ATLANTIC COAST OF LONG ISLAND
JONES INLET TO EAST ROCKAWAY INLET

LONG BEACH ISLAND, NEW YORK
HURRICANE AND STORM DAMAGE REDUCTION
HURRICANE SANDY LIMITED REEVALUATION REPORT

Environmental Assessment (EA)

U.S. Army Corps of Engineers
New York District

August 2015

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ABBREVIATIONS AND ACRONYMS

Abbreviation or Acronym	
ac	Acre/Acres
BMP	Best Management Practices
BOD	Biological Oxygen Demand
CFR	Code of Federal Regulations
CBRS	Coastal Barrier Resource System
CMSA	Consolidated Metropolitan Statistical Area
CO2	Carbon Monoxide
District	United States Army Corps of Engineers, New York District
cy	Cubic Yard/Yards
EA	Environmental Assessment
EFH	Essential Fish Habitat
FEIS	Final Environmental Impact Statement
ft	Foot or Feet
HTRW	Hazardous, Toxic, and Radioactive Waste
LRR	Limited Re-evaluation Report
lf	Linear Foot/Feet
MLW	Mean Low Water
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen Oxides
NWI	National Wetlands Inventory
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
NYSHPO	New York State Historic Preservation Office
O3	Ozone
Project	The Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York Storm Damage Reduction Project
Project area	6.4 miles of the Long Beach barrier island including the developed community of Point Lookout and adjacent beaches owned by the Town of Hempstead (i.e., Nickerson Beach, Lido Beach, and the City of Long Beach).
ROD	Record of Decision

Abbreviation or Acronym	
SSA	Sole Source Aquifer
yr	Year
USGS	United States Geologic Survey
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE), New York District (District), is proposing to implement a cost-effective solution designed to restore the shoreline and provide shoreline protection for Long Beach Island, a barrier island located between Jones Inlet and East Rockaway Inlet, in Nassau County, New York (Figure 1). The Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York Storm Damage Reduction Project (Project), covers approximately 6.7 miles (of which 6.4 miles represents protection provided by the selected plan) of Long Beach Island, and includes the developed community of Point Lookout and adjacent beaches, which includes Nickerson Beach, Lido Beach and the City of Long Beach (Project area).

Recent storm events, such as Hurricane Sandy and Hurricane Irene, have the left the barrier island system within the study area vulnerable, increasing the potential for overwash and breaching during future storm events. Based upon theses impacts, there is an increased urgency to implement the Recommended Alternative. As a result of this devastation, Public Law 113-2, the "Disaster Relief Appropriations Act, 2013" provided supplemental appropriations to federal agencies for expenses related to the consequences of Hurricane Sandy. The Second Interim Report to Congress named this Study (see Table 1) in the list of Projects previously authorized but unconstructed projects for reducing flooding and storm damage risks in the affected area. The proposed work in this assessment is being funded under PL-113-2.

In 1965, the USACE evaluated various storm protection options for the area and presented findings in the Beach Erosion Control and Interim Hurricane Study for the Atlantic Coast of Long Island, New York: Jones Inlet to East Rockaway Inlet (USACE 1965). Local interests opposed the plan and the project was terminated in 1971. Since that time, beach erosion and storm damage have continued in the area. In response, the USACE conducted a Reconnaissance Study (completed in 1989), and subsequently a Feasibility Study (completed in February of 1995), to evaluate an array of structural and non-structural measures to provide flood and storm protection for the Long Beach Island area (USACE 1989, 1995, 1999).

As a result of the Feasibility Study, several alternatives were evaluated and a final plan was selected. The plan, as presented in the Final Feasibility Study and Final Environmental Impact Statement (FEIS) for the Project, included widening of the existing beach with the hydraulic placement of beach fill material, rehabilitation of 17 groins at Long Beach, construction of six new groins west of Point Lookout at Lido Beach, and construction/rehabilitation of numerous boardwalk extensions, dune walkovers, and dune access points (USACE 1995). The Record of Decision (ROD) granted approval of the plan as presented in the 1995 FEIS and was signed on December 23, 1998.

As a result of the changes the project area has undergone, the proposed alternative was re-evaluated. The re-evaluation was conducted to address changes to the shoreline since the 1995 evaluation and changes in the Project scope (i.e., a reduction in the size of the Project area), and to address environmental concerns expressed by agencies and/or interest groups. Furthermore, this re-evaluation allowed incorporation of advancements in engineering evaluation methods. As a result of project re-evaluation, several modifications were made to the plan that was selected in

1995 and are presented in this EA. The proposed Project modifications are intended to provide a long-term, cost-effective solution for reducing erosion and maintaining the beach width in this area.

When compared to the original Project that was presented in the 1995 FEIS and approved through a Record of Decision in 1998, the proposed Project modification includes some new structural features and activities that are in addition to those proposed in the original Project (Table 2.1). However, the overall Project area has been reduced in the proposed Project modification and several structural features and activities (vehicle access ramps, new groins, dune walkovers, impacts within a 136-acre shorebird nesting/foraging area) have been eliminated. As a result, the proposed modification has significantly reduced the area of fill placement and the amount of fill material required for the Project. Specifically, 184 fewer acres will be filled (i.e., approximately 110 acres in the upper beach zone, 39 fewer acres in the intertidal zone, and 35 fewer acres in the sub-tidal zone), the amount of fill material required for the initial construction has been reduced by 3,922,000 cubic yards (cy), and the amount of fill material needed for each 5-yr renourishment activities has been decreased to 1,770,000 cy per yr. This EA provides specific details regarding proposed Project modification and its components.

The District has concluded that, similar to the original Project, the Project modification will result in minor short-term negative impacts to water quality, terrestrial and aquatic habitats. In addition, it has been determined that the proposed Project would exceed the Federal de minimis thresholds of 100 tons per year for NOx air emissions.

Impacts to other environmental resources in the modified Project area are expected to be minor and less than those that would have resulted from the original Project. Specifically, the modification will include the placement of unvegetated hard structures (buildings, groins, and beach access walkovers, ramps) in dune/upper beach, intertidal, and subtidal areas. These structures will permanently cover the substrate beneath the footprint and non-mobile benthic species and will limit the use of the area directly within the structure footprint for foraging by shorebirds and wading birds and some fish species. However, these impacts are not significant because of the following: potentially affected species will utilize other suitable habitat for foraging activities; the existing upper beach and dune areas in these locations are currently of relatively low value to most wildlife species and do not support any Federal or state-listed species (outside of the designated bird nesting area); the direct loss of benthic species and vegetation will be minimal and would not affect populations; and groins are likely to reduce the overall rate of beach loss and erosion in the Project area and will increase the forage base for many fish species by increasing invertebrate biomass. The two historic wrecks identified within the Project area will be avoided during the rehabilitation of the groins. There will be no adverse effects to these historic properties. The changes in the conditions of the resources are not significant, and the proposed impacts on these resources as a result of the authorized project are not significantly different than those described in the FEIS which was approved for the original Project in 1995 (USACE 1995).

The use of Best Management Practices (BMP) construction procedures and mitigation measures, pre-construction surveys for species of special concern in the Project area, post-construction surveys to monitor affects of groins on coastal processes and species, and avoidance of key

breeding/nesting and spawning periods, will reduce potential for negative impacts. Furthermore, implementation of the proposed Project will have significant overall beneficial impacts to the environment and surrounding communities, including benefits to aquatic habitats and species, an increase in the availability of suitable habitat for Federal and state-listed species and a diversity of shorebird communities, improved shoreline stabilization and flood protection, and recreational opportunity.

A Conformity Determination and a Final Statement of Conformity is appended to this document which identifies mitigation options that the District will implement to ensure compliance with the Clean Air Act -General Conformity Rule.

Based on a thorough evaluation of potential impacts performed for the 1995 FEIS and this EA, it has been determined that there will be no significant adverse impacts due to implementation of the proposed Project modification. Comments from agencies and interested parties have been addressed and all practicable means to avoid or minimize adverse environmental effects have been incorporated into the recommended plan.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)
ATLANTIC COAST OF NEW YORK, JONES INLET TO EAST ROCKAWAY INLET, ISLAND OF LONG BEACH, NEW YORK COASTAL STORM RISK MANAGEMENT PROJECT

I. NAME OF ACTION

Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Island of Long Beach, New York Coastal Storm Risk Management Project: Evaluation of an array of cost-effective shoreline protection measures to address significant beach erosion and deterioration of protective coastal structures along the densely populated southern coast of Long Beach Island. The approximately 6.4 mile Project area is located along the Atlantic Ocean shoreline of Long Beach Island, and includes the developed community of Point Lookout and adjacent beaches (i.e., Nickerson Beach, Lido Beach and the City of Long Beach).

II. DESCRIPTION OF ACTION

1. **Proposed Action:** As a consequence of severe coastal erosion during Hurricane Sandy on October 29, 2012, the dune and berm system between East Rockaway and Jones Inlets has become depleted and particularly vulnerable to overwash and potentially breaching during future storm events. This condition increases the potential for devastating storm damage to shore and particularly back-bay communities. In response to extensive storm damages and increased vulnerability to future events, consistent with the Disaster Relief Appropriations Act of 2013 (Public Law. 113-2; herein P.L. 113-2), and recognizing the urgency to repair and implement immediate storm protection measures, the U.S. Army Corps of Engineers, New York District (New York District) is proposing to implement the Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Island of Long Beach, New York Coastal Storm Risk Management Project which received a favorable Record of Decision (ROD) in 1998. Due to changed conditions compared to the original Project, the Project will be modified. The modification entails an overall reduction in the Project area, which results in a reduction of 6,000 linear feet (lf) of beach fill area, a reduction of 3,922,000 cy of fill material needed for initial beach fill and a reduction of 341,000 cy per yr for each 5-year renourishment activities, a reduction of five acres (ac) of dune plantings and a reduction of 15,000 lf of sand fence. Specifically, there will be a reduction of 110 ac of filling in the upper beach zone, 39 fewer acres of filling in the intertidal zone, and 35 fewer acres of filling in the sub-tidal zone.

   Structural components of the Project modification include the construction of 57 timber/gravel dune walkovers, extensions of existing dune walkovers and vehicle access ways. Construction of six new groins (two of the six groins originally proposed for the Project has been deferred indefinitely, and are not part of the proposed Project modification), the rehabilitation of 17 groins, the rehabilitation and extension of the eastern terminal groin. A comparison of components of the original selected plan and the proposed Project modification are shown in Table 1.

2. **Alternatives:** A full evaluation of alternatives was previously conducted for the Project, a plan was selected, and a favorable ROD was issued in 1998. During the re-evaluation of the Project a number of similar alternatives were evaluated and a plan was selected that included only slight modifications to the originally selected plan. Therefore, since the alternatives evaluated in 1998 and subsequent Project modifications are similar, a re-evaluation of alternatives was not deemed necessary as part of this re-evaluation. The alternatives considered have been consolidated into two general categories in this Final Environmental Assessment: 1) No Action Alternative, and 2) Beach Restoration with Groin Rehabilitation, Extension, and Construction.

III. ANTICIPATED ENVIRONMENTAL IMPACTS

The proposed stabilization effort consists of beach nourishment very similar to what has previously been performed along the coasts of New York and New Jersey by the New York District in that similar construction techniques and equipment will be used.

This 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 one to two year period. Due to the sandy sediments in the Project Area, 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.

Federal and State-listed threatened and endangered species likely to occur in the Project Area include the piping plover, red knot, the sea beach amaranth, Atlantic sturgeon, whales and sea turtles. The Project could potentially result in direct and/or indirect disturbances to piping plover and other nesting shorebirds, including the State-listed least tern, roseate tern, and common terns, if any are present in the project vicinity during the time of construction. However, these impacts can largely be avoided if construction activities are restricted to September 2 through March 31 (outside of the nesting season). Therefore, the USACE has incorporated these construction window recommendations, as well as other recommendations from the U.S. Fish and Wildlife Service (USFWS), into the project construction plans. In addition, the USACE will conduct a pre-construction survey for the sea beach amaranth and will avoid disturbing the plants if any are found within the construction area. As a result, significant adverse impacts to these species are not expected. The USACE has completed the consultation processes with the USFWS, pursuant to the Fish and Wildlife Coordination Act and the Endangered Species Act. No long-term adverse environmental impacts or consequences are anticipated to result from the proposed coastal storm risk management project. Based upon the project's Biological Opinion received from USFWS under Section 7 of the Endangered Species Act, with Reasonable and Prudent Measures implemented, the project, as proposed, was not likely to jeopardize the continued existence of the piping plover or red knot. USACE has coordinated with NMFS to ensure the latest protective BMPs are incorporated into the project's Plans and Specifications detailing specific construction measures to be undertaken to minimize potential adverse affects to protected aquatic species under their jurisdiction. The requirements of Section 7(a)(2) of the Endangered Species Act have been satisfied through extensive coordination with NMFS under

the emergency provisions of 50 CFR 402.05. The District continues to coordinate with NMFS to provide the latest, updated project information and current science consistent with the emergency procedures established for this action.

IV. COORDINATION

New York District has coordinated this project with Federal and State resources agencies and the interested public and issued a Notice of Availability of the draft Environmental Assessment (EA) in order to:

a. Inform agencies and stakeholders of the proposed work and the environmental evaluation contained in the draft EA, and
b. Provide an opportunity for comments on that evaluation and findings.

V. DETERMINATION

I have determined that this action does not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, the action does not require the preparation of a detailed statement under Section 102(2) (c) of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.). My determination was made considering the following factors discussed in this EA:

a. The proposed stabilization project has been designed to minimize impacts and avoid adverse impacts to threatened or endangered species potentially occurring in the project area. Specifically, no work will be performed between 1 April and 1 September in order to avoid impacts to nesting piping plovers.
b. No significant long term adverse impacts to the environment would be associated with the proposed project.
c. The emissions levels for NOx will exceed the ozone *de minimis* trigger levels for General Conformity while all other pollutants are below their respective trigger levels. NOx will be fully offset, by rule, therefore the net NOx emissions will be zero and therefore no significant impacts on air quality are expected from the proposed project.

V. FINDINGS

Given there are no anticipated significant impacts (primary or secondary) associated with the proposed shoreline protection project modification, this action has been determined to have no significant adverse environmental impact on the quality of the environment. Therefore, a Supplemental Environmental Impact Statement is not required and the alternative recommended represents sound engineering practices and meets environmental standards.

14 Aug 15

Date

David A. Caldwell
Colonel, U.S. Army
Commander

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New York District (District) is proposing to implement a cost-effective solution designed to restore the shoreline and provide shoreline protection for Long Beach Island, a barrier island located between Jones Inlet and East Rockaway Inlet, Nassau County, New York. The Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York Coastal Storm Risk Management Project (Project), covers approximately 6.4 miles of Long Beach Island, and includes the developed community of Point Lookout and adjacent beaches that include Nickerson Beach, Lido Beach, and the City of Long Beach (Project area). This area has been subject to major flooding during storms, causing damage to structures along the barrier island. Over the years, continued erosion, particularly in the eastern areas, has resulted in a reduction in the height and width of the beachfront, which has increased the potential for storm damage.

