US Army Corps of Engineers®
New York District

Raritan Bay and Sandy Hook Bay, New Jersey Supplemental Environmental Assessment

Hurricane Sandy Limited Reevaluation Report for Coastal Storm Risk Management Union Beach, New Jersey

June 2017

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

The U. S. Army Corps of Engineers, New York District proposes to implement the Raritan Bay and Sandy Hook Bay, New Jersey Hurricane Sandy Limited Reevaluation Report for Coastal Storm Risk Management Union Beach, New Jersey.

ALTERNATIVES

The current Hurricane Sandy Limited Reevaluation Report (HSLRR) incorporates minor design refinements from the 2003 Feasibility Report (the Chief's report was approved in 2006 and the project authorized in 2007). Consistent with the content of a Limited Reevaluation Report (LRR), the report does not reanalyze the full set of alternatives from the 2003 Feasibility Report, but updates the 2007 Authorized Plan and incorporates recent changes.

As such, the project recommended by the current HSLRR is identical to the Authorized Plan described in the 2003 Feasibility Report and 2003 FEIS in terms of project composition. The currently recommended plan contains minor modifications to design cross sections and minor alignment refinements, but there are no changes in project scope.

ENVIRONMENTAL IMPACTS

No impacts on geology would occur because bedrock elevation would be below the depth of the proposed beach/dune fill and periodic beach nourishment, as well as the levee and floodwall foundations. No significant impacts on topography, geology, or soils would occur as a result of implementing the 2016 HSLRR recommended changes.

No significant impacts to water quality area expected from the actions of the dredge. There may be a minor, localized increase in total suspended sediment along the path that the draghead takes as it entrains sediment. Additionally, direct impacts to (ocean) surface waters would include a temporary localized increase in turbidity and total suspended sediments during filling, regrading, and groin modification and pipe extension activities. Effects of beach fill operations on total suspended sediments appear to be limited to a narrow swath of beachfront with a lateral extent of several hundred feet. The construction and maintenance of the beach berm and dune, and periodic re-nourishments would have no significant impact on the existing regional hydrogeology and groundwater resources.

Additionally, construction and maintenance of the floodwalls and levees would have no direct impacts on regional hydrogeology and groundwater resources. Surface water quality would be temporarily impacted during construction of the levees, floodwalls, pump stations, and sluice gates, due to increased suspended sediments in the water column. However, implementation of soil erosion and sediment control measures and best management practices can minimize any adverse impacts. When storm gates are closed, impacts to salinity are expected to be minimal.

Review of activities pursuant to Section 404 of the Clean Water Act (CWA) will include application of the guidelines under the authority of the Section 404 (b) (Appendix F); the 2016 HSLRR recommended project is determined to comply with the Section 404(b) (1) Guidelines, subject to appropriate and reasonable conditions. In addition, a Water Quality Certificate will be obtained from the NJDEP in accordance with Section 401 of the CWA.

Construction and maintenance of the 2016 HSLRR recommended project would have no significant negative impact on the existing tidal influences, floodplain values, and would have beneficial impacts related to flooding events. The proposed changes to the alignment do not encroach upon the CBRA boundary. The 2016 HSLRR recommended alignment following the perimeter of adjacent uplands and minimizing the effects to the tidally-influenced habitat. Where utilized, gates have been designed to ensure that the same level of periodic tidal inundation of the estuary occurs as before construction to allow for the marsh to maintain itself.

Based on the results of a hydrological model to predict tidal flows and losses through constructed features, the gates have all been designed to cause no significant reduction or change in normal tidal flows. Therefore, the tidal wetlands in the study area are expected to receive the same frequency and levels of tidal inundation, allowing hydrological and vegetation patterns to remain the same and no significant impact on wetland hydrology are anticipated.

Construction of the beach berm and dune would have minimal impact on vegetation since the footprint of these features consists of non-vegetated habitats such as sand, rock, and intertidal waters; only a small portion of the beach berm and dune would affect vegetation. These areas are located where the beach berm and dune tie into the levees at Chingarora and Flat Creeks.

The final Union Beach, New Jersey Final Feasibility Report/Final Environmental Impact Statement was completed/approved in Sept 2003 and with the Record of Decision signed in July 2008. The recommended plan included a 17. 5 acre mitigation plan that would convert 12.0 acres of wetland Phragmites in the Flat Creek area to 10.0 acres of salt marsh and 2 acres of wetland scrub-shrub habitat. Also in the Flat Creek area, 2.5 acres of upland Phragmites would be converted to wetland herbaceous/scrub shrub habitat. For the East Creek area, 3.0 acres of wetland dominated by Phragmites would be converted to wetland scrub-shrub habitat. The Selected Mitigation Plan was based on using functional assessment methodology (EPW and HEP), calculating Total EPW FCUs and HEP HUs impacted - 25.42 and 11.84, respectively.

The analysis as part of the preparation of the Draft HSLRR and EA, noted that minor design changes and compliance with 2009 USACE Vegetation Management Policy resulted in an increase of the areal extent of wetlands affected by the HSLRR Recommended Plan. Due to the conceptual level estimate associated with the change in aerial impact, and due to the limited scope given as part of the HSLRR, a new functional assessment was not undertaken. It was noted in the HSLRR/EA, that during PED (when there is more detailed data available), the functional assessment analysis will be updated to confirm if additional acreage may be required. If so, the

Selected Mitigation Plan will be revised. However, due to the lower quality of the habitat to be impacted, it is not anticipated that there will be measurable increase in mitigation acreage needed.

The construction and maintenance of the dune and beach berm would result in long-term beneficial impacts on the project area's ability to withstand flooding events. The construction of the sluice gates, levees, floodwalls, and pump stations would also result in beneficial effects on how the project area experiences severe tidal flood events.

During construction, the clearing and grading of work areas could result in the loss of aquatic, vegetative, and some subsurface cover due to the movement and excavation of soil. These construction activities could result in the temporary and permanent loss of habitat and possible mortality of less mobile, burrowing, and denning species of wildlife such as mollusks, small rodents, snakes, turtles, and amphibians. Following construction, wildlife species are expected to resume their normal habits consistent with post-construction habitat availability in and around the project area.

Construction of the levees, floodwalls, pump stations, and gates would be limited to the upland areas adjacent to the salt marshes and some wetland areas along the edge of the marsh. In areas where levees or floodwalls are constructed in the wetlands, a short, one-time direct burial of existing shellfish may occur if any are present at the time. No long-term adverse impacts to the shellfish are expected as a result of the construction of these structures. The placement of the authorized revetments and terminal groins may have a long-term beneficial impact on shellfish by improving habitat for intertidal organisms. Impacts to wildlife habitat would be fully compensated through implementation of the authorized mitigation plan as discussed in the 2003 FEIS. This will be updated during the PED phase in consultation with NJDEP Land Use Regulation.

Construction of the revetments, terminal groins, and beach berm and periodic re-nourishments would have an indirect, short-term, negative impact on finfish species in the immediate project area. However, with the implementation of NMFS recommended RMPs including use of the deflector head, the instituted take statement, dredging only between November and May, and a long record of little to no dredge related impacts to any ESA species over the past 25 years, significant impacts that would jeopardize any local or regional population of ESA species is not anticipated.

In accordance with the USFWS recommendations, the District will survey for the federally threatened seabeach amaranth prior to shorefront construction and coordinate those results with the USFWS. Section 7, threatened and endangered species coordination with USFWS and NOAA, has determined no affect, to the piping plover, may affect, but is not likely to adversely affect the rufa red knot, and no affect to the northern long-eared bat.

No historic properties were identified in the Union Beach Project Area of Potential Effect that has previously been subject to investigation. A Programmatic Agreement (PA) was prepared and coordinated with the NJHPO, ACHP, the Delaware Nation, and the Delaware Tribe of Indians. Cultural resources studies of proposed wetland mitigation sites, once defined, will be undertaken and all work coordinated with the NJHPO.

In the comments on the original 2003 FEIS, the USFWS stated that parts of the Union Beach project were within the Coastal Barrier Resources System (CBRS) Unit NJ-04 (2008 Unit Alignment). The USFWS, in response to Hurricane Sandy, drafted a revised alignment for CBRS Unit NJ-04. On 7 July 2016, the USFWS announced in the Federal Register that it is developing a new CBRS mapping protocol for critical facilities located within and immediately adjacent to the CBRS. In the announcement, the USFWS stated that it may consider mapping a CBRS area to allow for the protection of existing critical facilities (e.g., sewage treatment facilities) that primarily serve areas located outside of the CBRS. The USFWS developed this new protocol for critical facilities to allow for the protection of the Bayshore Regional Sewerage Authority Wastewater Treatment Facility (located within the project area). In cases where the USFWS recommends the removal of an area from the CBRS in accordance with the new protocol, the change becomes effective only if the updated map is adopted through legislation enacted by Congress. The alignment for CBRS Unit NJ-04 the Service announced in the Federal Register on 7 July 2016 was as made effective on December 16, 2016, via Public Law 114-314. With this, the District is in compliance with CBRA.

The project has been evaluated for Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40 CFR§93 Subpart B). The project is presumed to conform to the General Conformity requirements and is exempted from Subpart B under 40CFR§93.153(c)(1).

DETERMINATION:

Given that there are no anticipated long-term, adverse impacts associated with the implementation of the recommended plan, a FONSI has been determined for this action. Furthermore, as the recommended plan would have no negative impacts on the quality of the environment, an Environmental Impact Statement in not required.

Thomas D. Asbery
Colonel, US Army
Commander

Date: 20170712

PERTINENT DATA

DESCRIPTION: The 2007 Authorized Plan, including updates developed for this Hurricane Sandy Limited Reevaluation Report (HSLRR), provides for a storm protective beach, berm and dunes, groins with interior drainage structures (levees/floodwalls, gates, pumps, road-raising and wetland mitigation) at Union Beach, New Jersey. The purpose of this HSLRR is to determine whether the authorized, unconstructed project remains economically justified.

LOCATION: Borough of Union Beach - Monmouth County, New Jersey

	2003 Feasibility	2017 HSLRR
LEVEE/FLOODWALL ELEMENT		
Levee		
Length (Chingarora: 6,428) (Flat/East: 4,442)	10,870 FT	
Length (Chingarora: 2,243) (Flat/East: 4,560)		6,803 FT
Top Elevation (NGVD29 / NAVD88)	15.0 FT / 14.0 FT	15.0 FT / 14.0 FT
Crest Width	10 FT	10 FT
Slopes	2.5:1	2.5:1
Fill Volume	156,700 CY	111,378 CY
Interior Levee		
Length	3,388 FT	3,388 FT
Top Elevation (NGVD29 / NAVD88)	8.0 FT / 7.0 FT	8.0 FT / 7.0 FT
Crest Width	2 FT	2 FT
Slopes	2.0:1	2.0:1
Fill Volume	3,997 CY	3,953 CY
Interior Drainage		
Primary Outlet Structures	11	11
Secondary Outlet Structures	37	45
8 @ 18" Concrete Pipe	210 FT	210 FT
23 @ 24" Concrete Pipe	905 FT	
31 @ 24" Concrete Pipe		1,055 FT
7 @ 36" Concrete Pipe	270 FT	270 FT
3 @ 48" Concrete Pipe	230 FT	480 FT
1 @ 4' x 4' Box Culvert	80 FT	25 FT
6 @ 60" Concrete Pipe	840 FT	840 FT
6 ft x 6 ft Tide Gate Structures w/ Sluice Gates	6	6
Natural Ponding Areas	4.21 AC	4.21 AC
Floodwall		
Length – Total	6,885 FT	12,907 FT
Chingarora Creek		
I-wall	4,468 FT	0 FT
T-wall on spread footing	488 FT	0 FT
T-wall on piles	0 FT	10,977 FT
Flat / East Creek		
T-wall on piles	1,929 FT	1,929 FT
Top Elevation (NGVD29 / NAVD88)	15.0 FT / 14.0 FT	15.0 FT / 14.0 FT

	2003 Feasibility	2017 HSLRR
Road Raising	580 FT	580 FT
Stream Closure Gates & Pump Stations		
Road Closure Gate (Miter 50' x 7')	1	1
Flat Creek Sector Gate	1	
Flat Creek Sector Gate Width Opening	35 FT	
Flat Creek Sector Gate Height	20 FT	
Flat Creek Sluice Gate		1
Flat Creek Sluice Gate Width Opening		35 FT
Flat Creek Sluice Gate Height		20 FT
East Creek Sector Gate	1	
East Creek Sector Gate Width Opening	35 FT	
East Creek Sector Gate Height	20 FT	
East Creek Sluice Gate		1
East Creek Sluice Gate Width Opening		35 FT
East Creek Sluice Gate Height		20 FT
Flat Creek Pump Station Capacity	250 CFS	250 CFS
East Creek Pump Station Capacity	100 CFS	100 CFS
Chingarora Creek (CI-3- CI-5) Pump Station Capacity	40 CFS	40 CFS
SHOREFRONT ELEMENT		
Length of Beach and Dune	3,160 FT	3,160 FT
Volume of Beach and Dune (Design fill only)	528,000 CY	528,000 CY
Width of Dune	50 FT	50 FT
Width of Beach Berm	50- 164 FT	50- 164 FT
Elevation of Dune (NGVD29)	17 FT	17 FT
Elevation of Beach Berm (NGVD29)	9 FT	9 FT
Length of Eastern Terminal Groin	228 FT	228 FT
Length of Western Terminal Groin	245 FT	245 FT
Length of Northwestern Revetment	405 FT	405 FT
Length of Southeastern Revetment	630 FT	630 FT
Dune Slopes		
Landward	1V:5H	1V:5H
Seaward	1V:10H	1V:10H
Beach Berm Slope	1V:15H	1V:15H
Renourishment - every 9 years thereafter by trucking	21,000 CY	21,000 CY
Total Initial Fill Beach and Dune (design, advance, overfill and tolerance	688,000 CY	688,000 CY
REAL ESTATE REQUIREMENTS		
Fee Simple		29.67 AC
Permanent Easements	87.30 AC	63.01 AC
Temporary Easements	3.25 AC	15.25 AC

	2003 Feasibility	2017 HSLRR
ENVIRONMENTAL CONSIDERATIONS		
Wetland Mitigation	17.5 AC	22.0 AC
Mitigation Acquisition	17.5 AC	22.0 AC
ECONOMICS		
Price Level	October 2002	October 2016
Discount Rate	5 7/8 %	2 7/8 %
Initial Project Cost	$ 96,669,300	$ 273,005,000
Annual Project Cost	$ 6,864,000	$ 12,403,700
Average Annual Benefits		
Damage Reduction	$ 10,999,000	$ 14,3164,000
Reduced Maintenance	$ 25,000	$ 38,000
Recreation	$ 8,500	$ 12,500
Total	$ 11,159,500	$ 14,414,500
Net Excess Benefits	$ 4,295,500	$ 2,010,700
Benefit to Cost Ratio	1.6	1.2
COST APPORTIONMENT (First Cost)		
Federal (65%)	$ 59,372,300	$ 177,453,250
Non-Federal (35%)	$ 31,969,700	$ 95,551,750
COST APPORTIONMENT (Continuing Construction Cost - Renourishment)		
Federal (50%)	$ 3,054,600	$ 7,071,000
Non-Federal (50%)	$ 3,054,600	$ 7,071,000
PHYSICAL CONDITIONS		
Tides		
Semi Diurnal		
Tide Range*	Mean 5.0 FT Spring 5.6 FT	Mean 5.0 FT Spring 5.6 FT

* Tide data is interpolated from NOAA values at Atlantic Highlands and WayCake Creek

	2003 Feasibility	2017 HSLRR
Stage		
Maximum Storm Stage		
Keyport, Sept 12, 1960, (NGVD29 / NAVD88)	10.5 FT / 9.4 FT	
Battery Park, Oct 29, 2012, (NGVD29 / NAVD88)		12.0 FT / 10.9 FT

