeon*

Impingement or entrainment in hydraulic cutterhead dredges may kill or injure sturgeon. In order for sturgeon to be impinged or entrained in the cutterhead dredge, sturgeon would have to be on the bottom. Sturgeon do occur on the bottom, especially while foraging; however, studies indicate that small, juvenile sturgeon (less than 0.6 foot fork length) need to be within 4.9 feet to 6.6 feet of the cutterhead for there to be any potential entrainment (Boysen and Hoover 2009). Sturgeon in the action area are considerably bigger (subadults and adults), and as they are stronger swimmers, are even less vulnerable to being overcome by the suction of the dredge and to becoming entrained. Because the dredge moves slowly and sturgeon are highly mobile, strong swimmers, it is likely that sturgeon would easily be able to avoid the dredge. This assumption is supported by recent monitoring work completed in the James River (Virginia) and the Delaware River (New Jersey) (Reine *et al.* 2014; ERC 2012). During these two studies, while the movements of tagged sturgeon were traced near a dredge, there were no interactions between tagged sturgeon and the dredge. Furthermore, tagged sturgeon moved through the dredge area during the study multiple times while the dredge was operating.

While entrainment of smaller sturgeon in cutterhead dredges has been observed (as evidenced by the presence of a few individual shortnose sturgeon at the Money Island Disposal Site in the Delaware River in 1996 and 1998), these instances are rare and have been limited to dredging events that occur near sturgeon overwintering areas where sturgeon are known to form dense aggregations. However, although sturgeon may be present in the action area year round, the action area is not a known overwintering area for Atlantic sturgeon. The risk of entrainment is also higher for small fish, including early life stages and small juveniles. Because these life stages are not present in the action area and the smallest sturgeon present would be at least 2.3 feet (the size at which we expect them to begin migrations from their natal river), the risk of entrainment is minimal in the action area. Increased risk factors (i.e., small fish, overwintering area) are not present in the action area, overall. Therefore, it is extremely unlikely that any sturgeon would be impinged or entrained in a cutterhead dredge operating within the project site; effects to sturgeon from the proposed hydraulic dredging operations are discountable.

***Dredging, Beach Nourishment, Inlet Management, and Fill Placement Effects on Foraging and Migration***

*Whales*

ESA listed species of whales may be present within the borrow areas where dredging will occur. Because whales forage upon pelagic prey items (e.g., krill, copepods), dredging and its impacts on the benthic environment will not have any direct effects on whale prey/foraging items. Additionally, the proposed project will have an observer on board and dredging operations will be stopped if a whale is in the vicinity of the project. Therefore, as dredging operations will not be undertaken within the vicinity of ESA listed species of whales, migratory behaviors of ESA listed whales will also not be affected. ESA listed species of whales will not occur in the shallow, nearshore area where fill placement for the repair of the groins will occur and will not experience any effects from fill placement activities. As such, the remainder of this section will discuss the effects of dredging and the alteration of sea turtle and Atlantic sturgeon foraging habitat.

*Atlantic Sturgeon and Sea Turtles*
Dredging can cause effects on Atlantic sturgeon and sea turtles by reducing prey species through the alteration of the existing biotic assemblages and habitat. As forage for both species may be present in the project area (e.g., polychaetes, bivalves, and gastropods), opportunistic foraging may occur at the site and thus, dredging and the placement of fill (e.g., beach nourishment, groin repair) may cause effects to sturgeon and sea turtles by reducing prey species through the alteration of existing biotic assemblages and habitat. This reduction, however, will be temporary (i.e., recolonization will begin within two months, with complete recolonization in a year; Burlas *et al.* 2001; Guerra-Garcia and Garcia-Gomez 2006 ). Due to the limited benthic foraging in the borrow area, some nearshore areas may be more desirable to certain turtles or sturgeon due to prey availability. The pipeline may also lay on the ocean floor causing a temporary reduction in available prey. There is no information to indicate that the dredged areas, sand placement sites, or pipeline placement sites have more abundant sturgeon and turtle prey or better foraging habitat than other surrounding areas. The assumption can be made that sturgeon and sea turtles are not likely to be more attracted to the waters of the action area than to other foraging areas in the waters of NY and will be able to find sufficient prey in these alternate areas.