This Environmental Assessment (EA) has been prepared in response to Public Law (PL) 113-2 of January 29, 2013, Disaster Relief Appropriations, in order to expedite implementation of the construction of the authorized but unconstructed project. This document is prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) which requires the preparation of an EA whenever an action of a Federal agency may significantly affect the quality of the human environment. This EA has been prepared to demonstrate project compliance with the National Environmental Policy Act (NEPA) in accordance with the Council of Environmental Quality (CEQ) regulations (November 20, 1978, 40 CFR Parts 1500-1508). A Final Environmental Impact Statement (FEIS) was prepared for the proposed Project in 1995 (USACE 1995) and a favorable Record of Decision (ROD) was granted for the Project in 1998. Subsequent to the 1995 release of the FEIS for the Project, the proposed alternative was re-evaluated. This EA re-evaluates the original EIS findings due to changes to the shoreline since the 1995, changes in the Project scope (i.e., a reduction in the size of the Project area), and to address environmental concerns expressed by agencies and/or interest groups. Furthermore, this re-evaluation allowed incorporation of advancements in engineering evaluation methods. As a result of project re-evaluation, several modifications were made to the plan that was selected in 1995, which are evaluated in this EA.

This EA addresses relevant changes in the existing condition that have occurred since the Feasibility Report was completed in February 1995, including changes due to Hurricane Sandy which impacted the study area in October 2012. The scope of this EA is to evaluate and document potential environmental affects that may result from modifications to the proposed Project and is provided as a supplement to the Final Environmental Impact Statement (FEIS) prepared for the proposed Project in 1995 (USACE 1995). This report includes the documentation necessary to meet the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality's Guidance Regarding NEPA Regulations, the USACE Procedures for Implementing NEPA (Engineer Regulation [ER]-200-2-2), the USACE Planning Guidance Notebook (ER 1105-2-100), National Historic Preservation Act of 1966, as amended (NHPA) or the Abandoned Shipwreck Act of 1987, the USACE Civil Works Ecosystem Restoration Policy (ER 1165-2-501), and coordination and consultation with local citizens and natural resource agencies which included the United States Environmental Protection Agency (USEPA), the United States Fish and Wildlife Service (USFWS), the

National Marine Fisheries Service (NMFS), and the New York State Department of Environmental Conservation (NYSDEC).

1.2 PROJECT HISTORY AND AUTHORIZATION

In October 1986, the Committee on Public Works and Transportation of the United States House of Representatives authorized the USACE to review the previous report on the Atlantic Coast of Long Island, New York, Jones Inlet to East Rockaway Inlet, to determine the feasibility of providing storm damage protection works for Long Beach Island. Subsequently, a reconnaissance study and report were completed in 1989, a Draft Feasibility Report and Draft Environmental Impact Statement (DEIS) report were circulated in 1994, and a Final Feasibility Report and Final Environmental Impact Statement (FEIS) report were circulated in 1995 (USACE 1995). The Final Environmental Impact Statement (FEIS) was completed in March 1998. Following completion of the FEIS, the Record of Decision (ROD) was signed in December 1998 and filed in the *Federal Register* in January 1999.

As part of the PED phase for the authorized project for Long Beach, in February 1998, a technical analysis entitled Terminal Groin Rehabilitation and Extension at Jones Inlet, Long Beach Island was completed and developed as a project modification to include the rehabilitation and extension of the terminal groin at Point Lookout to reduce the loss of sand from the beach and shoaling in the inlet.

Public Law 113-2, the "Disaster Relief Appropriations Act, 2013", The Second Interim Report to Congress named this Study in the list of Projects previously Authorized but Unconstructed projects for reducing flooding and storm damage risks in the affected area.

Local residents and officials were concerned that the proposed groin field would, because of its ability to retain sand, reduce transport of sand downdrift of the groin field, thus inducing greater erosion (more erosion than in the without project condition) immediately west of the last groin. They were concerned specifically that first, the long-established residential communities in Lido Beach and Lido West would be west of the proposed groin field termination point and the residents felt they were potentially vulnerable to downdrift erosion. Second, that beach area has been observed to experience significant changes in beach width and elevation between seasons and during storms. Third, there would be about 7,000 ft of shoreline without groins, and therefore potentially vulnerable, between the groined beach of the City of Long Beach and the proposed new groin field. The New York District, the U.S. Army Corps Coastal and Hydraulics Laboratory and New York State conducted a reanalysis of the project that addressed the issues of local concern and reexamined other portions of the Feasibility Recommended Plan using the latest computer models and field measurements or surveys obtained since the Feasibility Study (USACE 2013 HSLRR)

Since the Feasibility Study was performed in 1995, the New York District's Atlantic Coast of New York Monitoring Program (ACNYMP) has collected significant amounts of data to document beach conditions and processes. An enhanced understanding of the coastal processes, changing field conditions and improved numerical modeling tools, have resulted in the reanalysis of shoreline stabilization measures for the eastern end (Point Lookout) of Long Beach Island.

Significant accretion has taken place in the western portion of the eastern study area, especially at the ebb shoal attachment point (herein also called the ebb shoal "weldment"). However, to the east of the weldment, beach erosion has continued to occur with the attendant potential for flooding and other types of storm damage including endangering shorefront bath house and parking facilities. The discussion concerning these coastal processes can be found in the Physical Conditions section

Figure 1 .

As a result of the Feasibility Study, several alternatives were evaluated and a final plan was selected. The plan included widening of the existing beach with the hydraulic placement of beach fill material, rehabilitation of 17 groins at Long Beach, construction of six new groins west of Point Lookout at Lido Beach, and sand removal from an offshore borrow area. However, since the 1998 release of the FEIS for the Project the proposed alternative was re-evaluated. The re-evaluation was conducted to incorporate advancements in engineering evaluation methods, to address changes to the shoreline since the 1998 evaluation and changes in the Project scope (i.e., a reduction in the size of the Project area), and to address environmental concerns expressed by agencies and/or interest groups. As a result of project re-evaluation, several modifications were made to the plan that was selected in 1995 for this Project. As part of the PED effort for Long Beach, in March 2000, a report entitled, Technical Reanalysis of the Shoreline Stabilization Measures for the Eastern Portion of the Long Beach Island, New York Project was completed. This report evaluated and developed a revised plan for groin construction along the Lido Beach and Point Lookout shoreline reaches. The proposed groin field was found to be necessary to reduce sand losses to the berm and dune system. .

1.3 PURPOSE AND NEED FOR ACTION

The Project purpose remains the same as that presented in the 1995 Final Feasibility Report. The purpose is to evaluate an array of shoreline protection measures to address significant beach erosion and deterioration of protective coastal structures along the densely populated southern coast of Long Beach Island. Erosion has reduced the width of the protective beachfront and has exposed properties to a high risk of damage from ocean flooding and wave attack. Over time, the Project area has experienced significant sand loss associated with Hurricane Irene (2011) and Sandy (2012). There is increased potential for overwash and breaching during future less severe storm events, which could cause serious damage in the study area. Based upon theses impacts, there has been an increased urgency to implement the Recommended Alternative. As a result of this devastation, Public Law 113-2, the "Disaster Relief Appropriations Act, 2013" provided supplemental appropriations to federal agencies for expenses related to the consequences of Hurricane Sandy. Existing groins and jetties along the island have deteriorated and are becoming less effective at reducing sand loss along the shoreline and providing wave protection. Continuation of the trend in sand loss will increase the potential for economic losses and threat to human health and safety.

The purposes of the Project modifications are:

1) To reduce the threat of future damage to the shoreline due to wave attack, recession, and inundation from storms;
2) Mitigate or prevent the effect of long-term erosion;
3) Provide an economically justified plan;
4) Preserve, restore, and maintain existing ecological resources and habitats for native fish and wildlife, where possible; and,
5) Preserve or mitigate for the loss of historical, archaeological, and cultural resources in the Project area, if present.

The project purpose remains the same as presented in the Feasibility Report, which is to provide for coastal storm risk management along the barrier island of Long Beach. The study covers the Atlantic Coast of Long Island from Jones Inlet to East Rockaway Inlet and considers the restoration and coastal storm risk management of the shoreline of Long Beach Island (LBI) from storm damages caused by erosion, wave attack and inundation. Barrier islands, such as LBI, provide a unique ocean-side habitat as well as providing protection from flooding and erosion on the bay shorelines. Northeasters and hurricanes periodically impact the southern shores of LBI and the shoreline of the back bays. These storms produce tides and waves that cause extensive flooding on the bay shoreline of LBI and erosion to the barrier island. Flooding in the back bays is intensified when the barrier Island is breached or overwashed. While long-term erosion and large storms have posed a significant threat to the project area for many years, a series of recent storms has created a potentially imminent hazard of widespread overtopping of the island. Previous investigations indicate that at several locations, overtopping may erode the barrier to the point where a breach, or new inlet could be formed. Severe erosion of the protective dunes has left numerous barrier island human and natural structures subject to damage

from even minor storms. The project is needed to address three closely related components which create vulnerability to the barrier island and subsequently expose the natural and human communities of the island and bayshore communities to storm damage. These components are breaching, overwashing and tidal flooding.

2.0 MODIFICATIONS TO THE PROPOSED ACTION

The recommended plan for this Project includes the preferred plan (identified in the 1995 Feasibility Report and subsequent 1998 FEIS filing) with post-Feasibility modifications as detailed in this document. The recommended plan provides the most comprehensive, effective, and cost-effective solution to provide storm protection in the Project area.

The proposed action is a modification to the Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Island of Long Beach, New York Storm Damage Reduction Project that received a favorable Record of Decision (ROD) in 1998. When compared to the original Project, the Project modification entails an overall reduction in the Project, which results in a reduction of 6,000 linear feet (lf) of fill area, a reduction of 3,922,000 cy of fill material needed for initial beach fill and 341,000 cy per yr re-nourishment activities and a reduction of 15,000 lf of sand fence. Specifically, there will be approximately a reduction of 110 ac of filling in the upper beach zone, 39 fewer acres of filling in the intertidal zone, and 35 fewer acres of filling in the sub-tidal zone.

Structural components of the Project modification include: the construction of 57 timber/gravel dune walkovers, extensions of existing dune walkovers and vehicle access ways, construction of six new groins (two of the six groins originally proposed for the Project has been deferred indefinitely, and are not part of the proposed Project modification), the rehabilitation of 17 groins and the rehabilitation and extension of the eastern terminal groin.

In addition to the decrease in the size of the Project Area and the amount of sand material required for the Project, when compared to the original Project, the Project modification would result in limited construction activities originally proposed within a 136-acre shorebird nesting/foraging area which will be excluded from the Project (Table 1). The proposed Project modification would, however, result in an increase of walkover extensions and vehicle access as well as the rehabilitation of two additional groins, and the rehabilitation and extension of the east jetty. A comparison of components of the original selected plan and the proposed Project modification are shown in Table 1.

Table 1. Summary Comparison of the Original Proposed Project and the Currently Proposed Project Modifications.

Component	Original Project	Project Modification	Change
Beach fill material (for creation of beach berm, sand barrier and a dune)	41,000 linear feet (lf), some within shorebird nesting area	35,000 lf, none within shorebird nesting area	- 6,000 lf
Borrow area sand removal (i.e., total sandfill quantity, excluding 5-year renourishments)	8,642,000 cubic yards (cy)	4,720,000 cy	- 3,922,000 cy
Dune plantings	29 acres (ac)	34.0 ac	+5.0 ac
Sand fence	90,000 lf	75,000 lf	- 15,000 lf
Timber dune walkover ADA	13	12	-1
Timber Dune walkovers (from boardwalk) ADA	5	5	0
Timber Dune walkovers (from boardwalk) None ADA	0	6	+6
Timber non-ADA walkovers	6	23	+17
Timber Vehicle and pedestrian access from boardwalk	2	2	0
Gravel surface vehicle and pedestrian access way	2	9	+7
Extension of existing walkovers	12	8	-4
Raised timber vehicular access	1	0	-1
5-yr renourishment	2,111,000 cy/year (yr)	1,770,000 cy/yr	- 341,000 cy/yr
Rehab and 100 ft Extension of terminal groin	0	1	+ 1
New groins	6	4 (6 proposed, but 2 have been deferred)	0
Rehabilitation of existing groins	15	17	+ 2
Impacts to shorebird nesting/foraging area	136 ac	0 ac	No impacts

2.1 PROJECT ELEMENTS

2.1.1 Beachfill

The selected storm damage reduction plan including changes from the authorized project, comprises approximately 35,000 If of dune and beach fill and generally extends from the eastern end of the barrier island at Point Lookout to the western boundary of the City of Long Beach, including an incidental taper into East Atlantic Beach. This component of the Project includes the following: 1) a dune with a top elevation of +14 ft above NAVD, a top width of 25 ft, and landward and seaward slopes of 1V:5H that will extend along the entire project area (1V:3H on landward slope fronting the boardwalk; 2) in Point Lookout, a beach berm extending a minimum of 110 ft from the seaward toe of the recommended dune at an elevation of +9 ft NAVD, then sloping at 1V:20H to intersection with existing bathymetry; 3) In the Nickerson Beach area in the Town of Hempstead, dune only (no berm) placed along approximately 5,000 If of shoreline. Existing berm will remain undisturbed to allow for bird nesting and foraging; 4) In Lido Beach and the City of Long Beach, a stepped beach berm extending 40 ft. from the seaward toe of the recommended dune at an elevation of +9 ft NAVD, a 1V:10H slope downward to +7 ft NAVD, a 130 ft flat berm at +7 ft NAVD, then sloping 1V:30H to intersection with existing bathymetry; Total sandfill quantity of 4,720,000 cy for the initial fill placement, including tolerance, overfill and advanced nourishment (based on 2013 post-Hurricane Sandy survey); 5)planting of 34 acres of dune grass and installation of 75,000 If of sand fence

2.1.2 Rehabilitation of Existing Groins

Sixteen groins were proposed for rehabilitation in the plan selected in 1998. However, the existing groins within the Project were re-evaluated in March 2002 (USACE 2004b). The groins were evaluated for structural condition, sand trapping effectiveness, and planform holding effectiveness. As a result of this survey, a total of 17 groins were recommended for rehabilitation, including 15 groins in Long Beach and two groins in Point Lookout.

Rehabilitation was based on a condition survey of the existing groins conducted in September 2003, the plans for rehabilitation of existing groins in the Recommended Plan has been modified to include rehabilitation of those groins that were found in poor or fair condition that would be beneficial to the beach stability. Based on this evaluation, 15 of the 23 groins in the City of Long Beach and two groins in Point Lookout should be rehabilitated. The proposed rehabilitation would consist of repositioning existing armor stone and adding additional armor stone along the seaward 200-330 feet of each of the groins. A minimum constructible crest width of approximately 13 ft was selected with side slopes of 1V on 2H. A primary armor weight of approximately five tons was selected in order to approximately match the existing armor stone order to match the existing armor.

2.1.3 Construction of New Groins

The selected 1995 plan proposed eventual construction of six new groins (all 765 ft long and 70 ft wide) at Point Lookout (USACE 1995). Currently only the first four groins are targeted for immediate construction, whereas the remaining two groins are proposed for deferred construction as needed based on the stability of the existing weldment area. However, based on subsequent re-evaluation of the area, some modifications to the original design of the four new groins have been proposed. The Project requires the immediate construction of a new groin field at Point Lookout that will contain six groins that begin 800 feet west of existing Groin 55 in Point Lookout. The four groins would be constructed with tapered lengths and spaced at an interval of 800 feet. Groin lengths vary and range from 380 ft to 800 ft. Groin widths will be 13 ft.