TERMS, ACRONYMS, AND ABBREVIATIONS

AASHTO	American Association of Highway and Transportation Officials
ACHP	Advisory Council on Historic Preservation
ABU	Authorized but Unconstructed
APE	Area of Potential Effect
BFE	Base Flood Elevation
BO	Biological Opinion
BRSA	Bayshore Regional Sewage Authority
CAA	Clean Air Act
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
CO	Carbon Monoxide
CZM	Coastal Zone Management
DPS	Distinct Population Segment
DRV	Depreciated Replacement Value
EC	Engineering Circular
ECB	Engineering Construction Bulletin
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EM	Engineer Manual
ENR	Engineer News Record
EPW	Evaluation for Planned Wetlands Model
ESA	Endangered Species Act
ETL	Engineer Technical Letter
EA	Environmental Assessment
FCCE	Flood Control and Coastal Engineers
FEMA	Federal Emergency Management Agency
FEIS	Final Environmental Impact Statement
FS/FEIS	Feasibility Study/Final Environmental Impact Statement
FWCA	Fish and Wildlife Coordination Act
GIS	Geographic Information System
HEC-FDA	Hydrologic Engineering Center - Flood Damage Analysis model
HEC-HMS	Hydrologic Engineering Center - Hydrologic Modeling System
HEP	Habitat Evaluation Procedures Model
HRTW	Hazardous, Toxic, and Radioactive Waste
HSLRR	Hurricane Sandy Limited Reevaluation Report
IFF	International Flavors Fragrances
KCS	Known Contaminated Site
LER	Lands, Easements, and Rights of Way
LERRD	Lands, Easements, Rights-of-way, Relocations, and Disposal areas

LRR	Limited Reevaluation Report
NAAQS	National Ambient Air Quality Standards
NACCS	North Atlantic Coast Comprehensive Study
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NGVD29	National Geodetic Vertical Datum of 1929
NJDEP	New Jersey Department of Environmental Protection
NJHPO	New Jersey Historic Preservation Officer
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric and Administration
NOI	Notice of Intent
NOx	Oxides of Nitrogen
NRHP	National Register of Historic Places
O&M	Operations and Maintenance
PCBs	Polychlorinated Biphenyls
PA	Programmatic Agreement
PED	Planning, Engineering, and Design
PL	Public Law
PPA	Project Partnership Agreement
RCRA	Resource Conservation Recovery Act
RDC-SCC	Residential Direct Contact Soil Cleanup Criteria
REP	Real Estate Plan
ROD	Record of Decision
RONA	Record of Non-Applicability
SBBA	Sea Bright Borrow Area
SBEACH	Storm-induced Beach Change Model
SEIS	Supplemental Environmental Impact Statement
SLR	Sea Level Rise
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordinance
VOC	Volatile Organic Compound

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1 INTRODUCTION

1.1 Purpose and Need for USACE Action

Union Beach is located in the northern portion of Monmouth County, New Jersey, stretching along approximately 1.8 square miles of the Raritan Bay coastline on a point of land identified as Conaskonk Point. The area consists of low-lying areas with a number of small creeks draining north into Raritan Bay. Low-lying residential and commercial structures within Union Beach experience flooding caused by coastal storm inundation which has worsened in recent years because of the loss of protective beaches, increased urbanization, and the construction of structures susceptible to flooding.

In September 2003, the *Union Beach, New Jersey, Final Feasibility Report and Environmental Impact Statement,* (USACE 2003) was prepared to address hurricane and storm damage reduction opportunities in Union Beach and evaluate the environmental consequences in accordance with the National Environmental Policy Act (NEPA). The 2003 Feasibility Study/Final Environmental Impact Statement (FS/FEIS) recommended a comprehensive plan consisting of levees, floodwalls, road raising, tide gates, interior drainage, pump stations, terminal groins, sand placement and, the creation of a dune utilizing an offshore borrow area.

The recommended plan of the September 2003 Feasibility Report was authorized for construction in the Water Resources Development Act of 2007 (Public Law 110-114). The Record of Decision (ROD) for the FEIS was signed in 2008 (USACE 2008), but the project had not yet been constructed prior to Hurricane Sandy in 2012.

In response to the effects of Hurricane Sandy, Congress directed[1] the U.S. Army Corps of Engineers (USACE), New York District to prepare two reports: a project performance evaluation report and a comprehensive study addressing the flood risks of vulnerable coastal populations in areas affected by Hurricane Sandy within the boundaries of the North Atlantic Division. The First Interim Report of the Disaster Relief Appropriations Act, 2013 identified the Raritan Bay to Sandy Hook Bay, Union Beach, NJ project among the list of projects that meet the criteria for "*Authorized but Unconstructed Projects.*" The language in the Report directing the preparation of the current Hurricane Sandy Limited Reevaluation Report (HSLRR) states:

> *"When determining how to move forward in implementing project specific measures in accordance with the funding and direction in the Act, the Corps will perform an expedited limited re-evaluation that addresses resiliency, economics, risks, environmental compliance, and long-term sustainability…."*

The New York District prepared the HSLRR to serve as a decision document to support the construction of the previously-authorized Raritan Bay and Sandy Hook Bay, New Jersey Coastal

[1]Public Law (P.L.) 113-2, the "Disaster Relief Appropriations Act, 2013."

Storm Risk Management Project.[2] The HSLRR addresses relevant changes to the existing conditions that have occurred since the FR/FEIS was completed in September 2003, including changes due to Hurricane Sandy.

In anticipation of the extent of changes to the 2007Authorized Plan, the New York District published a notice of intent to prepare a Supplemental Environmental Impact Statement (SEIS) in the Federal Register[3]; the SEIS was to have supplemented the 2003 FS/FEIS and 2008 ROD.

Since the NOI was published, resource agency involvement through meetings, changes in plan formulation, and re-evaluation of the Union Beach project have reduced the magnitude and extent of proposed flood risk management measures and associated environmental impacts to the point that an SEIS is no longer the appropriate NEPA document.

In their answers to the 40 Most Asked Questions, the Council on Environmental Quality instructs agencies regarding supplementing valid EISs for proposals that have not yet been implemented. "*If an agency has made a substantial change in a proposed action that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, a supplemental EIS must be prepared for an old EIS so that the agency has the best possible information to make any necessary substantive changes in its decisions regarding the proposal.*" However, there is no substantial change in the proposed action relevant to environmental concerns or significant new circumstances that could have a bearing on the proposed action or its impacts. Therefore, the New York District has documented, evaluated, and further coordinated the effects of implementing the HSLRR Recommended Plan modifications in this supplemental environmental assessment (SEA) to assist USACE planning and decision making and to further the purposes of NEPA.

The New York District has prepared the HSLRR and this supplemental environmental assessment (SEA) to reevaluate the 2007 Authorized Plan and addresses changes to environmental conditions and minor changes recommended by the HSLRR. Accordingly, the New York District has prepared this supplemental EA to supplement the 2003 FEIS and 2008 ROD, as appropriate, and update the NEPA compliance for the HSLRR

Whenever practicable and according to CEQ regulations, agencies shall incorporate material into an environmental assessment "by reference" when the effect will be to cut down on bulk without impeding agency and public review of the action.[4] This supplemental environmental assessment evaluates the potential adverse and beneficial environmental impacts that may result from the changes of the 2007 Authorized Plan since the original 2003 FS/FEIS and 2008 ROD (USACE, 2003; USACE, 2008) were issued. As such, the 2003 FEIS is incorporated-by-reference with the incorporated material being cited and its content briefly described.

[2] The project was formerly referred to as the Raritan Bay and Sandy Hook Bay, New Jersey Coastal Storm Damage Reduction Project.
[3] FR Doc. 2014-01443
[4] 40 CFR 1502.21

1.2 Current Hurricane Sandy Limited Reevaluation

The HSLRR incorporates minor design refinements from the September 2003 Feasibility Report (the Chief's report was approved in 2006 and the project authorized in 2007). Consistent with the content of a Limited Reevaluation Report (LRR), the report does not reanalyze the full set of alternatives from the September 2003 Feasibility Report, but updates the 2007 Authorized Plan and incorporates recent changes.

As such, the project recommended by the HSLRR is identical to the 2007 Authorized Plan described in the 2003 Feasibility Report and 2003 FEIS in terms of project composition. The currently recommended plan contains minor modifications to design cross sections and minor alignment refinements, but there are no changes in project scope.

Accordingly, the HSLRR:

- Summarizes changes that have occurred since approval of the September 2003 Feasibility Report and the effects of these changes on the HSLRR Recommended Plan;
- Updates the September 2003 Feasibility Report project benefits and costs to the current price level;
- Provides changes in benefits and costs compared to September 2003 Feasibility Report values;
- Identifies changes in environmental conditions since the September 2003 Feasibility Report;
- Confirms that the HSLRR Recommended Plan, which has minimal changes from the 2007 Authorized Plan remains technically feasible, economically justified and environmentally acceptable, and addresses sustainability and resiliency; and
- Establishes the costs, cost sharing, and items of local cooperation necessary for the execution of the Project Partnership Agreement between the federal government and the non-federal sponsor, the New Jersey State Department of Environmental Protection (NJDEP).

2 2007 AUTHORIZED PLAN

2.1 Project Area

The Union Beach project area is located in the northern portion of Monmouth County, New Jersey as shown in Figure 1. It occupies a 1.8 square mile area of land along the coast of the Raritan Bay. The project area is defined by the Raritan Bay to the north, the Borough of Keansburg to the east, the Township of Hazlet to the south, and Chingarora Creek to the west (see Figure 2). Flat Creek and East Creek both flow through sections of Union Beach; all creeks flow north into Raritan Bay. To the east of East Creek is a levee with a nominal crest elevation of +15 feet NGVD29[5], which is part an adjacent Federal project – the Raritan Bay and Sandy Hook Bay Beach Erosion and Hurricane Protection project for the Borough of Keansburg, North Middletown, and Laurence Harbor.

Figure 1.
Project Area Location

[5] Although current USACE practice is to use vertical datum NAVD88 for planning studies. The Union Beach HSLRR utilized vertical datum NGVD29 in order to be consistent with the vertical datum used in the 2003 Feasibility Report.

Figure 2.
Project Area Overview

The western portion of Union Beach is characterized by low-lying marsh with some beach. The developed section of Union Beach at the Raritan Bay shoreline is lined by assorted bulkheads and seawalls. A locally constructed 1,850 foot long bulkhead parallels Front Street. The eastern shoreline of Union Beach is also characterized as an unprotected marsh.

The topography of Union Beach is characterized by low, flat terrain. Elevations range from 0 feet NGVD29[6] along the Raritan Bay coastline, to a maximum of approximately + 20 feet NGVD29 in the extreme southeastern and southwestern portions. Wide stretches of tidal marsh are located along the creeks and a portion of the bay shoreline.

The Borough's interior stormwater drainage system contains 38 outfalls. One outfall discharges directly into Raritan Bay, one into Natco Lake, ten into the marshlands along the western end of the Borough and four into the marshlands into the eastern edge. East Creek provides drainage for six stormwater outfalls and Flat Creek provides for 16 outfalls. The flat gradient of the streams and the low relief of the surrounding terrain make the project area extremely vulnerable to interior

[6] 1929 NGVD is National Geodetic Vertical Datum, which is equal to Sea Level Datum.

flooding during the periods of heavy rainfall. Severe thunderstorm activity in conjunction with high tides causes the creeks to overtop and spread their floodwaters within the broad floodplain.

2.2 Description of the 2007 Authorized Plan

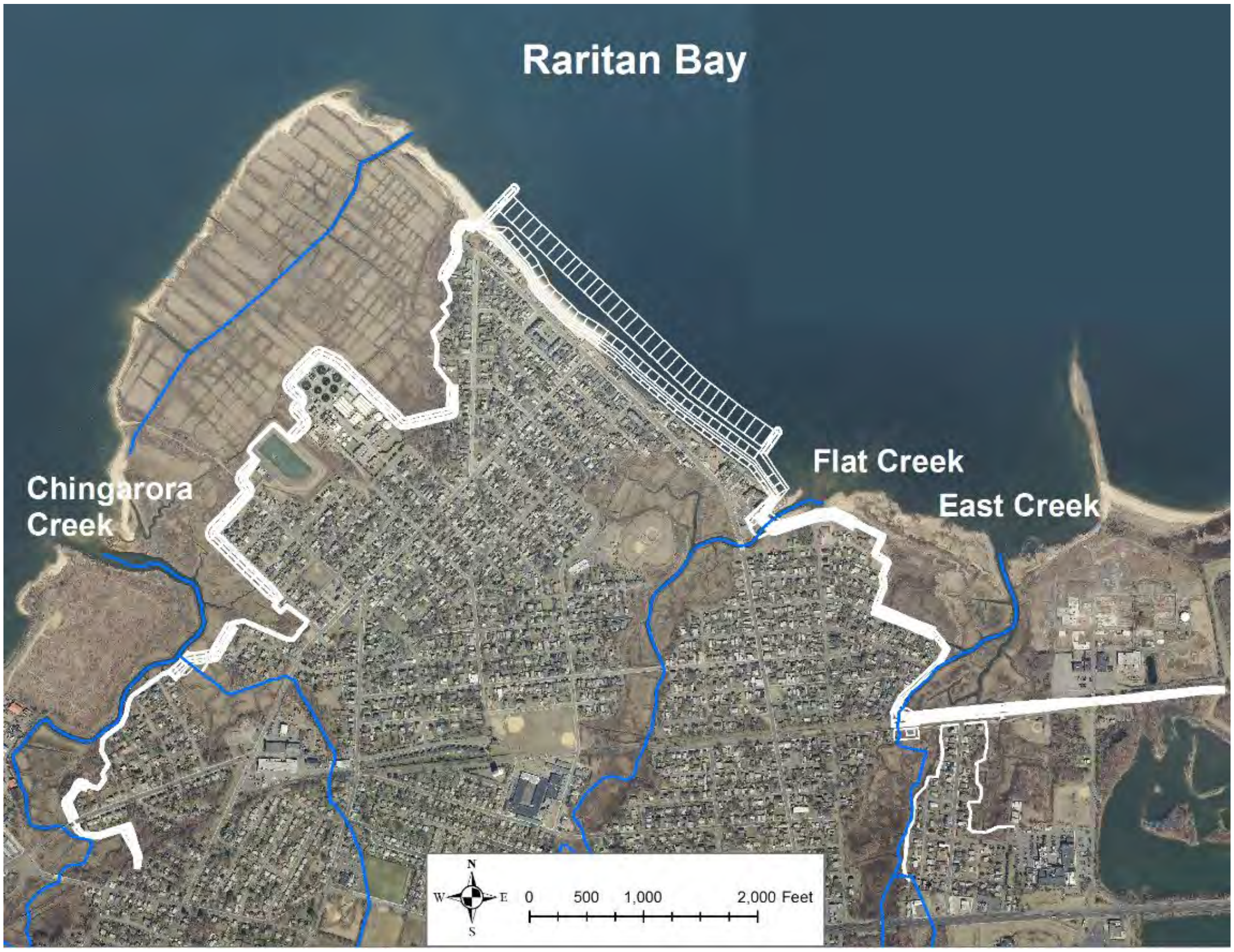
As described in the September 2003 Feasibility Report/FEIS (USACE, 2003):

"The Selected Plan consists of three major elements, including Chingarora Creek, Flat and East Creeks, and the Bay Shore. The levee and floodwall alignment for the Chingarora Creek element begins at the high ground (+15 ft NGVD) near the intersections of Florence Avenue and Bank Street and ends at the northwestern end of the Bay Shore element. The Bay Shore element consists of a beach and dune incorporating terminal groins with adjoining revetments stretching from the Chingarora Creek level floodwall alignment to the southeastern limit of the dune and ties into the levee alignment near Flat Creek. The Flat and East creeks element consists of a floodwall and levee alignment that begins at the southeastern limit of the Bay Shore element and ties into the existing Keansburg levee at the eastern end of the Study limits. A small supplemental, interior levee would protect the low lying homes within the area between East Creek and a tributary of East Creek while allowing flooding of the adjacent wetlands for the full range of non-storm tidal conditions. In addition to the initial construction, the Selected Plan includes periodic re-nourishments of the Bay Shore element."