While dredging, sand placement activities, and the placement of the pipeline may temporarily disrupt normal feeding behaviors for sturgeon and sea turtles by causing them to move to alternate areas, these activities are not likely to remove critical amounts of prey resources. Based on this and the best available information, we believe the impacts of dredging, fill operations, and placement of the pipeline on Atlantic sturgeon and sea turtle foraging are insignificant.

During dredging operations, ESA-listed species will avoid the immediate area when dredging, pipeline placement, and fill placement takes place. The proposed action will not alter the habitat in any way that prevents sturgeon or sea turtles from transiting the action area to other near-by areas suitable for foraging. Additionally, as the sand will be placed along the shoreline, placement of fill will not impede the transiting or passage of sea turtles or Atlantic sturgeon through the area. Based on this and the best available information, we believe the impacts of dredging, sand placement, and pipleine operations on Atlantic sturgeon and sea turtle migration are insignificant.

***Water Quality Effects: Dredging, Beach Nourishment, Inlet Management, and Groin Construction***
*Beach Nourishment and Inlet Management*
Beach nourishment and inlet management operations require the placement of large quantities of

sand below the mean high water mark of a shoreline. The placement of dredged material along beaches or shorelines cause an increase in localized turbidity in the nearshore environment. Nearshore turbidity impacts from fill placement are directly related to the quantity of fines (silt and clay) in the nourishment material. As the material from the borrow areas consists of beach quality sand of similar grain size and composition as indigenous beach sands, we expect short suspension time and containment of sediment during and after placement activities. As such, turbidity impacts would be short-term (*i.e.*, turbidity impacts will dissipate completely within several hours of the cessation of operations (Greene 2002)) and will be spatially limited to the vicinity of the dredge outfall pipe, the pump out buoy/mooring station, and dredge anchor points.

The Atlantic States Marine Fisheries Commission (Greene 2002) review of the biological and physical impacts of beach nourishment cites several studies that report that the turbidity plume and elevated total suspended solids (TSS) levels drop off rapidly seaward of the sand placement operations. Wilber *et al.* (2006) evaluated the effects of a beach nourishment project along the coast of northern New Jersey and reported that maximum bottom surf zone and nearshore TSS concentrations related to nourishment activities were 64.0 mg/L and 34.0 mg/L, which were only slightly higher than background maximum bottom TSS concentrations in the surf and nearshore zones on unnourished portions of the beach (i.e., less than 20.0 mg/L). Additionally, Wilber *et al.* (2006) reported that elevated TSS concentrations associated with the active beach nourishment site were limited to within 1,312 feet of the discharge pipe in the swash zone (defined as the area of the nearshore that is intermittently covered and uncovered by waves), while other studies found that the turbidity plume and elevated TSS levels are expected to be limited to a narrow area of the swash zone up to 1,640 feet down current from the discharge pipe (Schubel *et al.* 1978; Burlas *et al.* 2001). Based on this and the best available information, turbidity levels created by beach nourishment and inlet management operations along the shoreline are expected to be between 34.0 to 64.0 mg/l; limited to an area approximately 1,640 feet down current from the area of sand placement; and, are expected to be short term, only lasting several hours.

*Stone Fill Placement*

The placement of stone fill for the groin repair will be done at depths of up to 20 feet from land based equipment and will disturb shoreline sediments and may cause a temporary increase in suspended sediment in the nearshore area. However, suspended sediment is expected to settle out of the water column within a few hours and any increase in turbidity will be short term. Turbidity levels associated with any sediment plume are expected to be only slightly elevated above background levels. The equipment used will place the stone at slow speeds which will allow any ESA-listed species to avoid being directly struck by the placement of fill. Additionally, this activity will take place in a shallow area and any species in the vicinity is expected to move away from the construction activities prior to the placement of any fill. Based on this information, effects of stone placement to ESA-listed species are extremely unlikely, and therefore, discountable.