A determination to construct the two westernmost groins will be triggered at a later date within the 50-year Project life and be based on monitoring data. The criterion for construction includes a change from an accreting beach to an eroding beach in the area where the structures are to be located. The criteria will be evaluated based upon field measurements and analysis.

2.1.4 Point Lookout Terminal Groin Rehabilitation and Extension

During re-evaluation of the proposed Project, the USACE determined that Groin #58 (i.e., West Groin), the terminal groin in Point Lookout, required rehabilitation and extension. Accordingly, the District plans to rehabilitate the existing portion of the groin, extend the length an additional 100 feet (currently 200 ft), and extend the width to between 107 and 170 ft (currently widths range from 50 to 107 ft), in accordance with design specifications presented in the USACE Terminal Groin Rehabilitation and Extension at Jones Inlet, Long Beach Island, New York Report. Extending the terminal groin may decrease the amount of sediment lost toward the inlet after the beach fill component of the project is carried out. It will also possibly retain additional longshore sediment transport without causing large changes in inlet dynamics. The median armor weight for the rehabilitated and new portions of Groin #58 is approximately 10 to 10.75 tons (USACE 1999)

2.1.5 Dune Walkovers, Vehicle Access, and Boardwalk Extensions

Several dune walkovers, vehicle access points and boardwalk extensions are proposed for the City of Long Beach and the Town of Hempstead. Construction of these structures will allow the public to gain safe access to the beach without harming the existing and enhanced dune system.

A total of 57 timber dune walkovers (including 17 timber wheelchair accessible), 9 gravel surface vehicle and pedestrian walkovers, 29 timber non ADA compliant, two timber vehicular access ways from the boardwalk, eight extensions to existing walkovers, are currently proposed. Originally, 29 dune walkovers (both timber and gravel) and 12 vehicle access ramps were included in the selected plan (USACE 1995).

2.1.6 Comfort Stations and Lifeguard Headquarters

The currently proposed plan does not include the construction of combined comfort/lifeguard stations or the construction of timber retaining walls around four existing comfort stations. The

relocation and rebuilding of comfort stations and/or lifeguard stations and headquarters was not proposed in the original Project (USACE 1995). However, these structures were destroyed by Hurricane Sandy and the Town of Long Beach has currently relocated them.

2.1.7 Bird Nesting and Foraging Area

The proposed Project modification has excluded Project activities from within a 93.4-acre ephemeral pool and a 42.3-acre tern/piping plover nesting area located in Point Lookout, near the Jones Inlet ebb shoal attachment point (Appendix J). Project activities were proposed within this area as part of the original plan that was selected in 1995. However, the USACE reevaluated proposed Project activities in direct response to concerns regarding shorebird habitat from Federal and State agencies and other interested parties. As a result, construction of a beach berm within the bird nesting/foraging area has been eliminated from the proposed Project to allow for the continued unimpeded use of the area as shorebird nesting and foraging habitat. Two new groins were originally proposed within the tern/piping plover nesting area. However, based on a re-evaluation of the Project, construction of these groins has been deferred. No beach fill activities will take place within the bird foraging and nesting area.

2.1.8 Sand Removal from Offshore Borrow Area

An offshore borrow area, located approximately 1.5 miles south of Long Beach Island (Figure 3) between 25 feet mean low water and about 60 feet mean low water, has been identified as a potential source of sand material for beach fill and dune construction activities. Approximately 4,720,000 cy of material will be removed from this area. {The original plan selected in 1995 proposed 8,642,000 cy of sand removal (USACE 1995)}.

A hopper dredge may be utilized during construction of the LB project to obtain material from the borrow area, to sail to a pumpout area, and to connect to a pumpout buoy where it would pump the material from the hopper onto the shoreline via a pipeline. The hopper dredge would not be equipped with an Unexploded Ordnance (UXO) screening device because the state of New York does not require the use of UXO screening devices. Based on historical land use and the number of dredging projects and the millions of cubic yards dredged that have occurred off the south shore of Long Island, there has been no history of UXO/MEC encounters and no pre-project data suggests the presence of ordnance. In contrast, the state of New Jersey does require a UXO screening devices based on their past encounters with unexploded ordnances in the offshore borrow areas. In the past, along Long Island from Coney Island to Montauk Point, the New York District (NYD) has never used or needed UXO screening devices. The NYD feels that there is no justification that would warrant the use of UXO screening devices for this project.

2.2 REASONABLY FORESEEABLE FUTURE ACTIONS

Reasonably foreseeable future actions of the Project include beach renourishment and maintenance of beach access locations. Renourishment will be conducted every 5-years over the 50-year life of the Project. During each renourishment, approximately 1, 770,000 cy of sand will be added to the beach from the borrow area located approximately 1.5 miles offshore to the south of Long Beach Island. Approximately 2,111,000 cy per 5 years of sand removal were proposed

in the 1995 selected plan (USACE 1995). This borrow area contains approximately 36 million cy of suitable beach fill material. . Maintenance of beach access locations includes replacing deteriorated or damaged ramps, railings, and stairs associated with dune walkover and boardwalk extensions. Additionally, vehicle access locations will be monitored for excessive wear and maintained on an as-needed basis. Facilities such as lifeguard stations, comfort stations, and associated buildings will likely require periodic maintenance by the local sponsor.

3.0 AFFECTED ENVIRONMENT

A detailed discussion of the affected environmental resources associated with the Project is found in the project's original FEIS (USACE 1995). The proposed Project modifications will not involve any additional affected environmental resources. Therefore, only those environmental resources that may be subjected to additional negative impacts from the currently proposed Project are discussed in this EA.

The purpose of this section is to provide a brief summary of the affected environmental resources detailed in the FEIS and to update the information based on more recent studies and an evaluation of proposed project modifications as presented in this report.

3.1 DESCRIPTION OF PROJECT AREA

The Long Beach Barrier Island is approximately 10 miles long and varies in width from 1,500 to 4,000 ft. The island is located along the Atlantic (south) coast of Long Island, New York from Jones Inlet westerly to East Rockaway Inlet and parallels the south coast of Long Island (Figure 1). The island is separated from the mainland by bays. The Project area covers approximately 6.4 miles, 35,400 lf, of the Long Beach barrier island. The Project area is situated within Nassau County, New York, and from east to west includes the developed community of Point Lookout and adjacent beaches, including Nickerson Beach, Lido Beach and the City of Long Beach.

The Project area consists of beaches, sand dunes, herbs, low-growing shrubs, and tidal flats, and has been highly modified as a result of human development. T Upland areas in the vicinity of the Project have been committed to residential, commercial and recreational development. Near shore and upper beach areas in the Project area are heavily utilized for beach recreation. Numerous stone groins currently exist in the Project area, including 23 at Long Beach, three at Point Lookout and four at Lido Beach. Based on a 2003 assessment, over 60% of these are deteriorated. The offshore portion of the proposed project includes a 550 acre borrow area located approximately 1.5 miles south of Long Beach Island between 25 feet mean low water and to about 60 feet mean low water (Figure 2).

3.2 PHYSICAL ENVIRONMENT

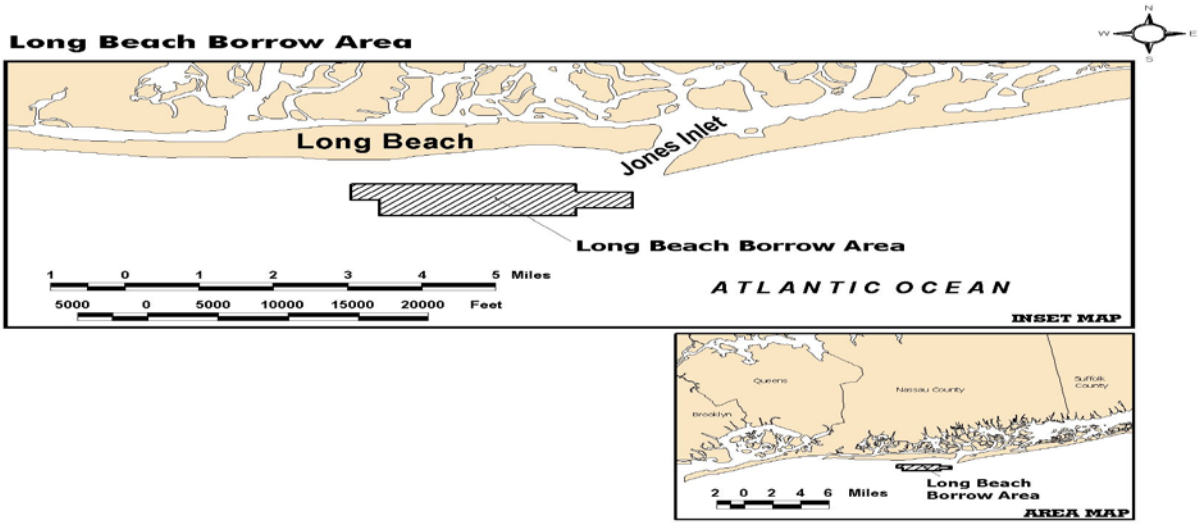
3.2.1 Topography, Geology, and Soils

The Project area is located in the Atlantic Coastal Plain Physiographic Province (Pickman 1993). Topography is low-lying, flat terrain with elevations generally ranging from 0 to 6 feet (ft) NGVD. Dominant landforms consist of shallow brackish lagoons and low relief sandy barrier

islands and associated dunes. Long Beach Island is one of these barrier islands. Based on beach sediment grabs in the Project area, sand samples ranged in size from very fine to coarse, with a median grain size of 0.21 to 0.22 mm (i.e., fine sand). The area has been severely disturbed due to human activities (Tunstead 1999). A thorough discussion of geologic features and substrate characteristics such as littoral materials, shoreline changes, and sediment budget, is found in the re-evaluation report for this Project.

No prime, unique, or important farmland soils exist within the Project area; therefore the Farmlands Protection Policy Act does not apply to the proposed Project (Tunstead 1999).

Figure 2. Location of the Long Beach Borrow Area.



3.2.2 Water Resources

The Project area is situated above the North Atlantic Coastal Plain Aquifer System, which is the sole source water supply for more than 3 million people and has been designated as a sole source aquifer (SSA) pursuant to Section 1424(e) of the Safe Drinking Water Act. Approximately 50% of the precipitation that falls on the land surface recharges the ground-water reservoir. Annual precipitation ranges from 40 to 44 inches in the Project area (United States Geologic Survey [USGS] 1995).

The Project area is classified by NYSDEC as Class SA, which defines surface water in the Project area as safe for primary contact recreation and shellfish harvesting (USACE 1995). Recent water quality data collected by USEPA and the New York City and Nassau County Public Health Departments show that overall bacteriological water quality in the Project area is very good (Jacobs 1999, Luke 1999, USEPA 1999b).

Tides in the Project area are semi-diurnal with mean range along the outer coast of Long Beach of 4.5 feet and a spring range of 5.4 feet. The mean range in Hempstead Bay is 3.9 feet with a spring range of 4.7 feet. Current velocities along the ocean shore range from 2.3 to 3.1 knots at flood tide and 2.2 to 2.6 knots during ebb tides. A thorough discussion of water resources,

including wave action, sea level rise, stage-frequency and storms, may be found in the re-evaluation report for this Project.

3.3 NATURAL ENVIRONMENT

3.3.1 Aquatic and Terrestrial Habitats

Oceanfront beach and deepwater ocean habitats constitute the majority of the Project area. The beach community includes upper, intertidal, and nearshore subtidal areas. Except for beachgrass, scattered herbs, and sparse low-growing shrub communities associated with the upper beach/dune area, most of the Project area is devoid of vegetation and is significantly impacted from human use of the area for recreational activities and significant development that abuts the upper beach zone in most of the Project area. The only undeveloped areas in the Project area, besides the beach itself, occur at Silver Point, and Lido Beach/Point Lookout.

The upper beach zone extends from dune areas to just above the high water line and includes dunes and supratidal areas of the beach. The area is predominately covered with sand. However, patches of herbaceous vegetation are found in the upper beach zone and are dominated by American beach grass (*Ammophila breviligulata*), other species found in this zone include spurge (*Euphorbia polygonifolia*), beach plum (*Prunus maritima*), seaside goldenrod (*Solidago sempervirens*), and sea rocket (*Cakile edentula*). The upper dune portion of this zone typically includes scattered patches of the herbs described above and stunted shrub species such as beach heather (*Hudsonia tomentosa*). In areas of low human disturbance, these areas can provide nesting and foraging areas for birds.

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 intertidal zone provides key foraging habitat for shorebirds.

The affected near shore subtidal zone extends from the low water line down to 25 feet below mean low water (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 1995). These structures provide habitat for numerous fish, macro-invertebrates, and birds.

The offshore subtidal zone is located approximately 1.5 miles south of Long Beach Island 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. The area also provides a migratory pathway and spawning, feeding and nursery area for many common mid-Atlantic fish species.

Based on USFWS National Wetland Inventory (NWI) maps, the Project area includes approximately 50% intertidal habitat, 30% subtidal habitat and 20% upland/upper beach habitat. The wetland/deepwater areas are devoid of vegetation and are considered non-jurisdictional (*i.e.*,

unregulated) wetlands.

3.3.2 Aquatic and Terrestrial Wildlife

FINFISH AND SHELLFISH

Both the nearshore and offshore waters of the Project area support seasonally abundant populations of many recreational and commercial finfish (USFWS 1989, 1995, USACE 1995). 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, 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 and by the NYSDEC in 2012 indicate that the borrow area itself contains very small, to no, localized populations of surf clam. It is the intent of the USACE to conduct another survey in the borrow area prior to the utilization of the borrow area.

Benthic Resources

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 1995). 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 1995). 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).

Sediments in the offshore borrow area contains over 75 taxa of benthic species (Steimle and

Stone 1973). The most numerous species were polychaete worms (dominated by the tube-dwelling polychaete, *Asabellides oculata*) and blue mussel (USACE 1995).

Reptiles and Amphibians

Due to the lack of freshwater habitats and vegetation along the beach and shoreline, no reptiles or amphibians are expected to inhabit the Project area (USACE 1995).

Birds

A wide diversity of bird species is likely to occur within, and in the vicinity of, the Project area. The most common species in the Project area are habitat generalists that are tolerant of development and that utilize beach habitat along the shoreline and deepwater habitats. Common species include herring gull (*Larus argentatus*), greater black-backed gull (*Larus marinus*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), barn swallow (*Hirundo rustica*), black-bellied plover (*Pluvialis squatarola*), black scoter (*Melanitta nigra*), bufflehead (*Bucephala albeola*), common grackle (*Quiscalus quiscula*), common yellowthroat (*Geothlypis trichas*), double-crested cormorant (*Phalacrocorax auritus*), European starling (*Sturnus vulgaris*), gray catbird (*Dumetella carolinensis*), mourning dove (*Zenaida macroura*), rock dove/pigeon (*Columba livia*), sanderling (*Calidris alba*), song sparrow (*Milospiza melodia*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), and tree swallow (*Iridoprocne bicolor* [USACE 1998, 2003, USFWS 1992]). Permanent avian residents of the surrounding area include various species of gulls, crows, pigeons, and sparrows, which are commonly associated with developed areas and areas of high human activity (USFWS 1992, USACE 1998, 2003).