As shown in Figure 3, the 2007 Authorized Plan documented in the September 2003 Feasibility Report is a beach berm and dune system with revetments and two terminal groins along the Raritan Bayshore, with a system of levees and floodwalls provided along Chingarora and East Creeks and crossing Flat Creek. The overall length of the 2007 Authorized Plan is 20,915 feet, and is comprised of 3,160 feet of dune, 10,870 feet of levee (Chingarora: 6,428 feet, Flat / East: 4,442 feet), and 6,885 feet of floodwall (Chingarora: 4,956 feet, Flat / East: 1,929 feet).

Also included in the 2007 Authorized Plan are a road closure gate, two road raisings, three pump stations, two sector gates, and six tide gate structures with sluice gates. The discussion below separates the 2007 Authorized Plan into three elements: Chingarora Creek, Shorefront, and East Creek / Flat Creek.

Figure 3.
Overview of 2007 Authorized Plan Alignment



2.2.1 Chingarora Creek Element of the 2007 Authorized Plan

The Chingarora Creek element of the 2007 Authorized Plan includes 6,428 feet of earthen levee, 4,468 feet of I-type floodwall, and 488 feet of T-type floodwall – each with a top elevation of + 15 feet NGVD29. Also included in this element are a 40 cfs pump station, a road closure gate, and three sluice gates that cross a Chingarora Creek tributary. The alignment begins at high ground (+ 15 feet NGVD29) near the intersection of Florence Avenue and Bank Street and ends at the northwestern end of the shorefront element. Figures 4, 5, and 6 provide an overview.

Figure 4 shows the 2007 Authorized Plan alignment beginning as an earthen levee approximately 500 feet southwest of the intersection of Florence Avenue and Bank Street. The levee has a 10-foot top width and side slopes at 1V:2.5H. At the design elevation of + 15 feet NGVD29, the levee ranges between five and 11 feet above existing grade through this section. The levee alignment crosses over the Monmouth County Parks Henry Hudson Trail and continues approximately 370 feet northwest. Access to the Henry Hudson Trail will be maintained with a paved transition to the trail over the levee. At this point, the alignment continues as a T-type floodwall, on a spread footing, for 488 feet along the north side of Chingarora Creek and the rear of the property lines of the homes fronting Broadway, with an average height of approximately 10 feet above existing grade.

The floodwall continues westerly along the properties on Broadway to a 45-foot long and 7-foot above existing grade hinged road closure gate crossing Broadway, which will be closed by public works crews during flood events. The alignment continues from the road closure gate as a levee, averaging seven feet above existing grade for approximately 440 feet along the rear property lines of the homes fronting State Street to a point approximately 500 feet northeast from the intersection of Broadway and Walnut Street. From this point, the alignment continues as an I-type floodwall seven feet above existing grade for approximately 1,500 feet along the wetlands east of the creek, perpendicular to Aspen, West, and Ash Streets. The alignment continues as a levee 11 feet above existing grade along the wetlands north of Ash Street for approximately 130 feet to the three (two gates at the main branch and one gate at the northern branch) 6 feet x 6 feet storm type sluice gates crossing the Chingarora Tributary.

Figure 4.
Chingarora Creek Element (1 of 3)

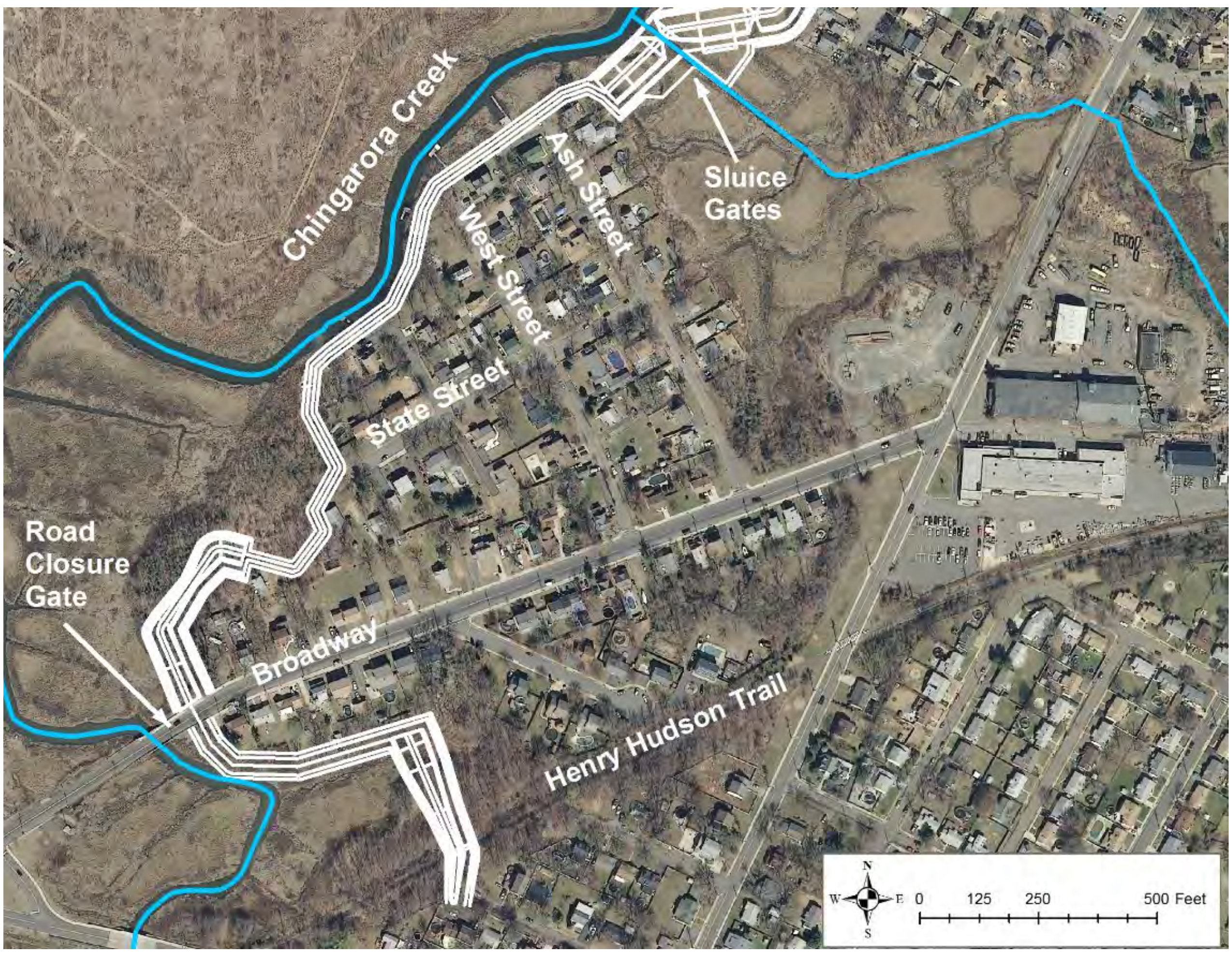
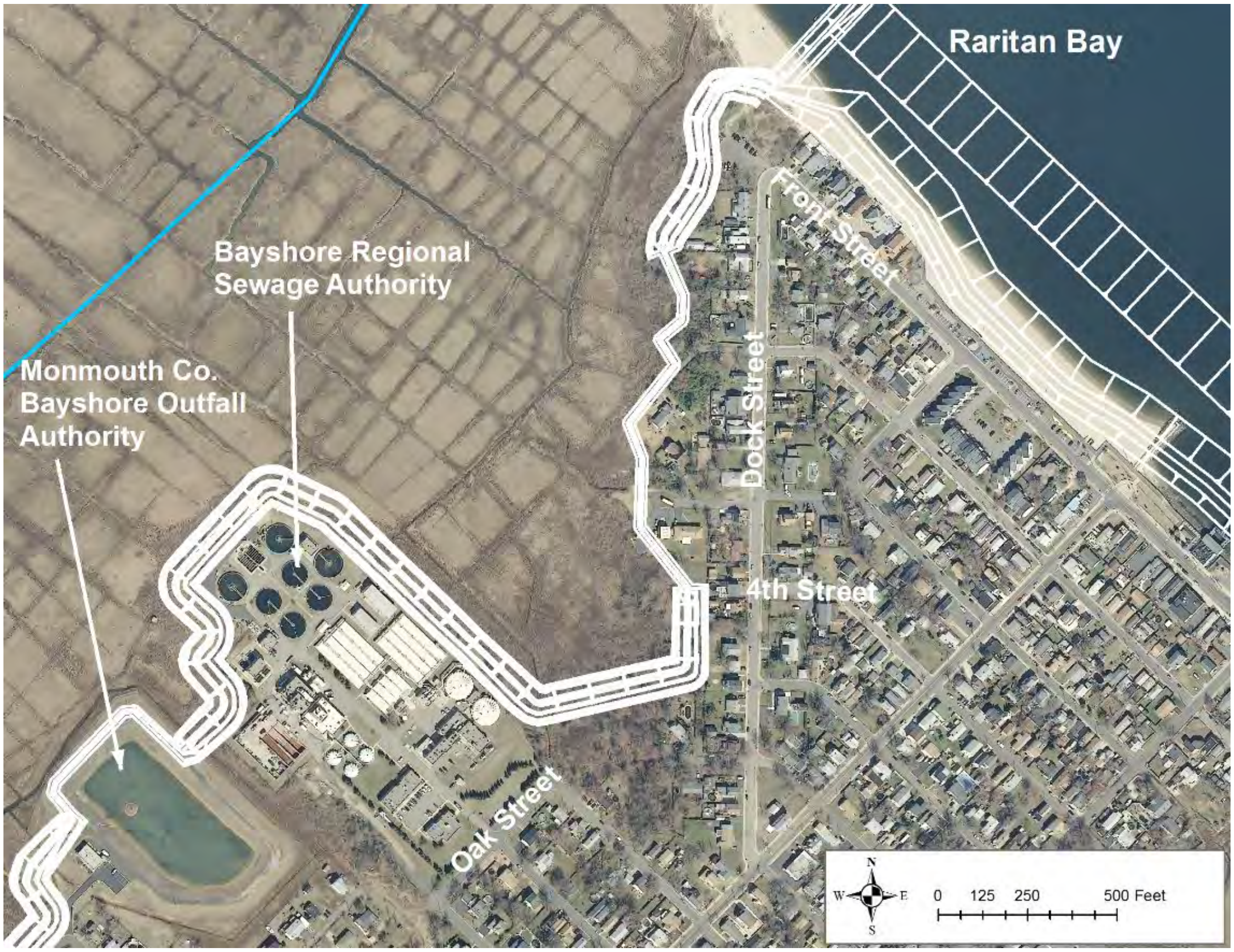


Figure 5 shows the levee continuing for approximately 520 feet to St. Johns Avenue where it proceeds as an I-type floodwall with an average height of 10 feet above existing grade for 1,250 feet along the wetland limits between St. Johns Avenue, Florence Avenue, and Bay Avenue. A 40 cfs pump station will be located near Bay Avenue. The alignment continues as a levee 11 feet above existing grade for 1,670 feet running parallel to Bay Avenue and Chingarora Street to the Monmouth County Bayshore Outfall Authority Settlement Pond.

Figure 5.
Chingarora Creek Element (2 of 3)

The alignment continues as an I-type floodwall three feet above existing grade for 600 feet along the westerly edge of the Monmouth County Bayshore Outfall Authority settlement pond to a levee about 910 feet northwest from the intersection of 8th Street and Oak Street. The levee alignment continues behind the Bayshore Regional Sewage Authority facility for approximately 2,610 feet along the wetlands limits to approximately 200 feet southwest from the intersection of Dock Street and 4th Street with an average height of 10 feet above existing grade. From this point, the alignment continues as an I-type floodwall nine feet above existing grade, running parallel and west of Dock Street for approximately 1,115 feet along the limits of the wetlands where it transitions to a levee. The levee alignment continues for approximately 670 feet with an average height of eight feet above existing grade, to tie into a sand dune behind the terminal groin of the bay shore approximately 250 feet north of the intersection of Dock Street and Front Street.

Figure 6.
Chingarora Creek Element (3 of 3)

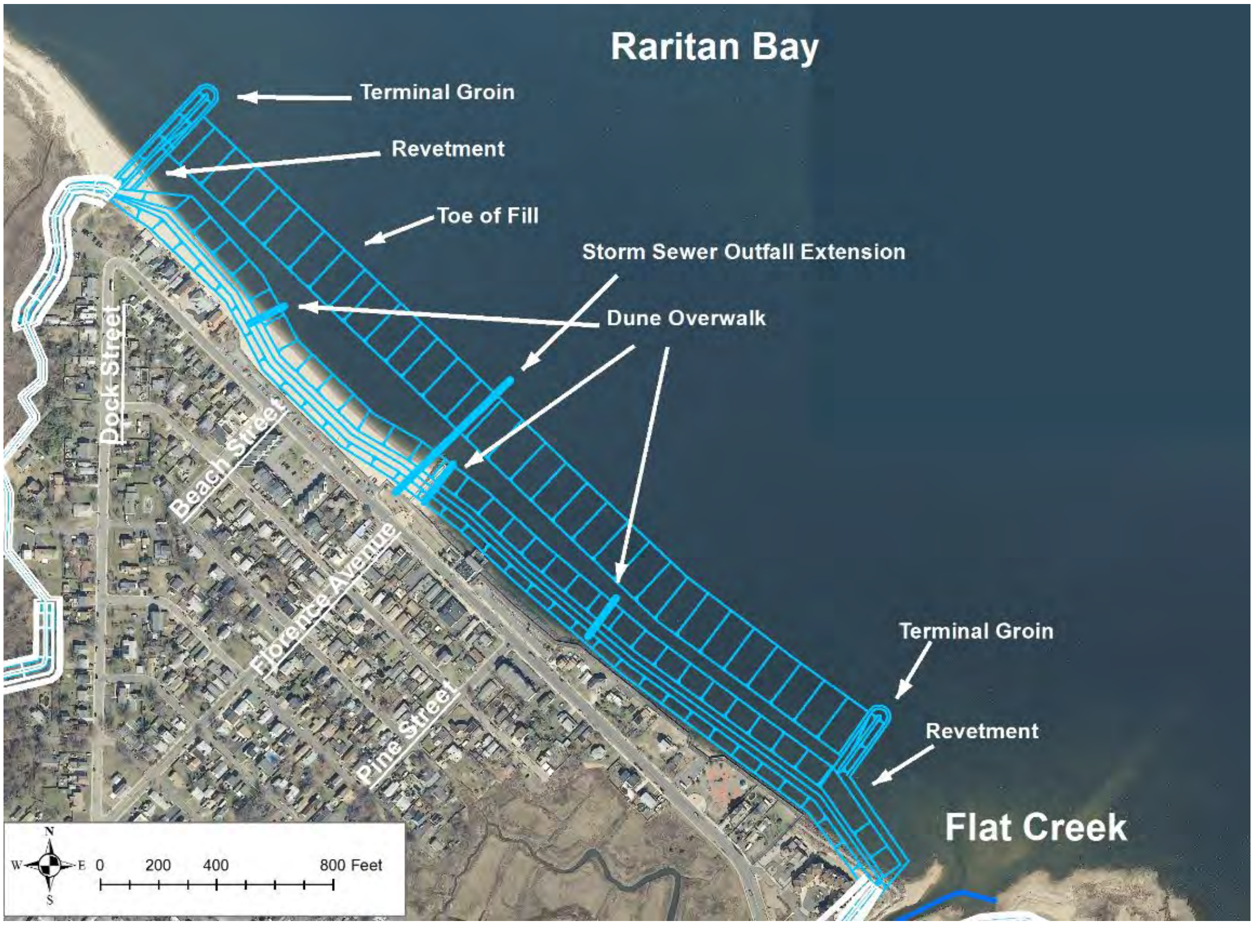


2.2.2 Shorefront Element

The shorefront element of the 2007 Authorized Plan consists of a beach and dune (overall length 3,160 feet) incorporating two terminal groins with adjoining revetments stretching from the Chingarora Creek levee/floodwall alignment to the southeastern limit of the dune that tie into the levee alignment near Flat Creek. The dune generally follows the layout of the existing shoreline and extends bayward along the existing bulkheads and beach.