*Dredging*

Dredging operations cause sediment to be suspended in the water column. This results in a sediment plume in the water, typically radiating from the dredge site and decreasing in concentration as sediment falls out of the water column as distance increases from the dredge site. The nature, degree, and extent of sediment suspension around a dredging operation are controlled by many factors including: the particle size distribution, solids concentration, and composition of the dredged material; the dredge type and size, discharge/cutter configuration, discharge rate, and solids concentration of the slurry; operational procedures used; and the characteristics of the hydraulic regime in the vicinity of the operation, including water composition, temperature and hydrodynamic forces (i.e., waves, currents, etc.) causing vertical and horizontal mixing (ACOE 1983).

*Cutterhead Dredging*
Based on a conservative total suspended solids (TSS) background concentration of 5 mg/L, modeling results of cutterhead dredging indicated that elevated TSS concentrations (i.e., above background levels) would be present throughout the bottom six feet of the water column for a distance of approximately 1,000 feet (USACE 1983). Based on these analyses, elevated suspended sediment levels are expected to be present only within a 1,000 foot radius of the location of the cutterhead dredge. Turbidity levels associated with cutterhead dredge sediment plumes typically range from 11.5 to 282 mg/L with the highest levels detected adjacent to the cutterhead dredge and concentrations decreasing with greater distance from the dredge (Nightingale and Simenstad 2001).

*Hopper Dredging*
Resuspension of fine-grained dredged material during hopper dredging operations is caused by the dragheads as they are pulled through the sediment, turbulence generated by the vessel and its prop wash, and overflow of turbid water during hopper filling operations. During the filling operation, dredged material slurry is often pumped into the hoppers after they have been filled with slurry in order to maximize the amount of solid material in the hopper. The lower density turbid water at the surface of the filled hoppers overflows and is usually discharged through ports located near the waterline of the dredge. In the vicinity of hopper dredge operations, a near-bottom turbidity plume of resuspended bottom material may extend 2,300 to 2,400 feet down current from the dredge (USACE 1983). In the immediate vicinity of the dredge, a well-defined upper plume is generated by the overflow process. Approximately 1,000 feet behind the dredge, the two plumes merge into a single plume (USACE 1983). Suspended solid concentrations may be as high as several tens of parts per thousand (ppt; grams per liter) near the discharge port and as high as a few parts per thousand near the draghead. In a study done by Anchor Environmental (2003), nearfield concentrations ranged from 80.0-475.0 mg/l. Turbidity levels in the near-surface plume appear to decrease exponentially with increasing distance from the dredge due to settling and dispersion, quickly reaching concentrations less than 1 ppt. By a distance of 4,000 feet from the dredge, plume concentrations are expected to return to background levels (USACE 1983). Studies also indicate that in almost all cases, the vast majority of resuspended sediments resettle close to the dredge within one hour, and only a small fraction takes longer to resettle (Anchor Environmental 2003).

*Effects on Whales, Atlantic Sturgeon, and Sea Turtles*
No information is available on the effects of TSS on juvenile and adult sea turtles. Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993).

TSS is most likely to affect sea turtles, subadult and adult Atlantic sturgeon, or whales if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle or sturgeon prey. As whales, sturgeon, and sea turtles are highly mobile, they are likely to be able to avoid any sediment plume and any effect on their movements is likely to be insignificant. Additionally, the TSS levels expected from dredging (11.5 to 475.0 mg/L) or beach nourishment/inlet management (34.0 to 64.0 mg/l) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993). While the increase in suspended sediments may cause whales, Atlantic sturgeon, and sea turtles to alter their normal movements, any change in behavior is not able to be measured or detected, as it will only involve minor movements that alter their course out of the sediment plume which will not disrupt any essential life behaviors. Based on this information, we believe the effects of suspended sediment on whales, Atlantic sturgeon, and sea turtles resulting from increased turbidity from dredging and beach nourishment operations are insignificant.