Mammals

The USFWS (1993) reported that the general Project area includes year-round habitat for terrestrial mammals such as the gray squirrel (*Sciurus carolinensis*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), Eastern cottontail (*Sylvilagus floridanus*), and feral cat (*Felis catus*) [USACE 1998, 2003, USFWS 1992]). This is consistent with results from studies conducted by the USACE on nearby Fire Island.

Extensive use of beach, dune, and near shore areas for public recreation limits the potential of habitats in the Project area for mammals. The primary use of the Project area by mammals is for resting and feeding activities.

3.3.3 Threatened or Endangered Species and Habitats

All appropriate Federal and State agencies were consulted regarding the potential for species and habitats of special concern within the Project area during the preparation of the FEIS for this project (USACE 1995). Correspondence received from these agencies and USACE responses to correspondence relating to the original Project are presented in the FEIS (USFWS 1989, 1995, NMFS 1993, USACE 1995). Subsequent recent correspondence relating to species and habitats of special concern are presented in Appendix A (Federal and State correspondence), Appendix C

(USFWS Fish and Wildlife Coordination Act 2(b) Report), and Appendix G (NMFS correspondence).

Federal Species or Habitats of Concern

The eastern portion of the project area (Nickerson Beach) is within a Significant Coastal Fish and Wildlife Habitat as designated by the New York State Department of State (NYSDOS), Division of Coastal Resources. This portion of the project area has also been designated an Important Bird Area by Audubon New York, and has been identified as a Significant Fish and Wildlife Habitat by the Service. In addition to the species that utilize the beach area listed in Section 3.3.2 above, the federally-listed species including the piping plover (*Charadrius melodus*; threatened) and sea beach amaranth (*Amaranth us pumilus*; threatened), which are protected under the Endangered Species Act (ESA) of 1973, as amended (87 Stat. 884, as amended; 16 U.S. C 15 31 et seq.) have been documented in the project area. The red knot (*Calidris canutus rufa*), a species recently listed as threatened has also been documented in the project area (USFWS, 2014). However, the extensive use of beach, dune, and near shore areas for public recreation has been limiting the potential of habitats in the Project area for successful bird nesting. The primary use of the Project area by birds is for resting and feeding activities.

Four species of threatened and endangered marine turtles may be present in the near shore waters of the Project area during summer and early fall. The Federally-listed Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) sea turtle, have foraging ranges that include the Project area (NMFS 2014)). .

***Atlantic Sturgeon (Acipenser** oxyrhynchus oxyrinchus*) are also protected, and like all anadromous fish, Atlantic sturgeon are vulnerable to various impacts because of their wide-ranging use of rivers, estuaries, bays, and the ocean throughout the phases of their life. General factors that may affect Atlantic sturgeon include: dam construction and operation; dredging and disposal; and water quality modifications such as changes in levels of dissolved oxygen (DO), water temperature and contaminants.

Atlantic sturgeons have been harvested for years. Many authors have cited commercial over-harvesting as the single greatest cause of the decline in abundance of Atlantic sturgeon (NMFS 2012A, 2014). Even though the fishery has been closed coast-wide since 1995, poaching of Atlantic sturgeon continues and is a potentially significant threat to the species, but the magnitude of the impact is unknown. Atlantic sturgeon may compete with other bottom feeding species for food, although there is no evidence of abnormally elevated interspecific competition, and it has been suggested by van den Avyle that "non-selective feeding of juvenile and adult sturgeons may reduce the potential for competition with other fish species". No Federally-protected marine habits of concern occur within the Project area.

State Species or Habitats of Concern

The State-listed threatened common tern (*Sterna hirundo*) and least tern (*Sterna antillarum*) are known to occur in the Project area. as well as a number of other at-risk shorebird species

including black skimmer (*Rhychops niger*), and American oystercatcher (*Haematopus palliatus*). These species are known to utilize coastal beach habitats similar to those found in the Project area and the species are commonly associated with nesting tern colonies.

Essential Fish Habitat

Pursuant to Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Federal agencies are required to consult with the NMFS regarding any action they authorize, fund, or undertake that may adversely affect Essential Fish Habitat (EFH). For assessment purposes, an adverse effect has been defined in the Act as follows: "Any impact which reduces the quality and/or quantity of EFH. Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species fecundity), site specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions."

Based on a review of the National Oceanic and Atmospheric Administration (NOAA) guide to EFH designations in the Northeastern United States, designated EFH occurs in the greater Project area as identified by the 10-minute by 10-minute square that is bounded as follows: North 40° 40.0' N, East 73° 50.0' W, South 40° 30.0' N, and West 74° 00.0' (NMFS 2004). NOAA describes this square as "Atlantic Ocean waters within the square within the Hudson River estuary affecting the following: western Rockaway Beach, western Jamaica Bay, Rockaway Inlet, Barren I., Coney I. except for Norton Pt., Peardegat Basin, Mill Basin, southwest of Howard Beach, Ruffle Bar and many smaller islands."

Fish occupation of waters within the project impact areas is highly variable spatially and temporally. Some of the species are strictly offshore, while others may occupy both nearshore and offshore waters. In addition, some species may be suited for the open ocean or pelagic waters, while others may be more oriented to bottom or demersal waters. This can also vary between life stages of Federally managed species. Also, seasonal abundances are highly variable, as many species are highly migratory.

3.4 CULTURAL RESOURCES

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the Advisory Council on Historic Preservation implementing regulations, 36 Code of Federal Regulations [CFR] Part 800, *Protection of Historic Properties*, the USACE has identified the Area of Potential Effect (APE) for this Project to include the offshore borrow area, the near shore and onshore sand placement area and the groin construction and rehabilitation areas. The New York District is supplementing surveys originally conducted for the 1998 Feasibility Study and FEIS to further identify historic properties and determine the effect of project plans on them. The New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) and other interested parties were consulted regarding this project during preparation of the EA. Correspondence relating to cultural resources is presented in Appendix F. In addition, a site reconnaissance and an extensive evaluation of the history and prehistory of the Long Beach Island was conducted and compiled for this study and remote sensing surveys and dive inspection were also carried out and others are on-going (Pickman 1993, Panamerican

Consultants, Inc. 1996, 1998a&b, 2005).

3.4.1 Historic Resources

The first European settlers arrived on Long Island during the first half of the seventeenth century. It was not until the middle of the nineteenth century, however, that Long Beach was occupied by Euro-Americans. According to local histories, no structures were located on Long Beach until after 1849. Residents of the mainland used the island primarily for pasturage. In 1849, a Life Saving Station was constructed on Long Beach to house surf boats, lifesaving apparatus and a crew of six to seven men.

Between 1849 and 1879, only a few buildings were constructed on Long Beach. In 1873, a transatlantic cable connecting New York to England, via Halifax, Nova Scotia, made its landfall at Long Beach Island, between the current Edwards and Riverside Boulevards. The development of the island began in 1880 with the construction of a railroad from Lynbrook to Long Beach and the construction of the first large resort hotel and bathing pavilion on the island. This was followed by the construction of a number of other hotels in the 1880s and 1890s and during the first two decades of the twentieth century. Summer homes and permanent residences were also built on the island during the twentieth century. The location of these structures was well north of the present boardwalk and beach zone (Pickman 1993). No significant remains of the project area's history would be situated along the site of the present beach.

Two structures located in the vicinity of the project area, the Granada Towers and the United States Post Office, are listed on the NRHP. One private residence, located on Washington Boulevard and thought to be one of the first private homes on Long Beach, is listed on the historic structures inventory maintained by the NYSOPR HP. None of these structures are within the APE. No other buildings or structures have been listed or determined eligible to be listed on the National Register within the Project area since the completion of the Final Feasibility Report and FEIS.

3.4.2 Shipwrecks

Several dozen possible shipwrecks were identified in the initial near-shore survey of the project area (Panamerican Consultants 1996 and 1998) around Long Beach. Further testing on these sites was carried out in 2005 (Panamerican Consultants, Inc. 2005). Two shipwrecks have been documented within the near shore sand placement. The 1837 wreck identified as the *Mexico* occurs near Lido Beach and a second wreck, known by local divers as the Marble Wreck, occurs near Point Lookout (Pickman 1993, Panamerican Consultants 1996, 1998, and 2005). Both wrecks are potentially eligible for inclusion in the National Register of Historic Places. Another object detected during the 1998 near shore remote sensing survey, referenced as Anomaly 18, is unknown and requires further investigation to determine its significance.

In November 2013, additional investigations were undertaken on 1) two anomalies identified in 1998 (Anomalies 18 and 29); 2) Anomalies 8, 10 through 12, which may represent the wreck of the *Mexico*; and 3) the remains of the wreck known as the Marble wreck (Panamerican 2014).

Anomaly 18 was a magnetic anomaly that was recommended for further investigation in 1997. It was reacquired in 2013 as three separate anomaly locations were detected in the vicinity of the original anomaly. All three locations were investigated by divers, who found no indications of structure located above the bottom were found at any of the three locations. These areas were also probed in 5-foot intervals to 25 feet in the cardinal directions to a depth of approximately eight feet. All three locations were negative for buried structures, indicating the anomalies could be isolated debris or buried deeply. No additional investigations were recommended.

Anomaly 29, originally identified in 1998, was relocated in 2013 and subjected to a dive inspection. No indications of structure located above the bottom were found. The target area was probed to a maximum depth of approximately 10 feet in 5-foot intervals to 25 feet in the cardinal directions. All probes were negative for buried structure, indicating the source of the anomaly may have been isolated debris, or very deeply buried. No additional investigations are recommended.

Anomaly 8, which was found to be three separate anomalies (8a, b and c) were inspected by divers. Anomalies 8a and 8b were found to represent the remains of a wrecked vessel or vessels, possibly the *Mexico*. No wooden structure was located during the underwater investigation. There is likely a wooden structure under the concretions identified and under the sand. Anomaly 8c was determined to be recent debris and Anomalies 10 -12 represented the offshore end of a discharge pipe. The wreck at Anomaly 8a and 8b, particularly if it represents the *Mexico*, is eligible for the National Register of Historic Places (Panamerican 2014).

The Marble wreck is located off the end of Point Lookout on the west side of Jones Inlet and covers an area approximately 225 feet by 100 feet. The remains consist of wooden hull remains, masses of concretions and at least one anchor. The wreck is in alignment with the western Jones Inlet jetty. This wreck has not been positively identified. It is referred to as the Marble wreck because marbles can be found in the concretions that may make up the vessel's cargo. The vessel represents a 19th century wreck of a wooden sailing vessel, although the type could not be determined. This wreck is eligible for the National Register of Historic Places (Panamerican 2014).

3.4.3 Submerged Sites

During the last glacial period, the sea level was up to 400 feet lower than current levels. The shoreline at this time lay at the outer edge of the continental shelf approximately 100 miles from the present shoreline. According to area studies, the sea level rose at a steady pace between circa 7000 to 3000 before present era, with a slower rate of increase after circa 3000, before present era. Cores taken adjacent to the project area indicate the presence of peat, silt, and clay deposits that are remains of the lagoons that formed behind the barrier islands that were created off the present Long Island shoreline at this time. The presence of these lagoonal deposits may mean that the inundation of the ground surface occurred in a low energy environment, which may have permitted any prehistoric sites located in the nearshore area to survive any disturbance. These deposits would consist of organic peat and/or organic silts and clays (Pickman 1993).

The proposed borrow area may also contain prehistoric land surfaces. The borrow site would have been available for human occupation until sometime after 7000 before present era. Two of fifteen cores taken from within the borrow site to a depth of 20 ft below the ocean floor contained either a clay layer or layer of dark gray silt (Pickman 1993). Based on data taken from cores and borings for adjacent areas, it is possible that these two cores taken within the borrow site may represent land surfaces that would lie on top of prehistoric deposits (Pickman 1993).

3.5 SOCIOECONOMIC ENVIRONMENT

Based on the 1998 FEIS, no Hazardous, Toxic, and Radioactive Waste (HTRW) sites, or New York State-listed Inactive Hazardous Waste Disposal Sites have been identified within the proposed Project area (NYSDEC and New York State Department of Health 1998) and no Federal navigational waterways of navigational projects are located in proximity to the proposed Project area.

3.5.1 General Setting

Population. Population in the City of Long Beach has decreased from a 1990 total population of 33,510 to a 2010 total of 33,275. The Town of Hempstead has shown an increase in population from 49,453 (1990) to 53,891 (2010). The Lido Beach Community's population has increased from 2,786 (1990) to 2,897 (2010). This population for Nassau County has increased from 1,287,348 (1990) to 1,339,532 (2010). The population trend for the project area is expected to be stable in the future.

Income. Per capita income is an indicator of the economic strength of a community. The per capita income in the City of Long Beach has increased during the period of 2000 to 2010 from $31,069 to $43,377. The per capita incomes have also increased for the Town of Hempstead from $28,153 (2000) to $37,211 (2010), Lido Beach Community from $47,604 (2000) to $74,449 (2010) and Point Lookout Community from $39,953 (2000) to $79,146 (2010) this rate of increase is higher than the overall rate for Nassau County.

Shore Ownership and Use. The majority of the beaches within the study area are publicly owned and publicly accessible. Within the Town of Hempstead there are several privately owned properties and several special park districts, which are discussed further in the formulation section. There is public transportation to the majority of the beaches as well as sufficient parking area along most of the project shorefront. There is full lateral beach access along the entire study area shorefront, and a public bus, which provides drop-offs along the main artery of the barrier island. As prescribed by Corps policy and regulations, costs of improvements in those areas that are not open to the public would be 100% non-Federal, unless protection to such areas is incidental to the project. The State has submitted a Public Access Plan, which is intended to conform with Federal policy. To allow for full public access and yet offset the levies that residents are charged for beach maintenance, several of the beach areas have adopted differential fees, which include higher fees for non-residents than residents.

3.5.2 Coastal Zone

The Project area is located within the designated coastal zone regulated under the Wetland Act of 1970 and Article 42 of New York Codes, Rules, and Regulations, Part 600.2, as well as within The Coastal Barrier Resources Act (CBRA) established the Coastal Barrier Resources System (CBRS). The Eastern portion of Long Beach Island is located in Fire Island Unit NY-59. Section 5 of the Coastal Barrier Resources Act (CBRA; 16 U.S.C. § 3504) prohibits new Federal expenditures or financial assistance within System units of the CBRS.

3.5.3 Aesthetics and Scenic Resources

Aesthetics and scenic resources in the Project area are accessed primarily by boardwalks along the shore, and encompass a view of the ocean and beach recreational facilities to the south and commercial and residential development to the north. The beach extends to the east and west for many miles, as does the boardwalk. Groins are visible along the shore throughout the project area.