To provide similar coastal storm risk management capability as the adjacent levees and floodwalls, a dune will be constructed with an elevation of + 17 feet NGVD29. The dune crest will be 50 feet wide, with a landward slope of 1 vertical on 5 horizontal (1V:5H) and a bayward slope of 1V:10H extending from the dune crest to the + 9 feet NGVD29 berm elevation. The width of the horizontal berm will range from a minimum of 50 feet near the two terminal groins to a maximum of 164 feet between Beach Street and Florence Avenue. From the bayward edge of the berm, the beach will follow a slope of 1V: 15H to the existing bay bottom (approximately - 3 feet NGVD29). The total initial fill volume will be approximately 688,000 cubic yards, including advance fill, overfill, and tolerance.

Figure 7.
Shorefront Element



Twelve feet of advance fill would be placed with initial construction, with 21,000 cubic yards of periodic renourishment to follow approximately 9 years after construction, continuing at a 9-year cycle. The nine-year renourishment interval was identified as the economically optimized renourishment interval. The periodic renourishment design meets both the long-term erosion needs as well as storm survivability requirements. Material would be utilized from the Sea Bright borrow area by hydraulic dredging for initial construction and an upland source by trucking for subsequent renourishment.

The dune section will be stabilized with dune grass and fencing. Three wood on dune walkovers located across from midway between Dock Street and Beach Street, across from Florence Avenue and across from Pine Street, will be constructed to allow for access to the beach, and to protect dune vegetation from pedestrian damage. A walkway connecting the overwalks will run along the crest of the dune to provide views of the bayfront. The existing storm outfall near Florence Avenue will be extended in conjunction with other drainage improvements based on the structure's current design.

To reduce fill losses and the drift of fill material into the adjacent salt marshes and to reduce initial renourishment beach fill costs, terminal groins will be constructed at both ends of the beach and dune fill. The structures will extend to the seaward toe of the beach fill. The length of the eastern and western groins were designed to be approximately 228 and 245 feet long respectively, to contain the design cross section, advance fill, and expected sand fillet growth. Along the beach berm, the crest elevation of both groins will be + 10 feet NGVD29. At the edge of the construction berm, the crests of the structures will decrease from + 10 feet NGVD29 to + 6 feet NGVD29 at a slope of 1V:15H. The offshore sections of the structures, designed to be visible at all phases of the tide, will feature a level crest at elevation + 6 feet NGVD29. The slopes on the seaward ends of the structures will be 1V:2H. Side slopes along the entire length of the structure will be 1V:2H.

Where the beach and dune fill ties in to the adjoining levees, the terminal groins will terminate at revetments. At the northwest end of the fill area, the revetment will extend 405 feet along the transition between the levee and the dune fill. Near the levee, the slope of the revetment will be 1 on 2.5. Near the dune, the slope of the revetment will be 1 on 2.5 below + 9 feet NGVD29 and 1V:10H above + 9 feet NGVD29, equal to the slope of the dune.

At the southeast end of the fill area, the revetment will consist of two sections - a 380 foot long section extending from the terminal groin to Flat Creek, and a 250-foot section parallel to Flat Creek extending from the existing shoreline to the tide gate. Along the section parallel to Flat Creek, the slope of the revetment will be 1 on 2.5. Along the section near the groin, the slope of the revetments will be 1 on 2.5 below + 9 feet NGVD29 and 1V:10H above + 9 feet NGVD29.

The landward end of the groin near Flat Creek coincides with proposed dune and levee. The landward end of the groin near Dock Street is located near the design berm. Between the landward end of the groin and the levee is a revetment section similar to the one protecting the dune/levee transition section.

2.2.3 Flat / East Creek Element of the 2007 Authorized Plan

The Flat / East Creek element of the 2007 Authorized Plan includes 4,442 feet of earthen levee, and 1,929 feet of T-type floodwall – each with a top elevation of + 15 feet NGVD29. Also included in this element are a 250 cfs pump station, a 100 cfs pump station, a sector gate crossing East Creek, a sector gate crossing Flat Creek, three sluice gates that cross an East Creek tributary, and an interior levee with a length of 3,888 feet and top elevation of + 8 feet NGVD29.

The Flat / East Creeks element begins at the southeastern limit of the Shorefront element and ties into the existing Keansburg levee at the eastern end of the project limits. Figure 8 provides an overview.

Figure 8.
Flat / East Creek Element Overview

The alignment begins at the eastern end of the Shorefront element, approximately 550 feet northwest of the intersection of Union Avenue and Brook Avenue, as a levee running parallel to Flat Creek along the left descending bank for approximately 278 feet. The levee has a 10-foot top width and side slopes at 1V:2.5H. At the design elevation of + 15 feet NGVD29 the levee ranges between five and 11 feet above existing grade through this section. A 35-foot long sector gate crosses Flat creek, approximately 150 feet downstream from the Union Avenue Bridge. A 250 cfs pump station will be located near the gate. The alignment continues along the east bank of Flat Creek as a levee for approximately 790 feet along the rear of the residential homes which front Brook Avenue. Riprap slope protection is provided for this section of levee to protect against wave action. The nine-foot high levee runs nearly parallel to Brook Avenue to a T-type floodwall, on pile foundations, about 350 feet northeast from the intersection of Brook Avenue and Shore Road.

The T-type floodwall continues southerly at a height of nine feet above existing grade for approximately 1,015 feet along the wetlands limits until it terminates 250 feet northwest from the intersection of Bayview Avenue and Beachview Avenue. From this point, a levee, averaging nine feet in height above existing grade, continues for approximately 540 feet easterly along the wetlands of East Creek parallel to Bayview Avenue.

Figure 9.
Flat / East Creek Element (1 of 2)

The levee abuts a T-type floodwall at nine feet above existing grade, on pile foundations, near the easterly end of Bayview Avenue, which continues along the edge of the wetlands for approximately 916 feet. The alignment continues east as a levee, ranging in height from three to ten feet above existing grade, for approximately 2,920 feet along the Monmouth County Henry Hudson Trail. A 35-foot long sector gate will cross East Creek, with a 100 cfs pump station located near the gate. Three 6 feet x 6 feet storm type sluice gates cross the East Creek tributary. The entrance to the International Foods and Flavors plant will be raised where the levee intersects the driveway.

The levee will tie into the high ground where the existing Keansburg levee intersects the Henry Hudson Trail at elevation + 15 NGVD29.

Figure 10.
Flat / East Creek Element (2 of 2)

A small supplemental interior levee will protect the low lying homes within the area between East Creek and East Creek Tributary while allowing flooding of the adjacent wetlands for the full range of non-storm tidal conditions. The interior levee has a top width of 2 feet and side slopes at 1V:2H. At the design elevation of + 8 feet NGVD29, the average levee height will be 2 feet above existing grade. The interior levee begins at the west end of Isabella Avenue and continues north along the edge of the wetlands for approximately 1,670 feet. The intersection of Harris Avenue and Jersey Avenue will be raised where the levee intersects Harris Avenue. The levee continues east and south along the edge of the wetlands for approximately 1,715 feet where it ties into the existing high ground, elevation + 8 feet NGVD29, approximately 130 feet north of the Willow Street and Wesley Avenue intersection.

3 REEVALUATION OF PROJECT DESIGN AND PERFORMANCE

The 2007 Authorized Plan alignment and project components were reevaluated to identify current policy compliance deficiencies, opportunities for design refinement, and changes to existing conditions. In addition, the HSLRR evaluated the 2007 Authorized Plan's design performance in managing coastal storm risk after the incorporation of new bay storm stage/frequency analyses, and post-Katrina levee/floodwall overtopping and failure analyses.

3.1 Policy Compliance

The following policy compliance issues were identified:

- Compliance with the Coastal Barrier Resources Act would require refinements to the alignment;
- Compliance with EC 1110-2-6066, Design of I-Walls (April 2011), would require the replacement of I-type floodwalls with T-type floodwalls; and
- Compliance with ETL 1110-2-571, USACE Vegetation Management Policy (April 2009) would require the acquisition of additional real estate easements.

3.1.1 Compliance with the Coastal Barrier Resources Act

The New York District consulted with the U.S. Fish and Wildlife Service (USFWS) to determine which parts of the 2007 Authorized Plan alignment infringed upon the Coastal Barrier Resources System (CBRS) boundary.[7] Four areas of infringement were identified within the Chingarora Creek element of the alignment, and are circled in yellow on Figure 11 and summarized below:

- Area 1 includes a levee and associated sluice gates along a major tributary to Chingarora Creek that intersect an extensive area of the CBRS. A substantial alignment shift in this area would be required in order to comply with the CBRA;
- Area 2 includes levee footprint infringements running adjacent to the CBRS boundary approaching the Monmouth County Bayshore Outfall Authority. A slight alignment shift away from the CBRS and conversion from levee to floodwall would be required to comply with the CBRA and maintain the overall line of protection.
- Area 3 includes a levee portion that intersects the CBRS to the southeast of the Bayshore Regional Sewage Authority. An alignment shift to the south would be required in order to comply with the CBRA in this area; and
- Area 4 includes a levee portion that intersects the CBRS to the west of the shorefront element. An alignment shift to the east would be required in order to comply with the CBRA in this area.

[7] CBRS is the mapping system used by the USFWS to define lands within the Coastal Barrier Resources Act boundaries.

Figure 11.
Alignment Infringement on CBRS Boundary

3.1.2 Compliance with Floodwall Design Policy

Floodwalls included in the 2007 Authorized Plan are I-Walls, T-Walls on spread footings and T-Walls on piles. While T-Walls were used in the design, the majority of the floodwalls were designed as I-Walls, a slender cantilever wall embedded into the base soil and stabilized by reactive lateral earth pressure.

Due to concerns on performance of I-Walls in major storm events in coastal regions, EC 1110-2-6066 "Design of I-Walls" was issued on 1 April 2011 by consolidating the findings and lessons learned from studies performed after Hurricane Katrina and other major coastal storms.

EC 1110-2-6066 paragraph 2-2e (9) states:

> *"While overtopping of the I-walls led to significant scour and damage in many cases, overtopping of T-walls did not lead to extensive scour and erosion, because the base of the inverted T-wall sections extended over the protected side. T-walls performed well during Katrina. Because of their pile foundations, they are better able to transfer high lateral water loads into stronger underlying foundation materials."*

Since the EC has expired, and a replacement has not been completed, Engineering Construction Bulletin (ECB) No. 2014-18 has been issued to provide the following interim guidance:

> *For the design of I-walls, use EC 1110-2-6066. For the evaluation of I-walls, use ETL 1110-2-575. For the design of cantilever and single anchored earth retaining sheet pile walls, use EM 1110-2-2504.*

Based on these criteria changes, it was necessary to reevaluate the 2007 Authorized Plan floodwall design I-Walls. Of the total 6,885 feet of floodwall included in the 2007 Authorized Plan, nearly 85 percent is greater than six (6) feet in height above existing grade. In addition, erosion control along the I-Wall also was a major concern during the HSLRR review. Significant changes on the protected side of I-Walls would be required to prevent loss of material due to overtopping. The cost to construct erosion control along the unprotected side of I-Walls and overtopping protection on the landside was determined to be less cost effective than a T-Wall system. Additionally, the T-Wall provides a more stable floodwall system and has better performance noting that erosion is a significant concern for any coastal storm risk management project.

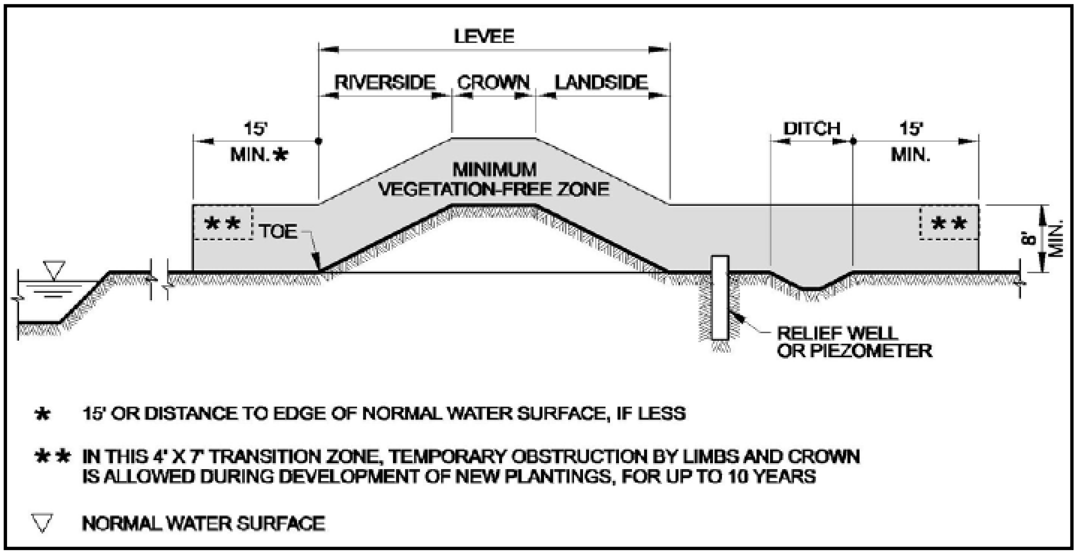
After consideration of new criteria and limited foundation information, the decision was made to replace all floodwall (both I-Wall and T-Wall on spread footings) with T-wall on piles for the HSLRR Recommended Plan.

3.1.3 Compliance with Vegetation Management Policy

Project easements were reviewed for compliance with respect to the USACE's vegetation management policy, ETL 1110-2-571, 10 April 2009, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*. The current vegetation management guidelines were not in place when the September 2003 Feasibility Report was completed. The new guidance requires a vegetation free zone 15 feet from levee toes, drains, or structural features and 15 feet from the faces of floodwalls and a minimum of eight feet beyond the footing.

This revised easement allows for operation and maintenance, surveillance, and access during high-water events. Vegetation has potential to impact the operations and degrade the performance of the system, including compromising the integrity of foundation if potential seepage paths are created by root penetration and/or root decay. Additionally, significant levee damage and creation of points of concentrated seepage discharge can be created by the uprooting of large trees during a flood event. The root-free zone provides a margin of safety between the greatest expected extent of plant roots critical to the performance and reliability of the flood damage risk reduction system. The typical configuration for a levee, as set forth under USACE's vegetation management policy, is shown in Figure 12.

Figure 12.
Typical Vegetation-Free Zone Configuration at Levee



For T-Walls, the vegetation-free zone extends horizontally 15-feet from the face of the wall and 8-feet minimum from the footing. Just as in the case with the levee sections, the vertical extent of the vegetation-free zone is a minimum of 8-feet. After review of the 2007 Authorized Plan's compliance with vegetation management policy adopted since 2003, real estate requirements were revised as part of the HSLRR.