***Effects of Vessel Interactions***

Whales, sea turtles, and sturgeon may be injured or killed as a result of being struck by boat hulls or propellers. The factors relevant to determining the risk to these species from vessel strikes vary, but may be related to the size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of individuals in the area (e.g., foraging, migrating, overwintering, etc.). We have considered the likelihood that an increase in vessel traffic associated with the project increases the risk of interactions between listed species and vessels in the project areas, compared to baseline conditions. The use of one hopper dredge and one cutterhead dredge will cause a small, localized, temporary increase in vessel traffic. Given the large volume of traffic in the project area, the increase in traffic associated with the projects is extremely small. Based on this information, we believe the effects of vessel traffic on whales, sea turtles, and sturgeon from dredging operations are insignificant.

**Conclusion**

Based on the analysis that any effects to ESA-listed species will be insignificant or discountable, we concur with your determination that the proposed project is not likely to adversely affect any listed species under our jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required. Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required. Should you have any questions regarding these comments, please contact Daniel Marrone at Daniel.Marrone@noaa.gov or by phone (978-282-8465).

**Technical Assistance for Proposed Species**

On March 23, 2015, we published a proposed rule to list three distinct population segments (DPS) of green sea turtles as endangered and eight distinct population segments of green sea turtles as threatened, including the North Atlantic DPS (80 FR 15272). This rule, when finalized, would replace the existing listing for green sea turtles. Once a species is proposed for listing, the conference provisions of the ESA may apply (see ESA section 7(a)(4) and 50 CFR § 402.10). Conference is defined as "a process which involves informal discussions between a Federal agency and the Service… regarding the impact of an action on proposed species or proposed critical habitat and recommendations to minimize or avoid the adverse effects" (50 CFR § 402.02). Federal agencies are required to confer with NMFS on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR § 402.10).

Currently, green sea turtles are listed as threatened, except for the Florida and Pacific coast of Mexico breeding populations, which are listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green sea turtles are currently considered endangered wherever they occur in U.S. waters. In the analysis above, we have considered effects to the current global listing of green sea turtles. Green sea turtles in the action area are from the North Atlantic DPS. As explained above, all effects to green sea turtles will be insignificant and discountable, and the proposed action will not result in the injury or mortality of any green sea turtles; as this determination was based on the potential effects to individuals, the proposed change in status for these sea turtles (i.e., from endangered to threatened) would not change these determinations. As all effects of the proposed action are insignificant and discountable, and the proposed action will not result in the injury or mortality of any green sea turtles, the action is not likely to appreciably reduce the survival and recovery of any DPS of green sea turtle, including the North Atlantic DPS. Therefore, it is not reasonable to anticipate that this action would be likely to jeopardize the continued existence of any DPS of green sea turtles. As such, we have determined that no conference is necessary for green sea turtles.

**Essential Fish Habitat Comments**

NMFS Habitat Conservation Division (HCD) is responsible for overseeing programs related to Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act and other NOAA trust resources under the Fish and Wildlife Coordination Act. HCD will provide comments separately on this project. If you wish to discuss this further, please contact Karen Greene at (732) 872-3023 or Karen.Greene@Noaa.gov.

Sincerely,

for Kimberly B. Damon-Randall
Assistant Regional Administrator
for Protected Resources

EC: Marrone, GAR/PRD
Greene, GAR/HCD
Gallo, ACOE

File Code: Section 7\ Non-Fisheries\ACOE\Informal\ 2016\New York\Fire Island to Montauk Point (FIMP)PCTS: NER-2016-13119

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