3.5.4 Recreation

The island is primarily residential with extensive recreational facilities to support recreational uses normally associated with beachfront open space. Facilities include bathhouses, boardwalks, refreshment stands, bathrooms, showers, lifeguard stations, hotels/motels, and access ramps to beach areas. The beach areas provide recreational opportunities for year-round residents and are easily accessible by people from New York City and surrounding areas of Nassau County. Annual beach attendance on Long Beach Island is estimated at over 1.5 million visitors (USACE 1998). Annual beach use is reported to have declined in the Point Lookout area due to severe erosion of the shoreline and loss of beach area. The south shore of Long Beach Island is a continuous strip of sand beach serving the year-round inhabitants as well as the great influx of summer visitors and vacationers. Most visitors to Long Beach are from Nassau, Kings, Queens, and New York Counties. From 1999 to 2002 an average of 500,000 people visited the beach in the City of Long Beach and from 1994 to 2002 an average of almost 500,000 in the eastern beaches of Point Lookout, Nassau County and Lido Beach. It is noted that due to the erosion, which has most severely affected the usage of the Point Lookout area, beach attendance has substantially declined. For example, the attendance in this area in 1984 was 523,065 while the average attendance from 1993 to 2002 was approximately 130,000.

3.5.5 Transportation

The study area is accessible to major population and commercial centers, through an extensive network of highways, roads and railways. Direct access from the major corridors to the barrier island is provided by three vehicular bridges from: Loop Parkway on the eastern end of the barrier island; Atlantic Beach bridge on the west; and the Long Beach causeway in the center. The communities are also served by the Long Island Railroad, which provides passenger rail service from eastern Long Island and New York City directly into the City of Long Beach. There is a public bus which runs east to west along the major artery of the barrier island from Point

Lookout to Atlantic Beach.

3.5.6 Noise and Air Quality

Noise level measurements have not been obtained in the Project area. In lieu of field measurements, the noise levels in the Project area can be approximated using existing land uses. The dominant land use in the Project area is primarily residential housing which has mean outdoor day-night sound levels range from 59 to 78 A-weighted decibel (USEPA 1978).

The proposed Long Beach Project is located in Nassau County, New York. Nassau County is part of the New York, Northern New Jersey, Long Island, Connecticut nonattainment area which is currently classified by EPA under the National Ambient Air Quality Standards (NAAQS) as "marginal" nonattainment for the 2008 8-hour ozone standard, nonattainment of the 2006 particulate matter less than 2.5 microns (PM2.5) standard, and maintenance of the carbon monoxide (CO) standard. The nonattainment area is part of the Ozone Transport Region. Ozone is controlled through the regulation of its precursor emissions, which include oxides of nitrogen (NOx) and volatile organic compounds (VOCs).

4.0 ENVIRONMENTAL IMPACTS

A detailed discussion of the environmental impacts associated with the Project may be found in the FEIS (USACE 1995). Those impacts were determined to be insignificant, comments from agencies and interested parties were addressed, and all practicable means to avoid or minimize adverse environmental effects were incorporated into the recommended plan. Cultural Resource Final Approval was based on "continued Section 106 work" prior to any project construction as described in Section 4.4.

Subsequent re-evaluations of the Project have resulted in some project modifications. The proposed modifications will not involve impacts to any additional environmental resources not addressed in the FEIS for the original project. However, the extent of impacts (i.e., acres of project footprint) has been reduced for some of the environmental resources that were identified in the 1995 FEIS. Specifically, when compared to the original proposed Project, the Project modification would result in a reduction of 170 acres of impact (i.e., 110 acres of filling in the upper beach zone, 39 fewer acres of filling in the intertidal zone, and 35 fewer acres of filling in the sub-tidal zone), the amount of initial fill material required for the Project would be reduced by 3,922,000 cubic yards (cy), and the amount of fill material needed for renourishment activities would be decreased by 341,000 cy.

The purpose of this section is to provide a brief summary of the impacts to environmental resources as detailed in the FEIS and to update the information based on more recent studies and an evaluation of proposed project modifications as presented in this EA (USACE 1998). Only those environmental resources that are likely to exhibit negative impacts from the currently proposed Project are discussed in this EA. The Fish and Wildlife Coordination Act 2(b) report for this Project is available in Appendix C.

4.1 OVERALL PROJECT AREA

The currently proposed Project represents a modification to the original approved Project that has reduced the overall amount of beach fill, dune fill, dune plantings, sand fence, and fill required for renourishment activities, and has reduced the number of dune walkovers, new groins and vehicle access ramps. In addition, the proposed project modification also has limited Project activities within a 136-acre shorebird foraging/nesting area. Although, the Project has increased the number of proposed boardwalk walkovers and vehicular ramps and now includes a 100-foot extension of groin 58 (i.e., East Groin), these changes are overall insignificant relative to the original approved Project and will have no significant negative environmental impacts.

In the 1995 FEIS, it was determined that offshore, near shore and onshore components of the Project could potentially cause some minor adverse impacts to water quality, aquatic habitats and species (i.e., benthic organisms, fish and their habitat), potential threat to several endangered marine and terrestrial species (i.e., sea turtles, piping plover, sea beach amaranth), cultural resources (i.e., shipwrecks), and socio-economic impacts to recreational activities during construction (i.e., noise and restrictions to construction areas). Similar potential impacts are likely under the currently proposed Project. However, it is the physical extent (i.e., acreage of impacts) that has changed which translates to less overall impacts throughout the Project area relative to the original approved Project. No significant negative impacts, in addition to those described in the 1995 FEIS and highlighted below, are expected from the currently proposed Project modification. No new natural resources or endangered species have been identifying within the project area since the 1995 EIS. The red knot (*Calidris canutus rufa*) and Atlantic Sturgeon (***(****Acipenser oxyrhynchus oxyrinchus*) have been listed since the 1995 EIS.

4.2 PHYSICAL ENVIRONMENT

4.2.1 Topography, Geology, and Soils

Construction/extension of hard structures (groins, walkovers, access roads) and beach fill placement would result in permanent impacts on topography within the footprint of the proposed activity. However, although impacts on topography would be permanent they would not result in significant negative impacts to Long Beach Island. Following Project activities the topography in beach fill areas will be characteristically similar to natural beach/dune communities found along the coast of Long Island. No impacts on geology would result from the Project structures because bedrock elevations would be below the depth of proposed fill and structure foundations.

No significant or long-term impacts would occur on native soil grain size, structure, nutrient status, or organic matter content as a result of the Project, because the structures would retain and capture littoral materials native to the beach community and the texture of the nourishment material to be used would be compatible with native sand material. Construction/extension of groins would result in continued protection of upland property from wave action and erosion that would accompany a storm with a reoccurrence interval of 100 years along the Long Beach shoreline and would reduce the amount of renourishment fill required. The groin structures would help to slow the long-term beach erosion rate in the Project Area.

4.2.2 Water Resources

Negligible increases in near shore turbidity and suspended solids may result during construction of the groins from disturbance of subsurface sediments. These increases in turbidity and suspended solids are likely to cause a short-term reduction in oxygen levels, a reduction in primary productivity and photosynthesis, and may clog gills and filter-feeding structures of some sessile aquatic species (Reilley et al. 1978, Courtenay et al. 1980). Periodic (every 5 years) renourishment activities would cause impacts similar to those generated during initial construction, but impacts would occur over a shorter period. However, because of tidal and current influences, and the relatively quick settling velocity of subsurface sediments (medium to fine grained sand), turbidity is expected to dissipate rapidly, both spatially and temporally (Naqvi and Pullen 1982) and the Project is not anticipated to have significant long-term impacts on water quality. Appendix B provides an evaluation of Project effects as related to the New York State Section 404(b)(1) water-quality guidelines. The Project would have no significant impact on regional hydrology or groundwater resources.

The Project would have no significant impact on natural tidal fluctuations. Littoral currents in the Project area would be affected considerably as a result of the perpendicular shoreline orientation of the groins, the longest of which is designed to extend as far offshore as the existing groins in Point Lookout. The lengths of the four new groins will range from 450 lf to 775 lf. The groin system will dissipate onshore and alongshore wave-generated erosive forces, allowing littoral material to settle in the Project area.

4.3 NATURAL ENVIRONMENT

4.3.1 Aquatic and Terrestrial Habitats

Construction of the proposed Project modification would impact shoreline intertidal, subtidal, and upper beach and dune habitats. However, when compared to the original approved project, the Project modification will affect 110 fewer acres in the upper beach zone, 39 fewer acres in the intertidal zone, and 35 fewer acres in the sub-tidal zone.

The upper beach zone and dunes represent terrestrial communities in the Project area. These areas are dominated by sand and beachgrass, therefore some impacts to the dunes and associated vegetation are anticipated primarily due to construction of permanent vehicle and pedestrian access ramps and walkways and placement of the sand barrier (i.e., dune) adjacent to the existing boardwalk in the city of Long Beach. As such, some permanent long-term impacts to the vegetated beach and dune communities are anticipated. However, impact are not deemed significant because the existing vegetated beach and dune communities are currently of relatively low overall value as a result of recreational use of the area and close proximity to high density development

Placement of groins would result in a small loss of intertidal beach and subtidal aquatic habitats located within the groin footprint. However, overall habitat within the intertidal zone would increase as the beach is widened as a result of proposed beach fill activities. In addition,groin structures themselves would reduce the rate of beach loss in the Project Area and would provide

vertical habitat for many marine organisms. The physical characteristics of the intertidal habitat will not be altered since the grain size of fill material will be the same as that of native sand in the Project area.

4.3.2 Aquatic and Terrestrial Wildlife

Finfish and Shellfish

Impacts during construction of the Project may include the mortality of clams, benthic fish communities (e.g., toadfish), and other invertebrates present in the sandy habitat of the Project area during placement of fill material and construction/extension of groins (Reilley et al. 1978, Courtenay et al. 1980, Naqvi and Pullen 1982). However, once constructed, the groins would improve habitat for some intertidal organisms (Carter 1989). For example, the crevices between the groin stones would provide protection from larger predators for the young of many species of finfish and shellfish.

Benthic feeding fish species (e.g., windowpane, summer and winter flounder) would experience temporary displacement until appropriate food sources recolonize the Project area (Courtenay et al. 1980). However, these and other fish that are present at the time of construction are expected to feed in the surrounding area and therefore will be unaffected by the temporary localized reduction in available benthic food sources.

The Project would impose minimal impacts during construction and for each renourishment for the local shellfish species within the Project area. No new natural resources or endangered species have been identifying within the project area since the 1995 FEIS. Most sessile species present directly underneath the Project footprint would be buried during construction. Motile shellfish species would be able to relocate temporarily outside of the immediate Project area. Based on surveys conducted in 2003 and 2012, there are only small populations of surf clam in the offshore borrow area. Therefore no significant impacts to surf clam populations are expected from the Project. Some species, such as rockweeds (*Fucus* spp.), oysters, and barnacles (*Balanus* spp.) would flourish on the newly constructed groins (Carter 1989).

In addition to the temporary impact to the fish and shellfish species of the Project area, a slight temporary increase in turbidity is also expected near the Project area during construction (Reilley et al. 1978, Courtenay et al. 1980, Naqvi and Pullen 1982). Increases in turbidity could affect the settling rate of shellfish ova and larva, and can clog and damage the gills of fish species (Uncles et al. 1998). However, the churned sediment would settle quickly and any impacts to the benthic fish and shellfish community would be minimal.

The Project would result in a long-term beneficial impact to both fish and shellfish species of the Project area. The groins would create areas suitable for recruitment and protection for numerous shellfish species. In addition, the groins would provide habitat and food source locations for fish species.

Benthic Resources

The proposed Project would cause short-term negative and long-term beneficial impacts to the benthic communities in the Project area (USACE 2001). Negative impacts to the benthic community would include the smothering of existing sessile benthic communities within the groin area and adverse effects to benthic organisms as a result of increased turbidity during construction. Beneficial impacts to the benthic community include the increase in food source, spawning beds, and shelter of the Project area (Reilley et al. 1978, Naqvi and Pullen 1982). No new natural resources or endangered species have been identifying within the project area since the 1995 FEIS.

The sessile benthic community beneath and in close proximity to the proposed groins would experience direct impacts. These species will be buried and some mortality of shellfish and polychaetes is expected for individuals that cannot escape during the construction process. In addition, a short-term impact to the existing benthic habitat would result from burial of the benthic floral and faunal community, which would cause a temporary and local decrease in food availability for the surviving benthic community.

The construction and extension of groins would cause a transient increase in turbidity within the Project area. One study performed in 1995 found that increased turbidity resulted in increased biological oxygen demand (BOD) (Uncles et al. 1998). No long-term impacts to BOD would occur because sediment would settle quickly upon completion of construction.

The construction and extension of groins would provide living spaces for the floral and faunal benthic species. Benthic resources would begin to recolonize the Project area immediately following Project completion. Infaunal organisms are likely to recolonize the area from nearby communities and re-establish to a similar community within a 1 to 2-year period (USACE 1995). It is possible that the species composition of the benthic community that reestablishes would be slightly different than the pre-construction composition (USACE 1995). Various floral species such as rockweed and spongomorpha (S*pongomorpha spp.*), and faunal species such as barnacle, oyster, and blue mussel, are expected to move into the area and colonize living space on the groin (Moore and Seed 1986).

Rockweeds are known to support numerous organisms, including both autotrophs and heterotrophs. In addition, rockweeds provide shelter, moisture at low tide, and food especially for the sessile epifaunal and epiphytic groups (Oswald et al. 1984). Gastropods, bivalves, and crustaceans are all common inhabitants of rockweeds. Thus, the benthic floral and faunal species increase throughout the Project area, the food source availability for the fish species, would also increase (Carter 1989).

In addition to creating living spaces and increasing food availability of the Project area, the proposed Project would provide shelter from wave attacks for the existing and surrounding benthic communities. Carter (1989) found that by orienting and streamlining, some bivalves and gastropods have reduced drag coefficients and increased the capability of resisting force.

Reptiles and Amphibians

No reptiles or amphibians are expected to occur within the Project due to lack of suitable habitat. Therefore, there will be no long-term impacts to reptiles and amphibians as a result of the Project.

Birds

The shoreline of Long Beach Island provides feeding and resting areas for birds that pass through the area along the Atlantic flyway during annual migration in early spring and late fall (USACE 1998, 2003, 2004a). Heavy machinery and the increased noise levels may temporarily affect birds in the Project area during construction activities. These effects may indirectly result in displacement of individuals and/or disruptions to nesting near construction activities. In addition, proposed vehicle and pedestrian access areas will promote access to and use recreational use of beach areas. Several proposed access ramps would be located in close proximity to known shorebird nesting and foraging areas.

Avian species are mobile and are expected to avoid direct mortality. In addition, in accordance with recommendations by the USFWS, most of the Project activities in the area of active nesting plovers will occur from September through April, outside the key spring and fall migration periods (Piping plover) to avoid disruption of migration activities (USFWS 2014b; 2014b). Recreational use of the Long Beach shoreline is currently relatively high. Birds have adapted to human use of the area and birds have continued to use the upper beach/dune area for nesting and foraging. Impacts to birds from the additional access areas to the beach are expected to be minimal.

Mammals

Although there is potential for Project construction activities to temporarily displace any mammals present in the area and limit access to feeding or nesting habitats, these species are mobile and are expected to avoid direct mortality (USACE 2004a). In addition, the sparsely vegetated terrestrial habitats impacted by the project (upper beach and dune) typically provide low quality habitat for mammals and are used only for foraging activities. Mammals are expected to utilize other suitable areas for foraging.