3.2 Design Refinements

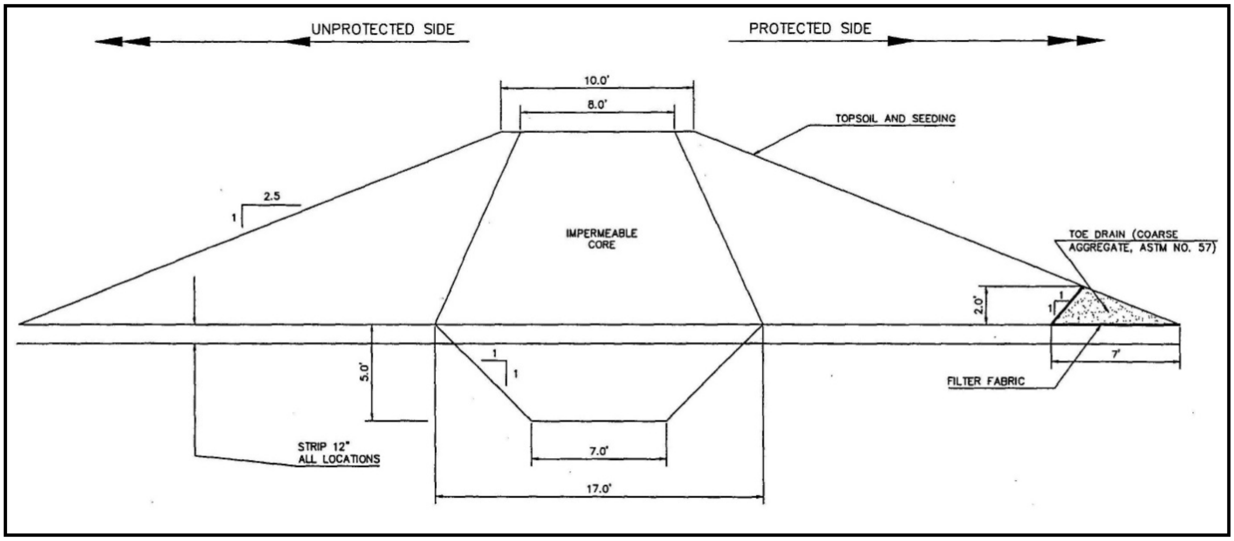
The following design refinements were identified:

- Levee embankment design may not provide adequate protection against seepage; and
- Several ninety-degree bends in alignment may result in constructability problems and erosion at floodwall and levee junctures.

3.2.1 Embankment Design

Levee design was conducted in accordance with EM 1110-2-1913 Design and Construction of Levees. The 1978 edition was utilized by the New York District for the preliminary design conducted as part of the September 2003 Feasibility Report. During that study it was determined that a single levee embankment section could be utilized to represent the subsurface conditions for both the east and west alignments. The levee section from the 2007 Authorized Plan is shown in Figure 13.

Figure 13.
2007 Authorized Plan Levee Section



Two selected representative levee cross sections were utilized for the preliminary design, one at Sta. 63+64 and the other at Sta. 51+50. Previously completed coastal storm risk management feasibility studies for nearby sites, (i.e., Port Monmouth, New Jersey) with similar geologic and hydraulic conditions were used to select initial side slopes and embankment material components, which were applied in stability and seepage analyses of the proposed levees. Conditions that controlled the design along with the results of all analyses supported the recommended slopes and material components.

The 2007 Authorized Plan levee was designed with a crest width of 10 feet and 1V:2.5H side slopes with levee heights varying from 4.5 to 12.5 feet above existing grade to support the design flood elevation of + 15 feet NGVD29. The design in the September 2003 Feasibility Report and FEIS recommended using commercially available embankment materials from known suppliers. The 2007 Authorized Plan included a toe drain that theoretically would meet the standards determined in the seepage analyses; however, the 2007 Authorized Plan did not include any penetration of the toe drain into the foundation which by current state of the practice is recommended. In addition, no overtopping protection was provided. To address these current design issues, the HSLRR includes an updated levee design.

3.2.2 Bends in the Alignment

Upon review of aerial photography and following site visits, there was concern regarding the number of floodwall bends that occur close to transitions from wall to levee embankment. These bends could result in wave diffraction and increase turbulence and cause erosion. Refinements to the alignment to soften wall angles and minimize transitions to levee adjacent to wall bends along with the need for limited slope protection will be investigated in PED.

3.3 Changes to Existing Conditions

Since being evaluated in 2003, the following changes to areas within the 2007 Authorized Plan footprint were identified:

- Residential development has occurred within the alignment easements;
- Bayshore Regional Sewage Treatment Authority has constructed a storage/treatment tank within the levee footprint; and
- Erosion of the banks of East Creek may have occurred.

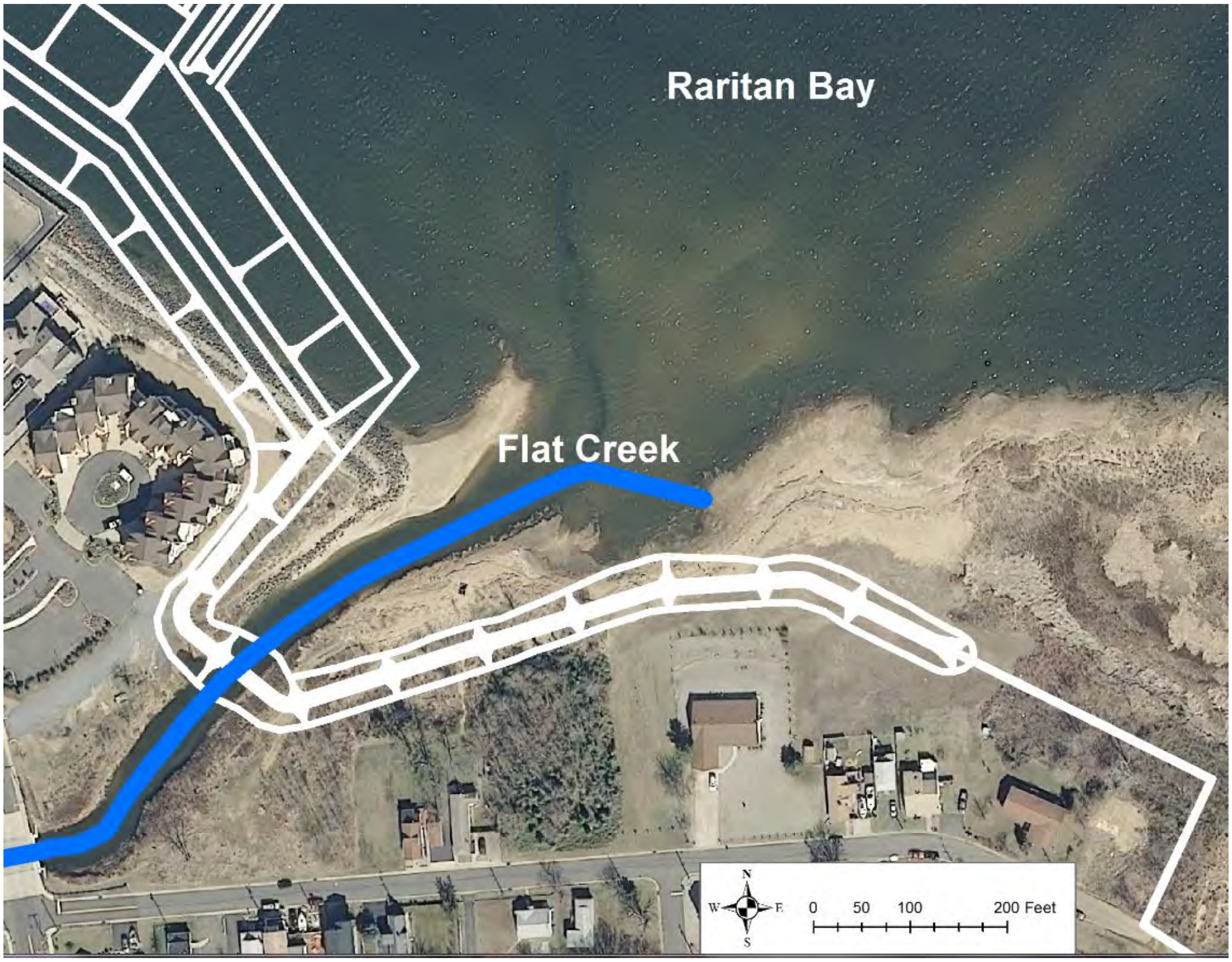
3.3.1 Property Development and Easements

Since completion of the September 2003 FEIS, a condominium development adjacent to Flat Creek, a storage/treatment tank at the Bayshore Regional Sewage Treatment Authority plant, swimming pools, fences, outbuildings and other structures have been constructed along the alignment or within the required easements.

The primary impact of a new condominium development constructed at the east end of the beach near Flat Creek (Figure 14) is the encroachment of required easement. The structure is located approximately 25 feet from the levee centerline. Since the levee height is almost nine (9) feet above existing grade in this location, the levee toe would be at the doorstep of the easternmost condominiums. As currently designed, the project would impact property owners due to the obstruction of their existing views of the waterfront and reduced open space.

No attempt was made to avoid any encroachments on the alignment easements as part of the HSLRR, and the additional costs of any necessary alignment shifts were not calculated. Alignment refinements to address these identified easement issues issue are to be fully analyzed as part of the PED phase.

Figure 14.
New Condominium Development Adjacent to Flat Creek



In other areas along the 2007 Authorized Plan alignment or within the updated easements (not pictured above) several swimming pools, fences, and outbuildings have been constructed since the 2003 FEIS. Many of these structures may be avoided during PED with minor adjustments to the alignment. A number of movable structures may be also be relocated as part of the real estate requirements. For the HSLRR and supplemental EA, no attempt was made to avoid these features and the added costs of real estate acquisition are included in the cost estimate.

3.3.2 Erosion of Streambank

Portions of the 2007 Authorized Plan T-Wall were aligned immediately along the top of the bank of East Creek. Cross sections of the floodwall reach from Sta 39+50 to Sta 43+50, indicate that a portion of the unprotected side of the wall footing is in the creek. Since current cross sections of the creek were not conducted as part of the HSLRR, there is concern that the footing depth may need to be greater than planned, and will result in taller stem and redesign. Adjustments to the alignment may be possible for limited reaches but the impact to residential properties is a concern. This will be further investigated in PED once updated surveys have been conducted.

3.4 Lessons Learned and Best Management Practices

The following opportunities to apply lessons learned from constructed projects and updated best management practices for closure structures and pump stations were identified:

- Broadway road closure structure;
- Flat Creek and East Creek closure structures; and
- Chingarora Creek pump station.

3.4.1 Broadway Closure Structure

The roadway at Broadway is about 35 feet wide, with a 4-foot sidewalk. A gate is necessary at this location since the roadway could not be elevated to the design height while maintaining traffic design speeds. The 2007 Authorized Plan specified a miter-type gate with a 40-foot wide opening for a total length of 50 feet and approximately 7 feet above existing grade. The support structure would be set back from the roadway five feet on either side, which would reduce the potential for impact by vehicles and provide space for pedestrian passage.

During reevaluation, alternatives to the miter gate at Broadway were considered. Miter gates require an extensive pile foundation due to the swinging of the gate through a minimum of 90 degrees from open to closed position. Review of the September 2003 Feasibility Report revealed that the miter gate cost was based on a width of 40 feet, not the 50 feet specified in the 2007 Authorized Plan. In addition, the miter gate cost provided in the September 2003 Feasibility Report appeared low when compared to miter gates constructed within the past 12 years as part of the Baltimore District Civil Works Program (e.g., Lackawanna River Project).

3.4.2 Flat Creek and East Creek Closure Structures

The September 2003 Feasibility Report stated that the selection of sector gates for the closures on Flat and East Creeks was primarily based on the fact that sector gates can operate in areas with channel sedimentation more reliably than sluice gates.

The sector gates, referred to as "storm gates" within the 2007 Authorized Plan, were sized using a UNET model to maintain tidal interchange of the wetland areas behind the alignment. Each sector gate facility was proposed to be 35-feet wide to allow normal tidal flushing. For Flat Creek, the existing bridge over Union Avenue/Front Street is 25 feet wide and restricts the flow more than the 2007 Authorized Plan's 35-foot wide downstream sector gate. For East Creek, a 35-foot wide sector gate was specified just downstream of the existing Henry Hudson Trail bridge. Since the existing Jersey Avenue Bridge over East Creek is only 15 feet wide, this upstream bridge constricts the existing tidal flows. The downstream bridge for the Henry Hudson Trail is 34 feet wide. The specified height of the 2007 Authorized Plan sector gates is + 15 NGVD29. This alternative would require two sector gates, each about 17' to 18' wide to meet the necessary 35' wide opening.

Based on information from the nearby Keansburg project, the cost to maintain sector gates is extensive. In addition, there is experience that when sector gates are closed during a storm, sediment and debris get trapped in the gate pockets, and require considerable effort before the gates can be reopened. If debris is not cleared, the gears that operate the gates could be damaged.

Construction costs of sector gates also are high relative to other possible options, such as sluice gates. Alternatives to sector gates were evaluated, and design changes have been incorporated into the HSLRR.

3.4.3 Chingarora Creek Pump Station

Results for East Creek are similar to the original elevations presented in the 2003 Feasibility Report. The Flat Creek interior flooding elevations recomputed for the HSLRR are higher than reported in the 2003 Feasibility report, which could be explained by the number of larger storm events that have occurred since the 2003 Feasibility Report was completed.

3.5 Design Changes Incorporated into the HSLRR

After reevaluation of the 2007 Authorized Plan, several changes were recommended and incorporated into the HSLRR Recommended Plan, as summarized below:

1. Alignment shift to avoid the CBRS boundary;
2. Floodwall design change – all T-Wall on piles;
3. Easements adjusted to comply with USACE vegetation management policy;
4. Levee embankment design change to address seepage risks;
5. Broadway closure structure design modification; and
6. Flat and East Creek gates design modification.

3.5.1 Alignment Shift to Avoid CBRS Boundary

The HSLRR incorporates changes in the 2007 Authorized Plan alignment so that the CBRS boundary--as noted in Figure 11 -- can be avoided. The HSLRR Recommended Plan alignment details are shown on Figure 15, and changes from the 2007 Authorized Plan alignment have been developed to avoid the CBRS boundary as summarized below.

- Area 1: The HSLRR Recommended Plan alignment includes 2,975 linear feet of floodwall to replace 731 linear feet of levee and an additional 128 linear feet of floodwall.
- Area 2: The HSLRR Recommended Plan alignment includes about 1,500 linear feet of floodwall to replace a roughly equivalent length of levee from the 2007 Authorized Plan alignment.
- Area 3: The HSLRR Recommended Plan alignment includes 165 linear feet of floodwall and 100 linear feet of levee to replace 287 linear feet of levee from the 2007 Authorized Plan alignment.
- Area 4: The HSLRR Recommended Plan alignment includes 251 linear feet of floodwall to replace 343 linear feet of levee from the 2007 Authorized Plan alignment.

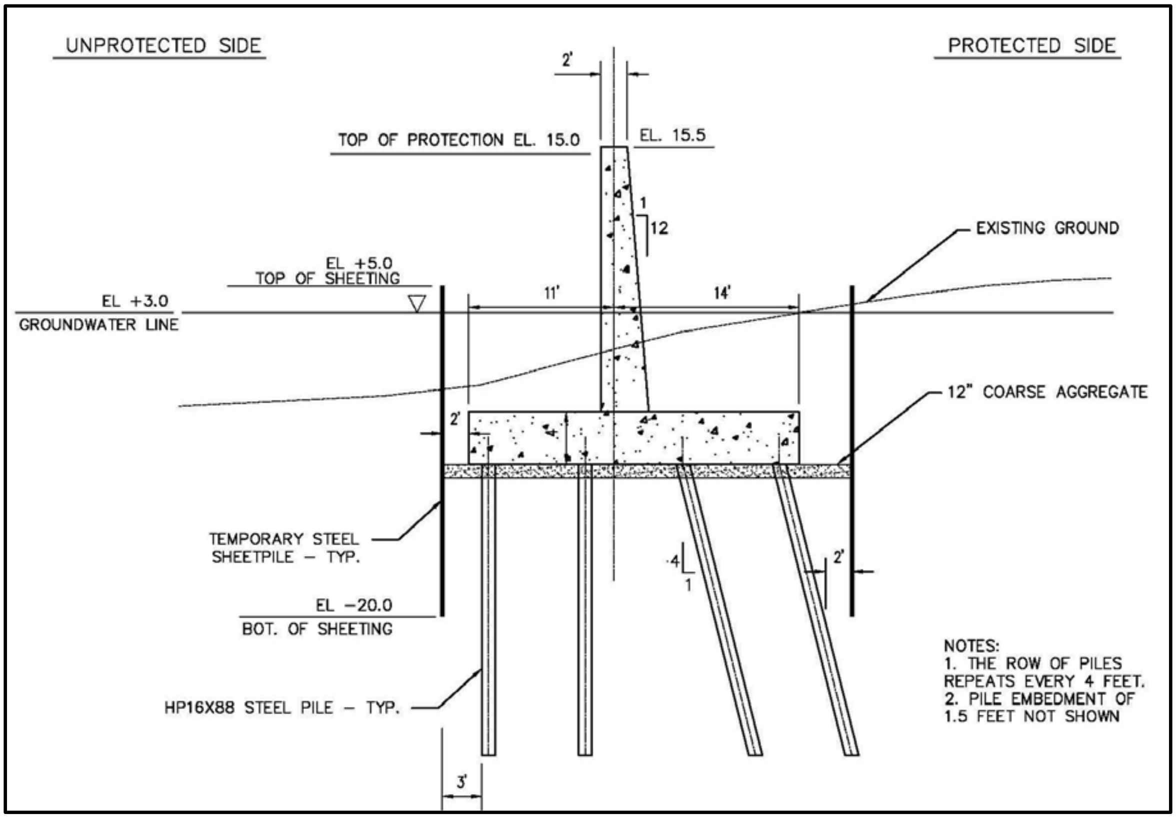
Figure 15.
HSLRR Recommended Plan Changes in Alignment to Avoid CBRS Boundary

3.5.2 Floodwall Design Change – All T-Wall on Piles

The HSLRR requires an update of the 2007 Authorized Plan floodwall design to be in compliance with design criteria specified in EC 1110-2-6066 "Design of I-Walls," issued on 1 April 2011. This design change resulted in the replacement of all I-Wall and T-Wall on spread footings specified in the 2007 Authorized Plan with T-Wall on piles for the HSLRR Recommended Plan. The T-Wall on piles design used for replacement of these features in the HSLRR was based on the design used for 1,929 linear feet of T-Wall on piles along the Flat/East Creek element of the 2007 Authorized Plan.