4.3.3 Threatened and Endangered Species and Habitats

The USACE coordinated with USFWS, NYSDEC and NMFS to assess potential impacts to threatened and endangered terrestrial and aquatic species and habitats as a result of the Project. Comments from agencies have been incorporated into this EA and were taken into consideration during Project re-evaluation and during development of Project species monitoring and adaptive management plans. The Fish and Wildlife Coordination Act 2(b) report for this Project is available in Appendix C.

Federal Species or Habitats of Concern

Federally listed species known to occur in the Project area include the Federally-threatened bird species, piping plover and red knot, the Federally-threatened plant, seabeach amaranth, and transient Federally-listed threatened loggerhead, as well as the endangered Kemp's ridley, leatherback, green turtles and Atlantic sturgeon. The remaining federally listed species that may occur in the project areas are: the endangered North Atlantic right whale (*Eubalaena glacialis*); the endangered humpback whale (*Megaptera novaeangliae*); and the endangered fin whale (*Balaenoptera physalus*).

The Project would potentially result in direct and/or indirect disturbances to nesting shorebirds and their broods, if any are present in the Project vicinity for this purpose at the time of construction. The USFWS submitted a Biological Opinion (BO) in November 2014 which contained Reasonable and Prudent Measures (see chart below) to ensure the project would not likely to jeopardize the continued existence of the piping plover. These measures restrict construction activities to September 1 through March 31 in areas with nesting plovers to avoid direct adverse impacts to the shorebirds (USFWS 2014b). USACE has incorporated these measures into its Project plans.

Long Beach 2015 Biological Opinion Reasonable and Prudent Measure
Piping Plovers
• Conduct surveys during the spring and summer prior to construction activities to identify nesting plover (linked to initial construction and nourishment – would occur every 5 years). Devise a restoration plan in coordination with the towns (one time). Develop a biological monitoring program to evaluate plover populations and behavioral responses to habitat changes in action area from construction of hard structures and construction of the adjacent dunes and berm (would occur annually for 5 years). • Erect symbolic fencing around nests and brood rearing areas (would occur annually for 5 years). • No construction from April 1 – September 1 to avoid nesting period (initial construction and nourishment-every 5 years). • No beach fill will be placed within 1000 meters of known plover populations. • Implement a 200 meter work zone around terminal groin 58 (initial construction and nourishment; every 5 years). • Monitoring of invertebrates in the intertidal zone berm and backshore. • Set up a predator management program (annual for 5 years). • Fly LIDAR and imagery each year for a period of 5 years.. • Plant the dune from Jones Inlet to groin D and from Lidos Beach Town Park East to western extent with a mix of native dune plants species with uniformed spacing. No planting west of Groin D, except in front of the residential areas

(initial construction and nourishment; every 5 years).
- No sand fencing west of groin D through Lido Beach East Town Park. But allow planting in Lido Beach Towne House Condominiums and from Prescott Street to Allevard Street (initial construction and nourishment; every 5 years).
- **Cover** sub aerial groins A-D with sand during construction and maintenance phases to minimize habitat fragmentation (every year).

Seabeach Amaranth

- Conduct surveys in July and August for the presence or absence in the project area (initial construction and nourishment; every 5 years).
- Erect symbolic fencing around plants (initial construction and every nourishment).
- Restrict construction no major activities in know areas June 1 – November 1 (initial construction and every nourishment).

Red Knot

- Monitor pre-concurrent and post construction for Red Knot**.** Devise a restoration plan in coordination with the towns (initial construction and every nourishment).
- LIDAR (use the plover LIDAR for Red Knot).

The Federally-listed threatened loggerhead, as well as the endangered Kemp's ridley, leatherback, and green turtles may utilize coastal resources in the Project vicinity for foraging). In accordance with the latest NMFS recommendations (NMFS 2014) , if hopper dredges are used in the inlets or offshore borrow area between mid-June and mid-November, NMFS-approved observers will be onboard the vessels to monitor the removal of the dredge material.

Dredging offshore areas has the potential to impact the Federally-listed species Atlantic Sturgeon habitat by removal/burial of benthic organisms, increased turbidity, alterations to the hydrodynamic regime. Hydraulic dredges can directly impact sturgeon and other fish by entrainment in the dredge. Dredging may also impact important habitat features of Atlantic sturgeon if these actions disturb benthic fauna. Alteration of rock substrate is not a concern as this does not occur in the project area). Indirect impacts to sturgeon from either mechanical or hydraulic dredging include the potential disturbance of benthic feeding areas, disruption of spawning migration, or detrimental physiological effects of re-suspension of sediments in spawning areas.

Although little is known about natural predators of Atlantic sturgeon, there are several documented fish and mammal predators, such as sea lampreys, striped bass, common carp, minnow, smallmouth bass, walleye, grey seal, and fallfish. There are some concerns that predation may adversely affect sturgeon recovery efforts in fish conservation and restoration programs, and by fishery management agencies. .

USACE is engaged with NMFS to ensure the latest protective BMPs (NMFS 2014) are incorporated into the projects' Plans and Specifications detailing specific construction measures to be undertaken to minimize potential adverse affects to protected aquatic species under their jurisdiction. USACE has coordinated with NMFS to ensure the latest protective BMPs are incorporated into the project's Plans and Specifications detailing specific construction measures to be undertaken to minimize potential adverse affects to protected aquatic species under their jurisdiction.

The planned construction methods will enable most work to be staged and performed from the land and the groins, thereby reducing the temporary water quality impacts and general disturbances resulting from in-water construction activities. Additionally, transient listed species are expected to avoid the Project area during construction activities. Therefore, the project is not likely to adversely affect these protected species.

State Species or Habitats of Concern

No State-listed threatened or endangered species of reptiles, amphibians, mammals, or vegetation were identified in the Project area, although several State-listed bird species are known to use habitats similar to those found in the Project area. Impacts and considerations that offset the impacts to the State-listed least tern, roseate tern, and common tern and special concern species black skimmer, would be similar as described for Federally-listed species.

Other State-listed threatened species that occur in the general area include the northern harrier, osprey, and the transient peregrine falcon and bald eagle. Construction and operation of the Project is not expected to significantly impact these species because the Project would not affect their preferred nesting habitat, and other foraging habitat is readily available in the vicinity of the Project.

Essential Fish Habitat

Temporary impacts on EFH are predicted during periods of active construction and would be the same as those described in Section 4.3.2 (Finfish and Shellfish, and Benthic Resources impact sections). Habitat would be temporarily degraded during groin construction and beach fill placement, as elevated suspended sediment levels would temporarily lower dissolved oxygen and visual feeding efficiency, and irritate gill tissue. Although sessile benthic invertebrates would likely be smothered during construction, and aquatic habitat would essentially be unavailable to motile species during construction, implementation of the proposed Project is predicted to enhance EFH over the long term. The groins would create areas of recruitment and protection for numerous shellfish species, which would also provide habitat and food source locations for fish species.

4.4 CULTURAL RESOURCES

In accordance with the Advisory Council on Historic Preservation regulations for implementing the National Historic Preservation Act (NHPA), 36 Code of Federal Regulations [CFR] Part 800, the New York District has identified two National Register eligible resources, the remains of

what may likely be the *Mexico* and the Marble wreck. Based on the underwater investigations conducted around these wrecks in comparison with project activities, it was determined that the rehabilitation of Groin 58 or sand placement should not have an adverse effect on these two historic properties. The NYSOPRHP has concurred with the determination of no adverse effect. Unless project plans change, no additional work is required. All correspondence can be found in Appendix F.

4.4.1 Historic Resources

No historic structures will be affected by the proposed project. A transatlantic cable dating from 1873 may be located within the nearshore portion of the Project area (USACE 1999). However, deposition of sand during construction would help to protect the cable. No adverse impacts to the cable are expected from the Project (NYSOPRHP 1993).

4.4.2 Shipwrecks

Based on the remote sensing survey and underwater investigation, a wreck, possibly the *Mexico* is located approximately 300 feet from the underwater toe of the sand placement offshore of Groins 28 and 29. The Marble wreck is also located at least 300 feet from the sand placement area. The terminal groin, Groin 58, will be rehabilitated and extended several hundred feet to the west, moving it further away from the Marble wreck. Both wrecks are eligible for the National Register of Historic Places. The project activities will not have an adverse effect on either wreck. Both wreck sites will be noted on the project plans as environmentally sensitive areas. In addition, the specifications will state that no anchoring, dragging, pipe laying or other activities that could disturb the ocean bottom will be conducted in these areas. In addition, anomalies 18 and 29 are located away from the current sand placement area and are likely buried such that project activities will not have an adverse effect on these potential resources (Panamerican 2014)..

4.4.3 Submerged Sites

Based on cores taken at the proposed borrow area, potential lagoonal deposits occur at 20 feet depth. Submerged prehistoric sites would occur below this depth (Pickman 1993). Thus, dredging activities for the Project would have no impact on submerged prehistoric sites. Should dredging depth exceed 20 feet, additional studies would be required to determine whether prehistoric deposits exist within the borrow area.

4.5 SOCIOECONOMIC ENVIRONMENT

4.5.1 Floodplains

Recognizing the Federal government's commitment to ensure no inducement of development in the floodplain, pursuant to Executive Order 11988, this project will identify in the Project Partnership Agreement, the need for the local sponsor to develop a Floodplain Management Plan, and a requirement for the local sponsor to certify that measures are in place to ensure the project does not induce development within the floodplain.

4.5.2 Coastal Zone

As required under the Federal Coastal Zone Management Act, the USACE reviewed the proposed Project in relation to the applicable policies of the New York State Coastal Zone Management Program and determined that it is consistent with all relevant policies in the original EIS. The New York State Coastal Zone Management Program Consistency has been provided as Appendix D.

It has also been determined that Unit 59 – Fire Island falls within the CBRS. Section 5 of the Coastal Barrier Resources Act (CBRA; 16 U.S.C. § 3504) prohibits new Federal expenditures or financial assistance within System units of the CBRS. As part of the compliance review for the project, the District has determined that the Project meets the following additional conditions under 16 U.S.C. § 3505 which provides rationale that the project be excepted:

- Section 6(a)(2) of CBRA provides an exception to Section 5, Limitations on Federal Expenditures Affecting the System, if the expenditure is for "the maintenance or construction of improvements of existing Federal navigation channels (including the Intracoastal Waterway) and related structures (such as jetties), including the placement of dredge material related to such maintenance or construction.

Placement of sand on beaches within the CBRS may fall under this exception if the sand is dredged to maintain a Federal navigation channel authorized prior to inclusion of the relevant CBRS unit in the CBRS. The legislative history of the CBRA indicates that Congress intended to exclude from the general prohibition on Federal expenditures within the CBRS future, as well as existing, dredged material disposal areas, so long as the disposal areas are necessary for the maintenance of an existing project. S. Rep. No. 97-419 at 7 (1982). In 1994, 1996, 2008, and 2014, material dredged from the Jones Inlet Federal navigation channel was placed on Town of Hempstead beaches within the project area and within the CBRS unit. These operations were conducted under various authorities. The 1994 and 1996 operations were undertaken under the authority of Section 145 of WRDA 1976, as amended (commonly referred to as Section 933 of WRDA 1986, which first amended the cost-sharing). The 2008 effort was undertaken as a state-funded operation through the IIS program, and the 2014 effort was undertaken as a Federal dredging project, since the extreme shoaling from Sandy necessitated a different dredge type, and made placement of sand the least cost disposal option. Since the proposed borrow source for the project is from an offshore source, this exception would not apply to the berm fill and dune construction component of the project.

This exception applies to the project's proposed improvements to the existing groin field. The existing groins are not features of the adjacent Jones Inlet Federal navigation project. They were constructed by non-Federal interests to reduce shore erosion along the barrier island. The District anticipates net benefits to the navigation channel in the form of maintenance dredging costs avoided. These benefits were not specifically quantified. The net benefits are based on a comparison of future with project and future without project conditions. The future without project condition includes the continued placement of sand on the Town of Hempstead beaches. As described above, this operation has been undertaken through several mechanisms, including

Section 145, which was repealed in WRDA 2007, when superseded by the authority provided under Section 204 of WRDA 1986, as amended. Although the Section 145 authority has been repealed, it is clear that the most likely future without project condition would be the placement of the inlet dredge material on the downdrift beaches. The Town of Hempstead has requested the Corps to undertake a Section 204 evaluation for this area, to allow for cost-shared placement in the future. If this is not a possibility, given that the State funded the entire dredging operation in the past, it is likely that the State and Town would fund any difference in cost to place sand on the beach in the future. Although the disposal of sand was done as a least cost disposal in the last dredging operation, this was due to the extreme shoaling caused by Sandy, and is unlikely in the future. Accordingly, it is reasonable to expect the future without project condition evaluated by the District is still reasonable even with the repeal of Section 145. It is reasonable to expect that the project will reduce the rate of erosion in this area, reduce the amount of sand that is deposited in the inlet, and reduce the navigation dredging requirement. The groin field improvements will also prevent adverse impacts to the navigation channel that would otherwise occur due to the sand placement that will occur as a part of the coastal storm damage reduction project. This is a sufficient basis to characterize the groin field improvements as improvements of an existing Federal navigation channel or structures related to an existing Federal navigation channel.

- Section 6 (a)(6) of CBRA which provided for federal funding for the maintenance, replacement, reconstruction, or repair, but not the expansion (except with respect to United States route 1 in the Florida Keys), of publicly owned or publicly operated roads, structures, and facilities

This exception does not apply to the groin field improvements since those improvements involve an expansion of the existing groin field through extension of the terminal groin and construction of new groins. However, the exception applies to the proposed berm fill and dune construction, since the beaches involved are publicly owned facilities. All project area beaches that fall within the CBRS unit are publicly owned, and to have been publicly owned at least at the time the feasibility report for the project was prepared in 1995. The beaches were also in municipal ownership at the time the CBRS unit was mapped, and it appears the areas has been in municipal ownership since the 1940's, and maintained in its current condition since the 1950's. (Mapping of the CBRS unit involved occurred in 1990 and was amended in 1992.) The privately owned parcels at Lido beach are excluded from the CBRS based on the attached map of the unit. There is support for characterizing publicly owned beaches as facilities in FEMA's regulations implementing CBRA for its disaster assistance programs, which define public facility to include public parks and "improved and maintained natural feature." 44 CFR 206.342(e) and 206.201. Given that another Federal agency defines public facility in this manner, a similar interpretation can be made here. It also seems reasonable to characterize the publicly owned beaches involved as essential links in the larger system of beaches and dunes on the barrier island.

In order to apply this exemption it needs to be demonstrated that the project does not involve an expansion of these publicly owned facilities, as expansion is not permitted under this exception. The District has reviewed the historic information that is available through surveys, aerial imagery, and digitized shorelines. In order to determine that the project does not represent an expansion, an assessment was made if the shoreline conditions proposed for the project

(represented by the constructed mean high water line) are further seaward than a condition that previously existed. The shoreline in this area is extremely variable. Digitized shorelines from 1947 and 1960 indicate that the shoreline in this area is further seaward in whole (1947) or in part (1960) than the MHW that would exist with the proposed project in place. More recently, a comparison of June 2014 aerial photography with the proposed constructed shoreline illustrates that the ongoing dredging and placement of sand from Jones Inlet is nearly identical to the proposed project footprint (placement of Jones Inlet material was completed in February 2014). A review of this information illustrates that the proposed project represents a reconstruction and not the expansion of a public facility.

Based on the preceding review, the District has concluded that the proposed Project meets the above-referenced exceptions and therefore is consistent with the purposes of CBRA.

4.5.3 Aesthetics and Scenic Resources

The Project would result in the addition of several groins in the viewshed and some reconstructed/extended groins would be larger than the existing groins. However, these changes do not significantly reduce the aesthetic and scenic resources, because groins are already part of the viewshed in the Project area.

4.5.4 Recreation

No significant or long-term impacts to recreational resources in the Project area are anticipated as a result of the proposed Project. Temporary disruption of recreational activities along the beach and boardwalk may occur in the Project area as a result of construction activities. However, these impacts would be minor and would be limited to the duration of construction activities in the Project area. Potential long-term benefits to recreational resources in the Project area include additional areas available for sport fishing (i.e., additional groins), an increase in the size of recreational beach area, improved access to comfort stations and lifeguard headquarters, and protection of beaches.

4.5.5 Transportation

Temporary disruption of traffic on local roadways and thoroughfares in the Project area may occur due to the delivery of stone rubble and other Project materials and equipment. These impacts would be minor and limited to the construction period. Project activities will not extend within the inlets and would therefore not impede boat traffic in these areas. No long-term impacts on transportation resources in the Project area are anticipated as a result of the proposed Project.

4.5.6 Noise and Air Quality

The Long Beach Project will temporarily emit emissions associated with diesel fuel equipment relating to dredging and groin construction activities. The localized emission increases from the diesel powered equipment will last only during the project's construction period and then end when the project is over, thus any potential impacts will be temporary in nature.

Based on the National Ambient Air Quality Standards (NAAQS), Nassau County is currently classified as "marginal" nonattainment for the 2008 8-hour ozone standard, nonattainment of the 2006 particulate matter less than 2.5 microns ($PM_{2.5}$) standard, and maintenance of the carbon monoxide (CO) standard. The county is part of the Ozone Transport Region. Ozone is controlled through the regulation of its precursor emissions, which include oxides of nitrogen (NOx) and volatile organic compounds (VOCs). Sulfur dioxide (SO2) is a precursor for $PM_{2.5}$. The combination of these designations and since the project is a Federal Action taken by the USACE, this project triggers a General Conformity Review under 40CFR§93.154 (see Appendix E).

The General Conformity-applicable emissions associated with the project are estimated as part of the General Conformity Review and are summarized below, by calendar year.

General Conformity-applicable emissions per calendar year based on project duration

	Estimated Emissions, tons per year					
Pollutant	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
NO_x	0.0	0.04	0.17	433.3	22.8	0.0
VOC	0.0	0.001	0.005	16.3	0.9	0.0
$PM_{2.5}$	0.0	0.002	0.007	22.5	1.2	0.0
SO_2	0.0	0.00003	0.0001	0.25	0.01	0.0
CO	0.0	0.007	0.030	56.5	3.0	0.0

The emissions levels for NOx exceed the ozone deminimis trigger levels for General Conformity while all other pollutants are below their respective trigger levels. Therefore, only NOx will need to be fully offset during the project (see General Conformity determination in Appendix __ for further information on offsets). Project emissions for VOC, PM2.5, SO2, and CO are all below their respective trigger levels and therefore, by rule are de minimis and will have only a temporary impact around the construction activities with no significant impacts. NOx will be fully offset, by rule, and therefore the net NOx emissions will be zero and therefore no significant impacts.

4.6 ENVIRONMENTAL JUSTICE

In accordance with Executive Order 12898 (dated February 11, 1994), Federal agencies are required to identify and address the potential for disproportionately high and adverse environmental and human health effects on minority and low-income populations, resulting from the agencies' programs, policies, and activities.

Population in the City of Long Beach has decreased from a 1990 total population of 33,510 to a 2010 total of 33,275. The Town of Hempstead has shown an increase in population from 49,453 (1990) to 53,891 (2010). The Lido Beach Community's population has increased from 2,786 (1990) to 2,897 (2010). This population for Nassau County has increased from 1,287,348 (1990) to 1,339,532 (2010). The population trend for the project area is expected to be stable in the future.

The population of Long Beach population is composed of predominately non-minority white populations. In this area, approximately 77% of the population is white, 5.8% of the population is black, 12.8% are Hispanic and the remaining 4.3% of the population includes other races such as Asian, Pacific Islanders, American Indians, and other races (Ersys 2000).

No significant or unacceptable adverse environmental or human health effects are expected to result from the proposed action. Therefore, there would be no disproportionately high and adverse impact to minority or low-income populations.

5.0 OTHER ENVIRONMENTAL CONSIDERATIONS

Irreversible and Irretrievable Commitment of Resources

The Project consists of sand placement and groin construction along the barrier island. Sand removed from the borrow areas will be permanently utilized for this project, however the sand volume is a small fraction of the available sand offshore. Berm and dune restoration involves the utilization of time and fossil fuels, which are irreversible and irretrievable. Impacts to the benthic community would not be irreversible, as benthic communities would reestablish with cessation of placement activities. Rock for groin construction will be barged or trucked in from out of area quarries. Groins will increase species diversity by providing structure. No other irreversible or irretrievable commitment of resources will occur as a result of this project.

Cumulative Impacts

The cumulative impact assessment of federal nourishment projects on the south shore of Long Island indicate that federal project actions would occur in dynamic environment whose inhabitants have adapted to these conditions. Studies indicate that borrow area and sand placement areas re-colonize shortly after construction activities are completed. Additionally, BMPs will lessen temporary impacts. Several other Federal projects are located along the Atlantic and south shore coast of Long Island. The four (4) civil projects within close proximity to the proposed FIMI are: 1) Shinnecock Inlet Navigation Project, 2) the Westhampton Interim Project, 3) the Moriches Inlet Navigation Project, and 4) the West of Shinnecock Project. Farther to the west, two Federal projects are under way: 1) Rockaway Inlet to Norton Point (Coney Island) and 2) East Rockaway Inlet to Rockaway Inlet (Rockaway Beach). To determine the potential cumulative impacts from these projects under the No Action Alternative, the areal extent of the borrow areas was calculated, and the results are shown in Table A. The acreage includes all borrow areas between the 18- and 60-foot contours from Breezy Point to Montauk Point. The used and proposed borrow areas in the No Action Alternative would disturb about 2.3 percent of the total nearshore and offshore areas that could be used.

Table A -- No Action Alternative - Borrow Area Size by Project

Project	Status	Acres
Coney Island	Constructed	528.0
Rockaway Beach	Constructed	521.1
Long Beach	Proposed	1,193.8
Westhampton Interim[1]	Constructed	308.5
West of Shinnecock[1]	Constructed	3,294.6
Used and Proposed Borrow Area Total		5,846.0
Available Borrow Area on the South Shore		183,655.0

Note: [1] Interim projects can be subsumed by the Reformulation Project.

The Town of Hempstead periodically dredges local channels for maintenance purposes. This dredging is conducted under permits issued by the USACE and NYSDEC. The dredging takes place mostly in the bays and not on the open Atlantic Ocean coast. The dredged materials are used as beach fill whenever the materials are suitable, and the placement is cost effective.

Cumulative Impacts of the No Action Alternative. With the No Action Alternative, the use of the nearshore and offshore borrow areas for ongoing Federal and State projects could have a cumulative impact on these resources. As discussed above, about 2.3 percent of the available acreage would be disturbed over the 50-year life of these projects. In any one year, the disturbance would be far less. It has been shown that these borrow areas can quickly recolonize after the disturbance. Because of the low percentage of disturbance and the recolonization potential, no cumulative impact from these projects is expected. The borrow areas would be physically changed. However, natural forces are constantly moving sand and changing the form of the sea bed. Therefore, these cumulative physical changes are not considered to be impacts.

Cumulative Impact of the Preferred Alternative. Relative to the categorization provided within Council on Environmental Quality guidance, the cumulative impacts of the Federal projects in the Study Area are uncertain. The coastal barriers were originally created by natural processes without human intervention. These natural processes redistribute sand in the nearshore environment in response to gradual erosion and storm events. Once coastal barriers are manipulated by human interventions, which Fire Island has undergone through maintenance of the inlets at either end of the island, they are no longer able to maintain their natural equilibrium. In combination with sea level rise, lower shoreface erosion, bayshore inundation and continuing natural sediment transport processes, the long-term effect of sand placement and prevention of breaches on the coastal barriers is uncertain. The impacts are also interactive in that the stabilization of barrier beaches and mainland shoreline may alter/prevent early successional communities such as maritime beach from evolving in overwash areas. The natural 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. Development patterns that have built up over the years took place prior to research on coastal barrier behavior and sea level rise. Under the cumulative effect of natural processes acting on an

environment altered by human intervention the proposed project mediates between managing risk and natural processes. The additive damages to homes, businesses, the area's recreational resources, and its economy would be reduced by the proposed project. The use of natural and nonrenewable resources in the salvage, repair, and reconstruction in the aftermath of storm damage would also be reduced. The proposed project maintains the opportunity for long-term management plans in the project area to incorporate natural processes and sea level rise adaptation within risk reduction and community resilience strategies.

Measures to Minimize Cumulative Impacts. Measures proposed to minimize the cumulative effects of the federal nourishment projects are listed as follows:

The majority of unavoidable impacts are likely to occur within the borrow areas. Measures to minimize dredging impacts include dredging in a manner so as to avoid the creation of deep pits, alternating locations of periodic dredging, conducting dredging during months of lowest biological activity when possible and the use of pipelines to lessen turbidity impacts within the water column. Post-construction benthic monitoring documents the level of recovery to identified sensitive areas.

The proposed activities will provide long-term protection of potential habitat for the listed species (Piping plover and seabeach amaranth) that utilize in the upper beach and primary dune areas. To further reduce potential indirect impacts, USACE will conduct pre and post construction field surveys for plovers and seabeach amaranth. Beach fill material would not be placed within 25 ft of the perimeter of population clusters or individual stems of seabeach amaranth. Work will be done from September 2 through March 31 on any given year.

CONCLUSION

When compared to the original Project that was presented in the 1995 FEIS and approved through a Record of Decision in 1998, the proposed Project modifications includes several structural features and activities (i.e., groin extension, new groin, rehabilitation of groin, dune ramps, and boardwalk/walkover extensions) that are in addition to those proposed in the original Project (Table 1). However, the overall Project area has been reduced in the proposed Project modification and several structural features and activities have been eliminated. The impacts within a 136-acre shorebird nesting/foraging area have been greatly reduced. As a result, the proposed modification has significantly reduced the area of fill placement and the amount of fill material required for the Project. Specifically, 184 fewer acres will be filled (i.e., approximately 110 acres of filling in the upper beach zone, 39 fewer acres of filling in the intertidal zone, and 35 fewer acres of filling in the sub-tidal zone), the amount of initial fill material required for the Project has been reduced by 3,922,000 cubic yards (cy), and the amount of fill material needed for 5-yr renourishment activities has been decreased to 1,770,000 cy per yr.

Similar to the original Project, the Project modification will still result in some short-term negative impacts to water quality, terrestrial and aquatic habitats and the species that utilize the habitats. The project activities should not have an adverse effect on the two National Register eligible wrecks identified as part of the additional remote sensing and underwater investigations.

In addition, it has been determined that the proposed Project would exceed the Federal de minimis thresholds of 100 tons per year for NOx air emissions.

Impacts to other environmental resources in the proposed Project Area are expected to be minor and less than those that would have resulted from the original Project. Specifically, the modification will include the placement of unvegetated hard structures (buildings, groins, and beach access walkovers, ramps) in dune/upper beach, intertidal, and subtidal areas. These structures will permanently cover the substrate beneath the footprint and non-mobile benthic species and will limit the use of the area directly within the structure footprint for foraging by shorebirds and wading birds and some fish species. However, these impacts are not significant because; affected species will utilize other suitable habitat for foraging activities; the existing upper beach and dune areas in these locations are currently of relatively low value to most wildlife species and do not support any Federal or state-listed species; the direct loss of benthic species and vegetation will be minimal and would not affect populations; and groins are likely to reduce the overall rate of beach loss and erosion in the Project Area and will increase the forage base for many fish species by increasing invertebrate biomass. The changes in the conditions of the resources are not significant, and the proposed impacts on these resources as a result of the authorized project are not significantly different than those described in the FEIS which was approved for the original Project in 1995.

The use of BMP construction procedures and mitigation measures, pre-construction surveys for species of special concern in the Project Area, and avoidance of key breeding/nesting and spawning periods, will reduce potential for negative impacts. Furthermore, implementation of the proposed Project will have beneficial impacts to the environment and surrounding communities, including benefits to aquatic habitats and species, improved shoreline stabilization and flood protection, and recreational opportunity.

Based on a thorough evaluation of potential impacts performed for the 1995 FEIS and this EA, it has been determined that with the exception of anticipated high NOx emission levels, there will be no significant adverse impacts due to implementation of the proposed Project modification. Comments from agencies and interested parties have been addressed and all practicable means to avoid or minimize adverse environmental effects have been incorporated into the recommended plan. This EA will be uploaded to the NYD web page for public review
https://intranet.usace.army.mil/nad/nan/Pages/Home.aspx

6.0 LIST OF PREPARERS

A list of preparers for this EA is provided below, including name, position, and role in preparation of the EA.

TABLE 5-1. LIST OF PREPARERS

U.S. Army Corps of Engineers, New York District

Name	Position	Role in EA Preparation
Robert Smith	Project Environmental Manager	Project Management Review
Jenine Gallo	Regional Technical Specialist	NOAA ESA and CAA Evaluations and Compliance
Nancy Brighton	Cultural Resources Specialist	Cultural Resources Input

7.0 COORDINATION WITH REGULATORY AGENCIES

Compliance of the proposed project with applicable federal statutes and executive orders is outlined in the Tables 6 and 7. For those statutes where compliance necessitates submittal of an application or consultation document to the agency with jurisdictional authority, the review agency and required permit/authorization is listed in Table 8.

Table 6: Effects on Resources of Principal National Recognition

Type of Resource	Principal Source of National Recognition	Measurement of Effects
Air Quality	Clean Air Act, as amended (42 USC 185h-7 et seq.)	Project would exceed the Federal de minimis thresholds of 100 tons per year for NOx air emissions
Areas of Particular Concern within the Coastal Zone	Coastal Zone Management Act of 1972, as amended (16 USC 1451 et seq.)	Significant effect: Beach will be restored; littoral drift to west will be improved.
Endangered and Threatened Species	Endangered Species Act of 1973, as amended (16 USC 1531 et seq.)	Received Biological Opinion with Reasonable and Prudent Measures to minimize impacts to the piping plover, red knot and seabeach amaranth. Emergency Exemption granted for aquatic species by NOAA-NMFS. The District continues to coordinate with NMFS to provide the latest, updated project information and current science consistent with the emergency procedures established for this action
Fish and Wildlife Habitat	Fish and Wildlife Coordination Act (16 USC Sec. 661 et seq.)	Short-term effect: Loss of benthos in the borrow and placement areas. Long-term effect: Creation of offshore borrow areas; restoration of beach berm and slope; maintenance of coastal habitats.
Essential Fish Habitat	Magnuson-Stevens Fishery Conservation and Management Act	No effect.
Floodplains	Executive Order 11988, Floodplain	The project will not induce development.