It was determined that all the walls for the project should be T-Walls on piles as conservative assumptions were made for the wall and pile capacity design because of the limited availability of subsurface investigations. Further analysis of the existing ground elevations revealed that where a 20-foot stem was necessary, a row of four piles repeating every four feet would be required. Where the stem height averages 14 feet, a row of three piles repeating every four feet would be required. These two typical revised wall sections were incorporated into the HSLRR, and the revised plan design for a 20-foot section is shown on Figure 16. The T-Wall design will be further analyzed in PED after additional subsurface explorations are completed.

Figure 16.
HSLRR-Revised Floodwall Section for 20-Foot Stem



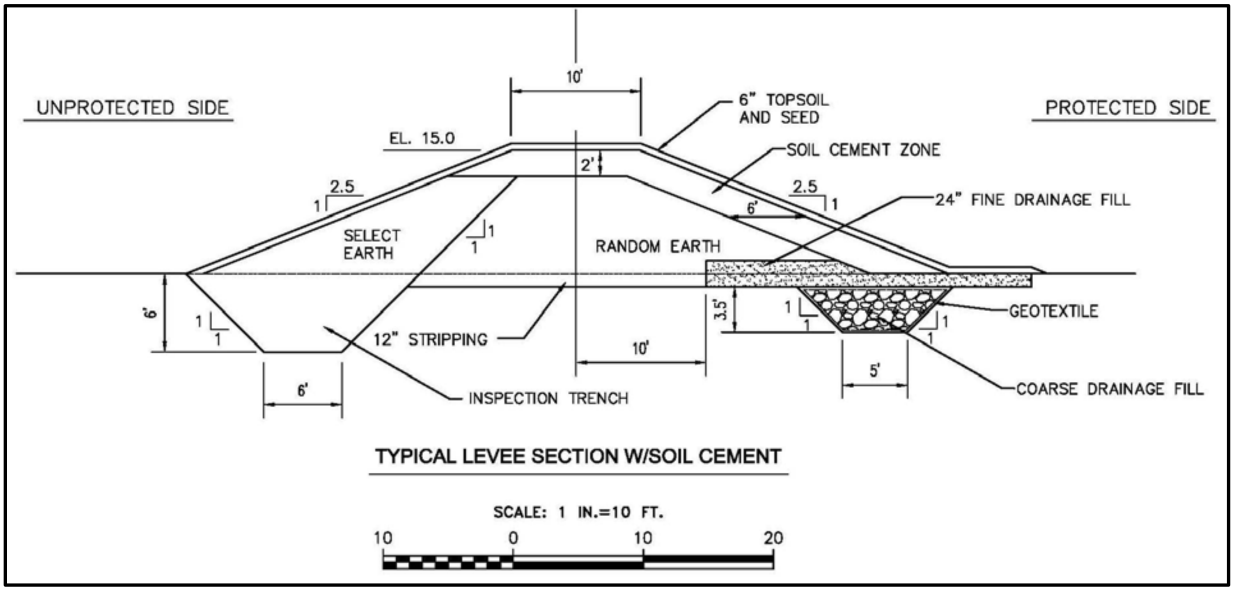
3.5.3 Easements Adjusted to Comply with USACE Vegetation Management Policy

Easements included in the 2007 Authorized Plan do not include temporary easements on the unprotected side of the levees, which are now required to enable construction. Therefore, a temporary easement of 10 feet is now included on the flood side. In addition, since the I-walls are now being replaced with T-Walls, additional perpetual easement to provide 21 feet (8 feet beyond footing) from the wall faces is required because only 10 feet is provided in the 2007 Authorized Plan. In addition, the easements and wetland impacts are based on a conservative T-Wall footing width of 30 feet. Design refinements are expected to result in a T-Wall footing width of 25 feet. Thus, a conservative assumption (i.e., assumed to be a larger area than necessary) was calculated for easements, which has resulted in slightly greater footprint and therefore there are impacts to properties identified during the real estate analysis. The HSLRR Recommended Plan incorporates the additional real estate easements required to comply with current USACE vegetation management policy.

3.5.4 Levee Embankment Design Changes

The HSLRR updated the 2007 Authorized Plan levee section to better address potential seepage risks in accordance with current design practices. Specifically, a blanket drain and a more robust toe drain extending into the foundation were included to assure adequate seepage control. The levee side slopes and footprint of the levee have not been changed. In addition, soil cement was added to the landside slope for overtopping protection. The updated levee cross section is shown in Figure 17. This section was used to update quantities and all associated costs in the HSLRR.

Figure 17.
HSLRR-Revised Levee Section



For the HSLRR Recommended Plan, the embankment would utilize a zone of select earth (impervious) consisting of more impervious material with a plasticity index (PI) greater than 5 and at least 25 percent fines.

The final design will be based on the best utilization of available materials[8] and the materials for the blanket and toe drain will be designed in accordance with New Jersey or AASHTO[9] aggregate standards. The soil cement will be designed during PED based on the materials available. For the main levee, the overall fill quantities increased by about 13-percent, primarily due to the revised toe drain.

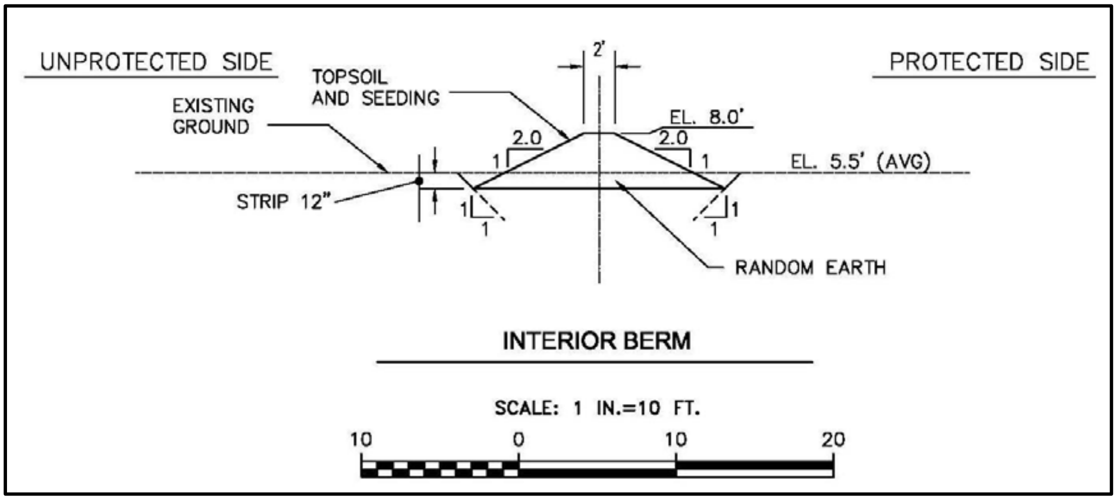
The cross section for the interior berm presented in the 2007 Authorized Plan also held a central core of impervious material and a toe drain with side slopes at 1V:2H. The purpose of this embankment is to prevent spring tides from inundating the low lying area along Harris Avenue. The interior levee geometry was unchanged for the HSLRR. However, the interior levee

[8] Most of the material suppliers listed in the 2003 Feasibility Report appear to be either sand and gravel suppliers or general contractors - no test reports were furnished indicating availability of supplying impervious levee fill. The design based material requirements primarily focused on desired permeability (hydraulic conductivity) parameters.

[9] American Association of State Highway and Transportation Officials

embankment composition was changed to all random earth and the toe drain eliminated. A typical section is shown below in Figure 18.

Figure 18.
HSLRR-Revised Interior Berm



3.5.5 Broadway Closure Structure Design Changes

Based on best management practices for closure structures, the closure structure at Broadway has been determined to be a more operationally effective horizontal roller gate, which would require a more simple foundation and would be closed just as quickly. The roller gate would require only a limited number of piles.

Similar to the miter gate, the roller gate would have a 40-foot wide opening with a total length of 50 feet and be approximately seven feet above existing grade. The support structure will be set back from the roadway five feet on either side, which will reduce the potential for impact by vehicles and provide space for pedestrian passage. The roller gate in Bound Brook, New Jersey, shown in Figure 19, is 58 feet wide and eight feet above existing grade. This type gate would require an abutment wall on one end and a section of floodwall behind where the gate is stored in the open position that would complete protection. A limited pile foundation may be required and the final design will be refined in PED. The design change in the Broadway closure structure from a miter gate to a roller gate was incorporated into the HSLRR Recommended Plan alignment.

Figure 19.
Roller Gate Road Closure Structure - Bound Brook, New Jersey

3.5.6 Flat and East Creek Gates Design Change

Box culverts and sluice gates were determined to be less maintenance intensive and more operationally simple alternatives to the sector gates included in the 2007 Authorized Plan. The sluice gates and box culverts would be sized to provide equivalent tidal exchange and meet any other environmental and recreation requirements. As noted above, Flat Creek is already restricted by the existing Union Avenue/Front Street Bridge to a width of 35 feet. East Creek is restricted by the 15-foot wide Jersey Avenue Bridge.

Additional foundation information from geotechnical investigations will also be utilized to refine the design in the PED phase. The scope of the HSLRR did not provide for a detailed design of this feature, though similar structures were used to develop a conservative cost estimate. A possible configuration of sluice gates with box culverts is shown in Figure 20.

The design change for Flat and East Creek gates from sector gates to sluice gates with box culverts was incorporated into the HSLRR.

Figure 20.
Sluice Gates with Box Culverts Closure

3.5.7 Reevaluation of Project Design Performance

The September 2003 Feasibility Report states (page 161) that the Union Beach levee/floodwall system would provide "*protection against the 100 year (1% annual chance) storm with 92% reliability...*". Economic analyses of the 2007 Authorized Plan documented in the September 2003 Feasibility Report accrued benefits up to the levee/floodwall elevation of + 15 feet NGVD29. The HSLRR incorporates lessons learned from Hurricane Katrina regarding the susceptibility of levees and floodwalls when still water elevations allow waves to interact with the levee/floodwall system.

The Union Beach levee/floodwall system is subject to wave action during more severe events on the northeast and west-facing alignments. When the still-water elevation is significantly lower than the top of the levee/floodwall system at + 15 feet NGVD29, small waves may break on the levee/floodwall system, but the freeboard (defined as the vertical distance between the top of the levee/floodwall system and flood waters) prevents waves from overtopping the system. When the still-water elevation approaches + 15 feet NGVD29 – yet still below this elevation – less freeboard exists, and waves impacting the levee/floodwall system are more likely to result in overtopping.

As part of the HSLRR (based on December 2012 stage frequency curves), five overtopping models were used to develop the mean overtopping flowrates for the different return intervals, and overtopping calculations were performed for stage elevations both with and without 0.7 feet of sea level rise over the period of analysis. Using post-Katrina levee studies, and assuming soil cement reinforcing on the landward slopes of the levees, the non-failure point of the Union Beach levee/floodwall system would be + 13.1 feet NGVD29 and the failure point of the system would be + 13.6 feet NGVD29.

At the beginning of the period of analysis in 2019, the non-failure-point elevation of + 13.1 feet NGVD29 corresponds to an event with a 94-year exceedance interval, and the failure-point elevation of + 13.6 feet NVGD29 corresponds to an event with a 123-year exceedance interval.

At the end of the period of analysis in 2069, when 0.7 feet of sea level rise is assumed to have occurred, the non-failure-point elevation of + 13.1 feet NGVD29 corresponds to an event with a 67-year exceedance interval, and the failure-point elevation of 13.6 feet NVGD29 corresponds to an event with an 87-year exceedance interval.

3.6 HSLRR Alignment and Design Changes to 2007 Authorized Plan

The majority of the HSLRR Recommended Plan actions include substantially unchanged portions of the original 2007 Authorized Plan. The entire shorefront element (including groins, revetments, and renourishments), interior floodwall, interior drainage, road raising, stream closure gates and pumping stations, and use of the Sea Bright Borrow Area remains unchanged from the 2007 Authorized Plan. The primary differences between the 2007 Authorized Plan and the HSLRR Recommended Plan involve floodwall and levee alignment changes for the Chingarora Creek element.

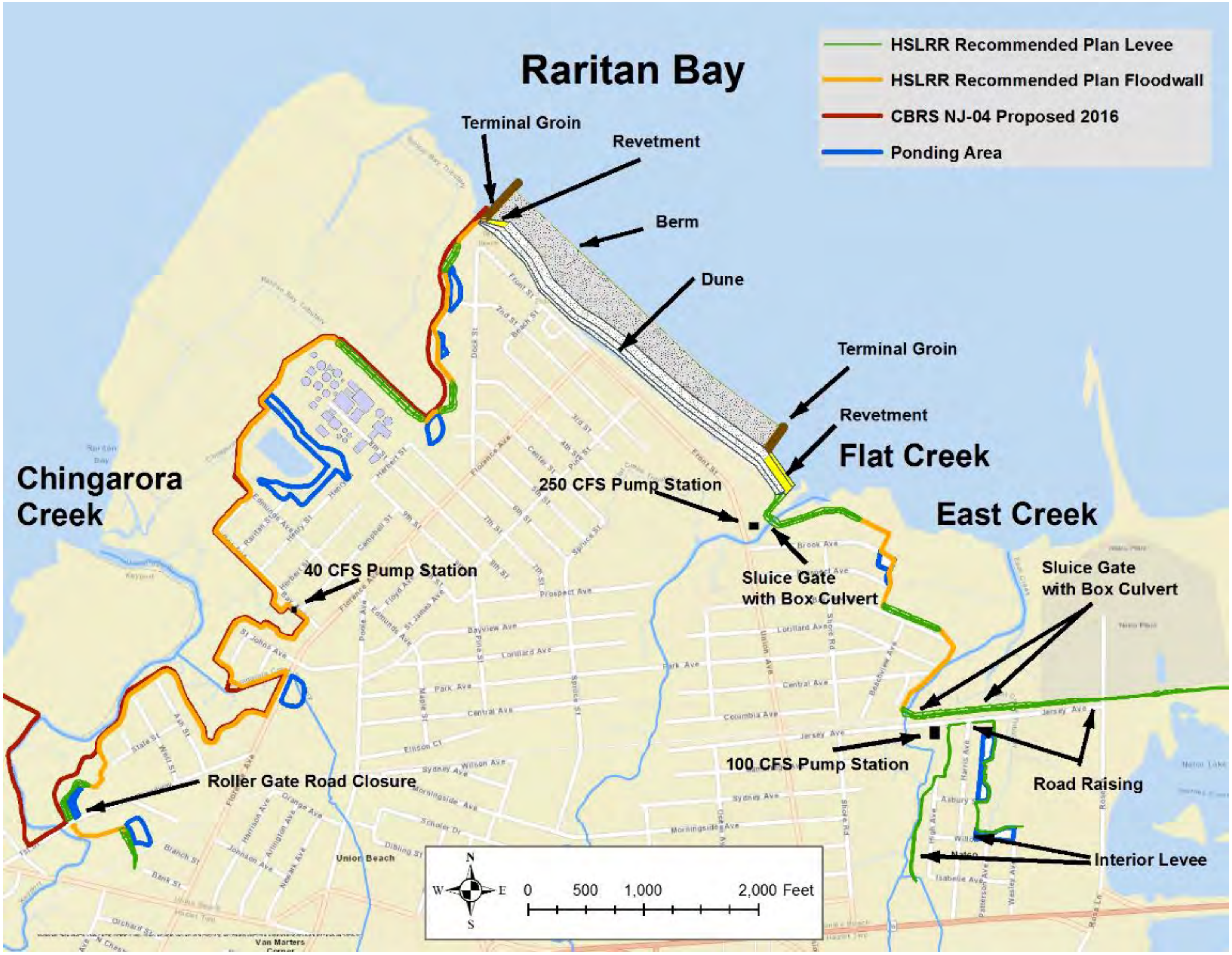
A general overview of the HSLRR Recommended Plan is shown on Figure 21. It is important to note that the HSLRR Recommended Plan alignment is unchanged from the 2007 Authorized Plan for all areas east of the termination of the Chingarora Creek floodwall at the northwestern terminal groin.

The Chingarora Creek element of the HSLRR Recommended Plan alignment includes 10,977 linear feet of floodwall and 2,243 linear feet of levee – each with a top elevation of + 15 feet NGVD29. Also included in this element are a 40 cfs pump station, a road closure gate, and three sluice gates that cross a Chingarora Creek tributary. Like the 2007 Authorized Plan alignment, the HSLRR Recommended Plan alignment begins at high ground (+ 15 feet NGVD29) near the intersection of Florence Avenue and Bank Street and ends at the northwestern end of the shorefront element. Figures 22, 23, and 24 provide an overview. Please note that the geographic coverage of Figures 22, 23, and 24 correspond to the geographic coverage limits of Figures 4, 5, and 6 shown previously for the Chingarora Creek Element of the 2007 Authorized Plan.

Figure 22 shows the HSLRR Recommended Plan alignment beginning as an earthen levee approximately 500 feet southwest of the intersection of Florence Avenue and Bank Street (identical to the 2007 Authorized Plan alignment). The levee has a 10-foot top width and side slopes at 1V:2.5H. At the design elevation of + 15 feet NGVD29, the levee ranges between five and 11 feet above existing grade through this section. The levee alignment crosses over the Monmouth County Parks Henry Hudson Trail and continues approximately 370 feet northwest. Access to the Henry Hudson Trail will be maintained with a paved transition to the trail over the levee.

At this point (identical to the 2007 Authorized Plan alignment), the HSLRR Recommended Plan alignment continues as a T-type floodwall, on a spread footing with an average height of approximately 10 feet above existing grade.

Figure 21. HSLRR Recommended Plan Overview



After 488 feet, the HSLRR Recommended Plan alignment diverges from the path of the 2007 Authorized Plan alignment (which transitioned to a levee at this point), and continues as a T-type floodwall in a southerly direction toward Broadway, while maintaining its position outside of the CBRS boundary. The floodwall remains outside of the CBRS boundary, progressing in a northeasterly direction toward Florence Avenue. When the floodwall reaches the western edge of Florence Avenue, it continues its path adjacent to Florence Avenue and outside of the CBRS boundary. After the floodwall crosses the tributary to Chingarora Creek, it takes a sharp turn to the southwest, staying outside of the CBRS boundary and maintaining the alignment behind residential property located on Campbell and State Streets.

Figure 22. HSLRR Recommended Plan Chingarora Creek Element (1 of 3)

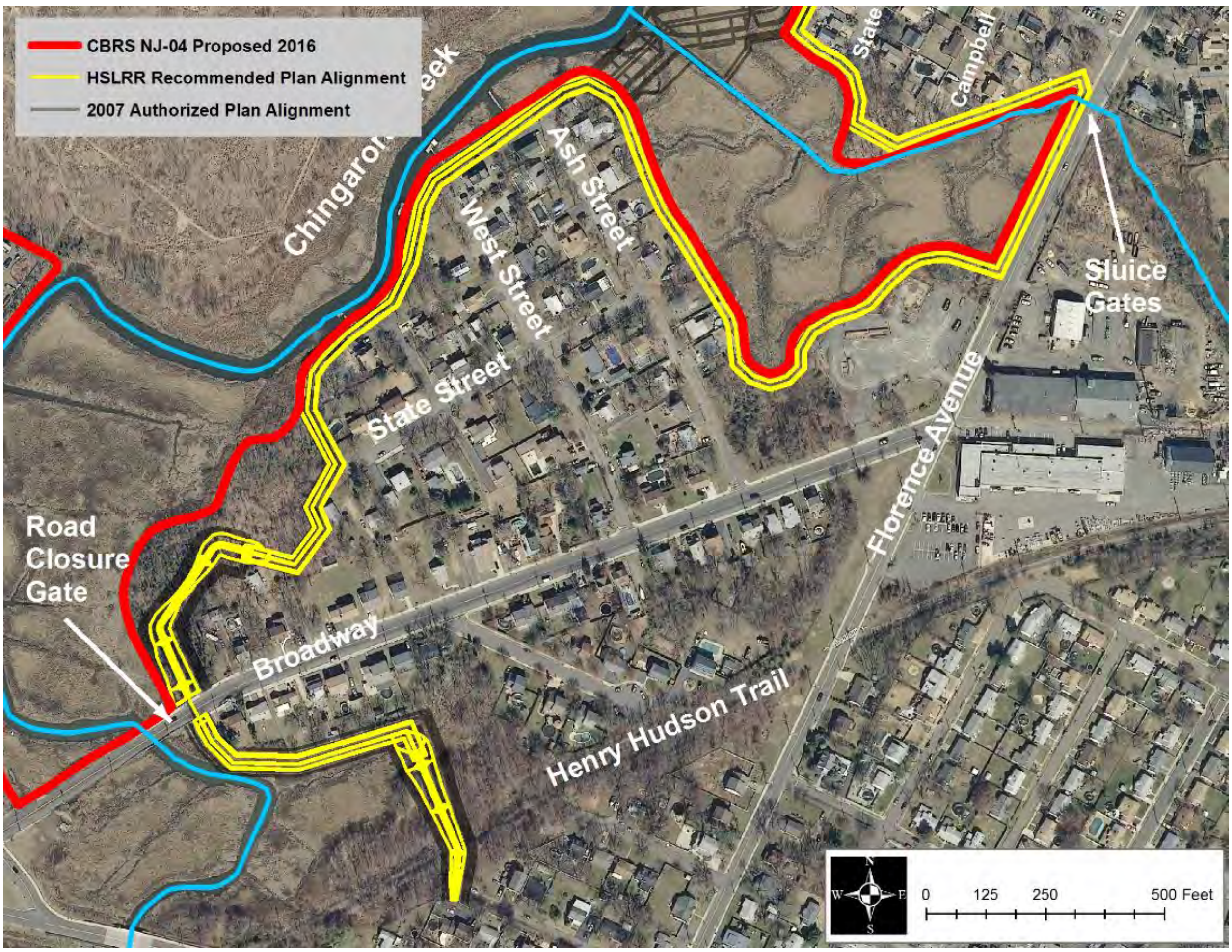


Figure 23 shows the HSLRR Recommended Plan alignment continuing as a floodwall outside of the CBRS boundary as it approaches St. John's Avenue, then takes a southeasterly direction toward Florence Avenue. As the floodwall makes this southeasterly turn, it continues on the general path of the 2007 Authorized Plan alignment and then takes a northeasterly turn parallel to Florence Avenue. When the T-type floodwall reaches Bay Avenue, it continues along the southwestern edge of Bay Avenue, and skirts around one residential property located on the western side of Bay

Avenue (still following the general path of the 2007 Authorized Plan alignment, though as a floodwall). The HSLRR Recommended Plan alignment continues northwesterly along Bay Avenue as a T-type floodwall in order to stay outside of the CBRS boundary.

When the floodwall reaches the northwestern edge of Chingarora Street, it turns to the northeast, and continues toward Edmunds Avenue. Upon reaching Edmunds Avenue, the HSLRR Recommended Plan alignment makes a 90-degree turn to begin its path around the Monmouth County Bayshore Outfall Authority.

Figure 23.
HSLRR Recommended Plan Chingarora Creek Element (2 of 3)

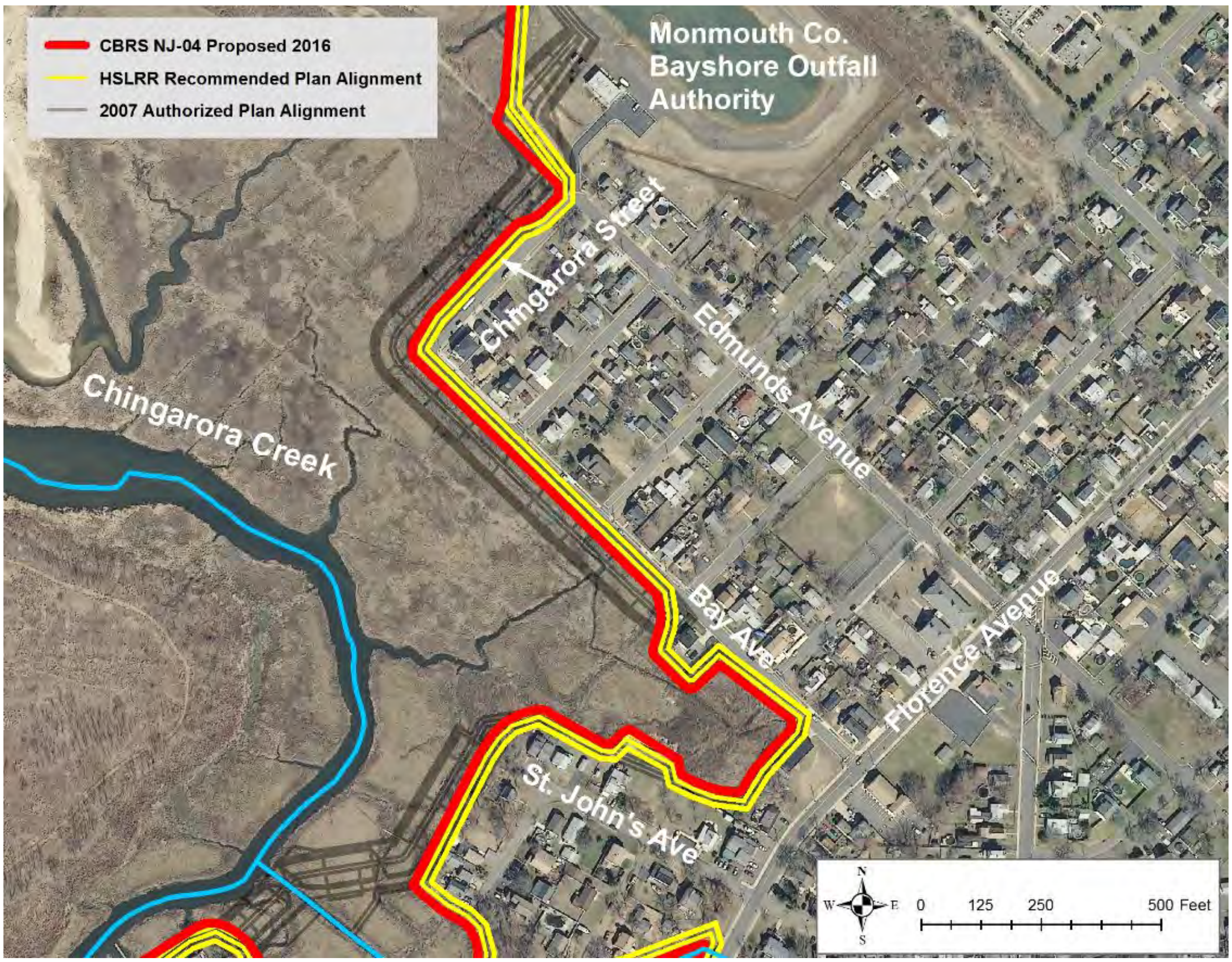
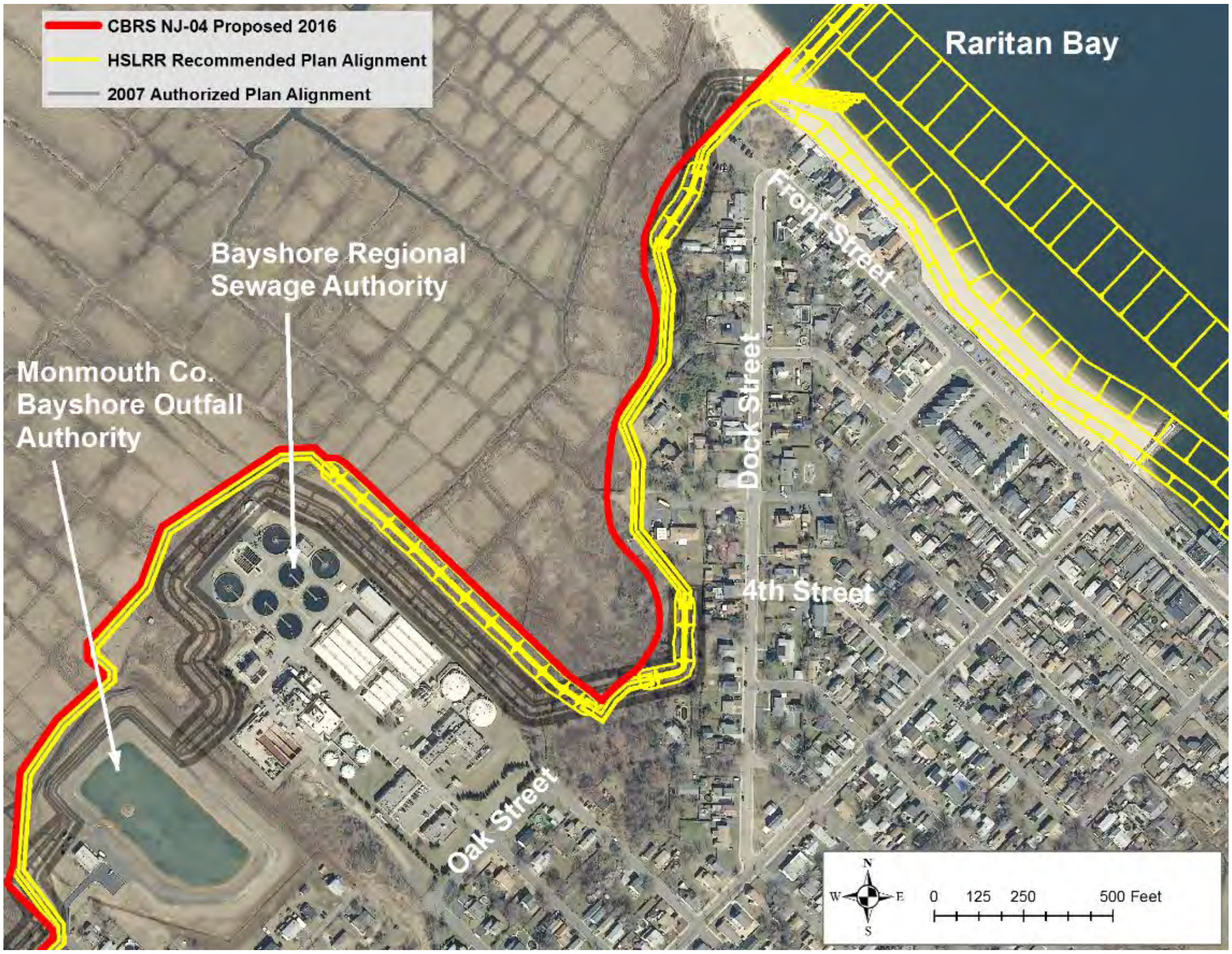


Figure 24 shows the HSLRR Recommended Plan alignment continuing outside of the CBRS boundary as a floodwall until the alignment approaches the northwestern edge of the Bayshore Regional Sewage Authority. At this point, the HSLRR Recommended Plan alignment transitions to a levee and continues in a southeasterly direction until it approaches Oak Street. The levee then transitions to a T-type floodwall for about 230 feet in order to stay outside of the CBRS boundary.