Type of Resource	Principal Source of National Recognition	Measurement of Effects
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended (16 USC Sec. 470 et. seq.). Abandoned Shipwrecks Act of 1987.	Full compliance
Prime and Unique Farmlands	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA.	Not present in project area.
Water Quality, Water Pollution, Public Health	Clean Water Act of 1977 (33 USC 1251 et seq.)	Local short-term effects on sedimentation and turbidity during construction. No measurable long-term sedimentation or turbidity effects; increased public safety.
Wetlands	Executive Order 11990, Protection of Wetlands, Clean Water Act of 1977 (33 USC 251, et seq.)	No effect.
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended (16 USC 1271 et seq.)	Not present in project area.
Wilderness Areas	The Wilderness Act of 1964, Otis G. Pike Wilderness Area, Public Law 95-585.	Not present in project area.

Table 7: Compliance with Environmental Requirements and Protection Statutes

Requirement	Compliance
FEDERAL POLICIES COMPLIANCE	
Archaeological and Historic Preservation Act, as amended	Full
Clean Air Act, as amended	Full
Clean Water Act of 1977, as amended	Full
Coastal Zone Management Act of 1972, as amended	Full
Coastal Resources Barrier Act	Full
Endangered Species Act of 1973, as amended	Full
Estuary Protection Act (PL 90-454)	Full
Federal Water Project Recreation Act, as amended	N/A
Fish and Wildlife Coordination Act, as amended	Full
Land and Water Conservation Fund Act of 1965, as amended	Full
Marine Protection, Research, and Sanctuary Act of 1969, as amended	N/A
National Environmental Policy Act of 1969, as amended	Full
Organic Act of 1916	Full
Wilderness Act (PL-88-577)	Full
Rivers and Harbors Appropriation Act of 1899, as amended	N/A
Watershed Protection and Flood Prevention Act, as amended	Full
Wild and Scenic River Act, as amended	N/A
Toxic Substances Control Act (PL 94-469), as amended	N/A
EXECUTIVE ORDERS, MEMORANDA, ETC.	
Floodplain Management (E.O. 11988)	Full
Protection of Wetlands (E.O. 11990)	N/A
Environmental Effects Abroad of Major Federal Actions (E.O. 12114)	N/A
Impacts on Prime and Unique Farmlands (CEQ Memo 8-30-76)	N/A
STATE AND LOCAL POLICIES	

The proposed project will comply with all appropriate State and local policies.

Table 8: List of Permit / Approvals to be Applied / Obtained

Review Agency	Permit Type
USACE	Clean Water Act Section 404 - (a 404(b)1 assessment is provided
NYSDEC	Clean Water Act Section 401 Water Quality Certificate (WQC) State Environmental Quality Review Act (SEQRA) Compliance
NYSDOS	Federal Consistency (Coastal Zone Management/Waterfront Revitalization Program) (a Federal Consistency Assessment Form (FCAF) and supporting document on policy consistency is provided in Attachment E)

The USACE is coordinating with the NYSDEC to obtain a Section 401 Water Quality Certificate. The consistency determination from the New York State Office of Coastal Zone Management has been attached in appendix E. The USACE coordinated with NYSDEC and the USEPA regarding nonattainment for NOx air emissions. In addition, the USACE received a Report from the USFWS pursuant to Section 2(b) of the Fish and Wildlife Coordination Act. Section 7 of the Endangered Species Act (ESA) consultation with USFWS was completed on November 2014. In addition, the USACE has consulted with the National Marine Fisheries Service under Emergency Consultation procedures in accordance with Section 7 of the ESA as well as coordinating under Section 305(b)(2) of the MSFCMA. All applicable Federal, State, and local policies will be complied with during review and implementation of the proposed Project. The following is a list of various entities that the USACE consulted and/or coordinated with on this project.

- U.S. Fish and Wildlife Service - Long Island Field Office and New York Field Office
- National Marine Fisheries Service
- New York State (NYS) Department of Environmental Conservation
- NYS Department of State
- NY State Historic Preservation Office
- Town of Hempstead

8.0 REFERENCES

Carter, R.W.G. 1989. Coastal Environments: An Introduction to the Physical, Ecological, and Cultural Systems of Coastlines. Academic Press, San Diego, CA. 617 pp.

Courtenay, W., B. Hartig, and G. Loisel. 1980. Evaluation of Fish Populations Adjacent to Borrow Areas of Beach Nourishment Projects at Hallandale, FL. U.S. Army Corps of Engineers, 23 pp.

Jacobs, J. 1999. Personnel Communications during July, 1999, between Tone Luke, New York Public Health Department, New York City, NY and Dan Marquis, Northern Ecological Associates, Inc., Portland, ME.

Luke, J. 1999. Personnel Communications during July, 1999, between Tone Luke, Nassau County Public Health Department, New York City, NY and Dan Marquis, Northern Ecological Associates, Inc., Portland, ME.

Moore, P.G. and R. Seed. 1986. The Ecology of Rocky Coasts. Columbia University Press, New York, NY. 467 pp.

National Marine Fisheries Service (NMFS). 1993. Letter regarding special concern species, dated June 1993 from Richard Roe, Regional Director of NMFS to Bruce Bergmann, Chief of Planning Division, USACE, New York District.

National Marine Fisheries Service (NMFS). 2004. Designated Essential Fish Habitat [Online]. Available: HTTP://www.nero.nmfs.gov.

National Marine Fisheries Service (NMFS). 2012A. Biological Opinion for the New York and New Jersey Harbor Deepening Project for Threatened and Endangered Species: Atlantic Sturgeon, Whales, and Sea Turtles.

National Marine Fisheries Service (NMFS). 2014. Biological Opinion for Beach Nourishment Projects Utilizing the Sea Bright Offshore BorrowArea: Union Beach, Port Monmouth, and Elberon to Loch Arbour, New Jersey

Naqvi, S. and E. Pullen 1982. Effects of beach Nourishment and Borrowing on Marine Organisms. USACE, New York District, North Atlantic Division, 43 pp.

Oswald RC, Telford N, Seed R, Happey-Wood CM 1984. The effect of encrusting bryozoans on the photosynthetic activity of *Fucus serratus* L. Estuar Coast Shelf Sci 19:697–702

Panamerican Consultants, Inc. 1996a. Remote Sensing Survey - Atlantic coast of Long Island – Jones Inlet to East Rockaway Inlet – Long Beach Island, Nassau County, New York. Report on file with the United States Army Corps of Engineers – New York District. New York, New York. (February)

Panamerican Consultants, Inc. 1996b. Underwater Inspection of Four Shipwrecks – Atlantic coast of Long Island – Jones Inlet to East Rockaway Inlet – Long Beach Island, Nassau County, New York – Storm Damage Reduction Project. Report on file with the United States Army Corps of Engineers – New York District. New York, New York. (April)

Panamerican Consultants, Inc. 1998. Remote Sensing Survey, Near Shore Project Area – Atlantic coast of Long Island – Jones Inlet to East Rockaway Inlet – Long Beach Island, Nassau County, New York – Storm Damage Reduction Project. Report on file with the United States Army Corps of Engineers – New York District. New York, New York.

Panamerican Consultants, Inc. 2005. Phase II Underwater Inspection Of Seven Targets In The Eastern Portion Of The Long Beach Project, Nassau County, New York. Report on file with the United States Army Corps of Engineers – New York District. New York, New York.

Panamerican Consultants, Inc. 2014. Remote Sensing Survey and Dive Inspection of Two Shipwrecks and Two Anomalies in Connection with the Long Beach Storm Damage Reduction Project. Under Contract to Moffat and Nichol. Prepared for US Army Corps of Engineers, New York District.

Pickman. Arnold. 1993. Cultural Resource Reconnaissance, Atlantic Coast of Long Island, Jones Inlet to East Rockaway Inlet, Long Beach Island, Nassau County, New York. Prepared for the USACOE, New York District.

Ray, G. and D. Clarke. 1995. Baseline Characterization of Benthic Resources and Their Use by Demersal Fishes at a Beach Renourishment Borrow Site off Coney Island, New York. Prepared for the U.S. Army Corps of Engineers, New York District, Environmental Analysis Branch.

Ray, G. 1996. Characterization of Benthic Resources at a Potential Beach Renourishment Borrow Site in the Vicinity of Coney Island, New York: June to September 1995. Prepared for the U.S. Army Corps of Engineers, New York District, Environmental Analysis Branch.

Reid, R.N., D.J. Rodosh, A.B. Frame, and S.A. Fromm. 1991. Benthic Macrofauna of the New York of the New York Bight, 1979-89, NOAA Tech. Report, NMFS 103. 50 pp.

Reilley, F. and V. Bellis. 1978. A Study of the Ecological Impact of Beach Nourishment with Dredged Materials on the Intertidal Zone. Institute for Coastal and Marine Resources. Technical Rpt. 4, E. Carolina University, Greenville, NC. 107 pp.

New York State Office of Parks, recreation and Historic Preservation (NYSOPRHP). 1993. Letter regarding cultural resources in the vicinity of Long Beach, NY, dated June 1993 from Julia Stokes, Deputy Commissioner for Preservation, NYSOPRHP, to Bruce Bergmann, Chief of Planning Division, USACE, New York District.

Steimle, F.W. Jr. and R.B. Stone. 1973. Abundance and Distribution of Inshore Benthic Fauna off Southwestern Long Island, New York. NOAA Administration Technical Report NMFS SSRF-673.

Tunstead, R. 1999. Telephone Communication on July 1, 1999, between R. Tunstead, Geologist, U.S. Department of Agriculture, National Resources Conservation Service, Staten Island, New York, and M. Van Brocklin, Northern Ecological Associates, Inc. Canton, New York.

Uncles, R.J., I. Joint, and J.A. Stephens. 1998. Transport and retention of Suspended Particulate Matter and Bacteria in the Humber-Ouse Estuary, United Kingdom, and their relationship to Hypoxia and Anoxia. *Estuaries*. 21:4A:597-612.

United States Army Corps of Engineers (USACE). 1965. Beach Erosion Control and Interim Hurricane Study for the Atlantic Coast of Long Island, New York: Jones Inlet to East Rockaway Inlet.

United States Army Corps of Engineers (USACE). 1989. Atlantic Coast of Long Island, New York: Jones Inlet to East Rockaway Inlet, Long Beach Island, New York: Reconnaissance Report.

United States Army Corps of Engineers (USACE). 1995. Final Feasibility Report and Environmental Impact Statement, Atlantic Coast of Long Island, New York: Jones Inlet to East Rockaway Inlet, Long Beach Island, New York. USACE, New York District.

United States Army Corps of Engineers (USACE). 1999. Terminal Groin Rehabilitation and Extension at Jones Inlet, Long Beach Island, New York. USACE, New York District,

United States Army Corps of Engineers (USACE). 2001. The New York District Biological Monitoring Program for the Atlantic Coast of New Jersey Asbury Park to Manasquan Section Beach Erosion Control Project.

United States Army Corps of Engineers (USACE). 2002. Technical Reanalysis of the Shoreline Stabilization Measures for the Eastern Portion of the Long Beach Island Project.

United States Army Corps of Engineers (USACE). 2003. Final Avian Survey Summary Report for the Reformulation of the Shore Protection and Storm Damage Reduction Project, South Shore of Long Island, New York - Fire Island Inlet to Montauk Point.

United States Army Corps of Engineers (USACE). 2004a. Final Small Mammal and Herpetile Survey Summary Report for the Reformulation of the Shore Protection and Storm Damage Reduction Project, South Shore of Long Island, New York - Fire Island Inlet to Montauk Point.

United States Army Corps of Engineers (USACE). 2012. Biological Assessment for the New York and New Jersey Harbor Deepening Project for Threatened and Endangered Species: Atlantic Sturgeon, Whales and Sea Turtles.

U.S. Environmental Protection Agency (USEPA). 1978. Protective Noise Levels. A Supplement to the USEPA Report: Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, EPA/ONAC 550/9-74-004, March, 1974, Office of Noise Abatement and Control, Washington, D.C.

U.S. Environmental Protection Agency (USEPA). 2004. Interactive Site for Data on National Air Quality and Emissions Standards, Trends, and Reports, Office of Air Quality Planning and Standards. Available at: http://www.epa.gov/airs/ accessed April 2004.

United States Fish and Wildlife Service (USFWS). 1982. Fish and Wildlife Resource Studies for the Fire Island Inlet to Montauk Point, New York, Beach Erosion Control and Hurricane Protection Project Reformulation Study. U.S. Department of the Interior, Fish and Wildlife Service, Region 5, Cortland Office, Cortland, NY.112 pp.

United States Fish and Wildlife Service (USFWS). 1989. Planning Aid Report for the Atlantic Coast of Long Island, East Rockaway Inlet to Jones Inlet (Long Beach Island), Cortland: U.S. Fish and Wildlife Services, New York Field Office.

United States Fish and Wildlife Service (USFWS). 1995. Final Fish and Wildlife Service Coordination Act Section 2(b) Report for the Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Storm Damage Reduction Project. U.S. Fish and Wildlife Service, Department of the Interior, Ecological Services, Region 5, Long Island Field Office, Islip, New York. 32 pp.

United States Fish and Wildlife Service (USFWS). 1999a. Letter regarding rare species in the vicinity of Long Beach, NY, dated October 20, 1999 from Frank Santomauro, P.E., Chief of Planning Division, USACE, New York District to Mr. David A. Stilwell, Acting Field Supervisor, U.S. Fish and Wildlife Service, New York, New York.

U.S. Fish and Wildlife Service (USFWS). 1999b. Draft Fish and Wildlife Coordination Act Report for the Atlantic Coast of New York City, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York, Storm Damage Reduction Project. Prepared by Christy Johnson-Hughes, USFWS, Field Office, Long Island, New York.

U.S. Fish and Wildlife Service (USFWS). 2014A. Draft Fish and Wildlife Coordination Act Report for the Atlantic Coast of New York City, Jones Inlet to East Rockaway Inlet – Long Beach Island, Nassau County, New York, Storm Damage Reduction Project. USFWS, Field Office, Long Island, New York.

U.S. Fish and Wildlife Service (USFWS). 2014B. Final Biological Opinion and Conference Opinion Jones Inlet to East Rockaway Inlet, Long Beach Island, Nassau County, New York Coastal Storm Risk Management Project. USFWS, Field Office, Long Island, New York.

U.S. Geological Survey (USGS). 1995. Ground Water Atlas of the United States. Hydrologic Investigations Atlas 730-M, United States Geological Survey, Reston, VA. Available at: http://capp.water.usgs.gov/gwa/. Retrieved April 2004.

Vladykov, V.D., and J.R. Greely. 1963. Fishes of the Western North Atlantic 1:24-60.

Woodhead, P.M.J. 1992. Assessments of the Fish Community and Fishery Resources of the Lower New York Bay Area in Relation to a Program of Sand Mining Proposed by New York State. Stony Brook: Marine Science Research, SUNY at Stony Brook.

Way, C.M. 1998. Characterization of Benthic Macroinvertebrate Resources at Beach Renourishment Borrow Sites in the Vicinity of Coney Island, New York: 1997 Monitoring.