The T-type floodwall continues to the east, and then again transitions to a levee for roughly 350 feet. The alignment transitions back to a T-type floodwall in order to remain outside of the CBRS boundary, and continues in a northerly direction for about 1,050 feet toward Front Street.

The floodwall transitions to a levee 300 feet to the southeast of Front Street, and continues as a levee in a northerly direction for 275 feet. The HSLRR Recommended Plan alignment makes a final transition to floodwall in order to stay outside of the CBRS boundary until it reaches the Shorefront Element.

Figure 24.
HSLRR Recommended Plan Chingarora Creek Element (3 of 3)



3.7 HSLRR Comparison to 2007 Authorized Plan Real Estate Estimate

All lands, easements, rights of way, relocations and disposal (LERRDs) required for the Project will be acquired prior to construction, with the LERRDs required for each phase of construction to be secured first by the non-federal sponsor.

The September 2003 Real Estate Plan (USACE, 2003) required approximately 91.03 acres of land to construct the 2007 Authorized Plan. However, the HSLRR Recommended Plan revision to the alignment would require an adjustment (increase) to the project's footprint. Furthermore, adverse impacts to private property based on the HSLRR Recommended Plan design would result in the acquisition of additional real estate. As a result, the Project's real estate requirements would increase from 91.03 acres (2007 Authorized Plan) to 107.93 acres (HSLRR Recommended Plan). Table 1 shows a comparison of the difference between the real estate requirements identified in the September 2003 Real Estate Plan and the estimate for this HSLRR.

Table 1.
Comparison of 2003 Feasibility Report and HSLRR Acreage Requirements

	2003 Feasibility Report	**2016 HSLRR**
Temporary Work Area Easements	3.25 acres	15.25 acres
Permanent (Perpetual) Easements[10]	69.80 acres	63.01 acres
In Fee Simple	17.98 acres	29.67 acres
TOTAL	**91.03 acres**	107.93 acres
Private Owners	98	119
Public Owners	3	2
TOTAL	**101**	121

The major differences between the two estimates shown in Table 1 are found in Temporary Work Area Easements and in Acquisition in Fee Simple. Also, as can be seen in the table, there are minor differences in Permanent Easement acreages between the two estimates. Minor differences between the two estimates can be attributed to differences in methods employed in deriving the estimates.

3.7.1 Temporary Work Area Easements

Temporary Work Area Easement acreage calculated for this HSLRR exceeds the acreage reported in the September 2003 Real Estate Plan by 12 acres. This difference is due to the inclusion of several large consolidated staging areas under the current estimate that do not appear to have been included in the September 2003 Real Estate Plan.

[10] In the 2003 FS/FEIS, acres required for environmental mitigation were classified as a conservation easement, and included under the category of permanent (perpetual) easements. The current real estate plan includes wetlands mitigation acreage under the category of in fee simple. For the purposes of comparison consistency, acreage for the 2003 conservation easement has been re-categorized as in fee simple.

3.7.2 Wetlands Mitigation

Mitigation requirements outlined in the September 2003 FR/FEIS and documented in the 2007 Authorized Plan's Record of Decision (USACE, 2008) included the conversion of approximately 17.5 acres of giant reed (*Phragmites australis*) dominated inter-tidal wetlands to inter-tidal wetlands dominated by salt marsh cord grass. The recommended mitigation plan also involved monitoring benthos recovery and re-colonization and adaptive management to monitor the success of the mitigation (USACE, 2003). The 17.5 acres resulted from converting:

- 12 acres of phragmites-dominated wetlands in the Flat Creek area to 10 acres of salt marsh,
- 2.5 acres of upland phragmites-dominated habitat would be converted to wetland herbaceous/scrub-shrub habitat in the Flat Creek area, and
- 3 acres of wetland-dominated phragmites would be converted to wetland scrub-shrub habitat in the East Creek area.

The final Union Beach, New Jersey Final Feasibility Report/Final Environmental Impact Statement was completed/approved in Sept 2003 and with the Record of Decision signed in July 2008. The recommended plan included a 17. 5 acre mitigation plan that would convert 12.0 acres of wetland Phragmites in the Flat Creek area to 10.0 acres of salt marsh and 2 acres of wetland scrub-shrub habitat. Also in the Flat Creek area, 2.5 acres of upland Phragmites would be converted to wetland herbaceous/scrub shrub habitat. For the East Creek area, 3.0 acres of wetland dominated by Phragmites would be converted to wetland scrub-shrub habitat. The Selected Mitigation Plan was based on using functional assessment methodology (EPW and HEP), calculating Total EPW FCUs and HEP HUs impacted - 25.42 and 11.84, respectively.

The analysis as part of the preparation of the Draft HSLRR and EA, noted that minor design changes and compliance with 2009 USACE Vegetation Management Policy resulted in an increase of the areal extent of wetlands affected by the HSLRR Recommended Plan. Due to the conceptual level estimate associated with the change in aerial impact, and due to the limited scope given as part of the HSLRR, a new functional assessment was not undertaken. It was noted in the HSLRR/EA, that during PED (when there is more detailed data available), the functional assessment analysis will be updated to confirm if additional acreage may be required. If so, the Selected Mitigation Plan will be revised. However, due to the lower quality of the habitat to be impacted, it is not anticipated that there will be measurable increase in mitigation acreage needed.

3.7.3 In Fee Simple Acquisitions

To construct the current HSLRR project, approximately 29.67 acres would be required in fee simple consisting of 30 parcels (24 privately-owned and 6 publicly-owned). Of the total 29.67 acres:

- 22.0 acres would be required for wetlands mitigation;
- 0.55 acres would be required to accommodate free standing pump stations; and

- 7.12 acres would be required for the alignment right of way and ponding areas.

In-Fee Simple Acquisition acreage under the current estimate exceeds the acreage reported in the September 2003 Real Estate Plan by 11.69 acres (17.98 acres in the September 2003 Feasibility Report and FEIS vs. 29.67 acres for the current HSLRR). Of this difference, 4.5 acres is due to an increase in wetland mitigation area as described above.

An additional difference in the acreage required for In Fee Simple Acquisitions is found in the difference between the alignment right of way and ponding areas acreage estimate in the September 2003 Real Estate Plan and the current estimate. For the HSLRR Recommended Plan, 7.12 acres (impacting 19 privately-owned parcels) would be required in because of significant adverse impact on a property owner; the 2003 Real Estate Plan reports this type of In Fee Simple acquisition to be 0.48 acres.

4 EXISTING ENVIRONMENT

This section describes only the changes from the 2003 FEIS. For a review of the sections that have not changed please, see the 2003 FEIS. The existing environment for the Sea Bright Borrow Area (SBBA) is listed separately.

4.1 Topography, Geology, and Soils

There are no changes since the 2003 FEIS.

4.2 Water Resources

There are no changes since the 2003 FEIS.

4.3 Tidal Influences and Floodplain Values

For the changes since the 2003 FEIS, please see the Engineering Appendix of the corresponding HSLRR for this document.

4.4 Vegetation and Wetlands

Wetland and open water habitats constitute the majority of the undeveloped portions of the project area, particularly around Chingarora, Flat, and East creeks. A detailed wetland survey was conducted throughout the entire project area in support of the 2003 FEIS and (USACE, 1999) the vegetation and wetland community has only changed in minor areas since that time.

Figure 25 depicts the areal extent of wetlands within the project area as well as an estimate of the extent that the proposed HSLRR project would affect wetlands. The District will consult with all federal and state regulatory agencies during the PED phase in order to avoid and minimize wetland impacts. The Evaluation for Planned Wetlands (EPW) and Habitat Evaluation Procedures (HEP) implemented to characterize and assess impacts to wetland functions and values were used in the 2003 EIS. Those same procedures will be utilized, should the wetland impacts increase.

4.4.1 Uplands

There are no changes since the 2003 FEIS.

4.5 Fish and Wildlife

4.5.1 Shellfish

Based on a review of the NJ Shellfish Growing Water Classification Charts developed by the NJDEP, the project area is designated “Prohibited”, waters where the harvest of shellfish is not allowed. The NJDEP (NJDEP Shellfisheries, 2014) surveyed clam stock in Raritan and Sandy Hook Bays. The study (NJDEP Shellfisheries, 2014) found the project area has a hard clam (*Mercenaria mercenaria*) abundance of “occurrence”. The NJDEP designates the project area as “Prohibited” waters where the harvest of shellfish is not allowed.

4.5.2 Finfish

A literature search for finfish in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for finfish in the project area.

Figure 25.
Wetland Impact Areas

4.5.3 Benthic Resources

A literature search for benthic resources in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for benthic resources in the project area.

4.5.4 Amphibians and Reptiles

A literature search for amphibians and reptiles in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for amphibians and reptiles in the project area.

4.5.5 Birds

The USFWS notes that, according to the Breeding Bird Atlas for New Jersey, there are approximately 60 species of nesting migratory birds in the project area (USFWS, 2014a). A literature search for birds in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for birds in the project area.

4.5.6 Mammals

A literature search for wildlife in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for wildlife in the project area.

4.6 Federal Threatened and Endangered Species

Although federally listed by the USFWS, the following species have no history in the project area, and will not be discussed further:

- dwarf wedge mussel (*Alasmidonta heterodon*); endangered
- bog turtle *(Clemmys [Glyptemys] muhlenbergii)*; threatened
- roseate tern (*Sterna dougallii dougallii*); endangered
- Indiana bat (*Myotis sodalis*); endangered
- northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*); threatened
- small whorled pogonia (*Isotria medeoloides*); threatened
- swamp pink (*Helonias bullata*); threatened
- Knieskern's beaked-rush (*Rhynchospora knieskernii*); threatened
- American chaffseed (*Schwalbea americana*); endangered and
- sensitive joint-vetch (*Aeschynomene virginica*); threatened.

4.6.1 Sea Turtles

All species of sea turtles in U.S. waters are protected under the Endangered Species Act of 1973. There are four species of marine turtle that may occur within the Atlantic waters around the project site and in the SBBA. They include the Northwest Distinct Population Segment (DPS) of the loggerhead (*Caretta caretta*), the Kemp's ridley (*Lepidochelys kempi*), the green (*Chelonia mydas*) and the leatherback (*Dermochelys coriacea*) turtles. In New Jersey waters, the loggerhead is the most abundant species observed. The green turtle is relatively rare. The loggerhead and Kemp’s ridley forage on shellfish including crabs, shrimps, and bivalves. The green turtle feeds almost exclusively on vegetation. All three species are benthic feeders. The leatherback feeds in the water column on jellyfish.

March 16, 2010, National Oceanic and Atmospheric Administration (NOAA) published a proposed rule to list two DPS of loggerhead sea turtles as threatened and seven DPS of loggerhead sea turtles as endangered. On September 16, 2011, a final listing determination was made designating the Northwest Atlantic Ocean DPS, South Atlantic Ocean DPS, Southeast Indo-Pacific Ocean DPS, and the Southwest Indian Ocean DPS as threatened. The Northeast Atlantic Ocean DPS, Mediterranean Sea DPS, North Indian Ocean DPS, North Pacific Ocean DPS, and South Pacific Ocean DPS have been designated as endangered (76 FR 58868). The listing became effective October 24, 2011.

Sea turtles are seasonally distributed along the east coast of the U.S. migrating to and from favorable habitats extending from Florida to New England. Seasonal water temperature cues induce migratory behaviors. As water temperatures rise in the spring, migrating turtles begin to move northward and reside in relatively shallow inshore waters to take advantage of abundant forage. As temperatures begin to decline rapidly in the fall, turtles in the northeast Atlantic begin to migrate back to southern waters. Sea turtles can be expected to be in the vicinity of the project borrow area when the water temperature surpasses 15° C (60° F) which generally coincides with June 1. However, the window of residence for these four species is considered May 1 until November 30. Southern migration begins when the water drops below 15° C. Turtles are migrating out of the New York Bight by the beginning of November. Future warming ocean trends may cause this window to be expanded.

The majority of sea turtles entering coastal and nearshore northeast waters appear to be small to medium sized juveniles (Morreale and Standora, 1994). The abundant prey species, low currents, and warm temperatures in the large bays and estuaries like Long Island Sound, Raritan Bay, and southern New Jersey appear to provide high value foraging habitat for these young turtles. Satellite acquired swimming data from tagged sea turtles revealed that when they are in inshore shallow estuarine waters and embayments their movements appear more random as they spent most of their time swimming/foraging or resting at depths between 15 and 50 ft (Morreale and Standora, 1994). When migrating in coastal waters, to and from these foraging grounds, their moves are well directed (north/south) and relatively rapid along a comparatively narrow corridor of deeper offshore water.

4.6.2 Whales

Three species of state and federally listed whales may also occur within the (offshore) project area. These species include the endangered North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), and fin or finback whale (*Balaenoptera physalus*). All are listed as endangered. Humpback whale presence in the northwestern Atlantic is variable and probably a response to the changing distribution of preferred food sources. Humpbacks on their northward migration to summering areas in the Gulf of Maine transit through the New York and New Jersey area from June through September. Finback whales occupy both deep and shallow waters and are probably the most abundant large cetacean in New York waters. They are most abundant in spring and summer, but do have some presence during the winter months. Humpback whales and finback whales primarily occur in the deep offshore waters of the continental shelf of New Jersey.

The North Atlantic Right whales are known to use the vicinity of the area as a migration route to and from southern breeding grounds primarily during the months of February through April and September through October. The National Marine Fisheries Service has established regulations to implement speed restrictions for vessels larger than 65 feet in Seasonal Management Areas (SMAs) where Right whales are known to occur along the east coast of the US Atlantic Seaboard at certain times of the year. From November 1 through April 30, Seasonal Management Areas are designated along the coast of New York and New Jersey and the SBBA lies within one of these (USACE 2013). The state and federally endangered sperm whale *(Physter catodon*) have also been noted from strandings in the region.

4.6.3 Atlantic Sturgeon

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus)* is anadromous, spending the majority of their adult phase in marine waters, returning to their natal freshwater rivers to spawn. Five DPS of Atlantic sturgeon were listed as threatened or endangered under the Endangered Species Act, including a New York Bight DPS. Known spawning populations for the New York Bight DPS exist in two rivers: the Hudson and Delaware Rivers. In the Hudson River estuary, spawning, rearing, and overwintering habitats were reported to be intact by Bain (1997), supporting the largest remaining Atlantic sturgeon stock in the U.S., however, a population decline from overfishing has also been observed for this area (Bain 1997, Bain 2001). General factors that may impact 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 (ASSRT, 2007). Other threats to the species include vessel strikes. Many authors have cited commercial over-harvesting as the single greatest cause of the decline in abundance of Atlantic sturgeon. Although little is known about natural predators of Atlantic sturgeon, there are several documented fish and mammal predators, such as sea lampreys (*Petromyzon marinus*), striped bass (*Morone saxatilis*), common carp (*Cyprinus carpio*), minnow (*Cyprinidae*), smallmouth bass (*Micropterus dolomieu),* walleye (*Sander vitreus*), grey seal (*Halichoerus grypus*), and fallfish (*Semotilus corporalis*) (ASSRT, 2007).

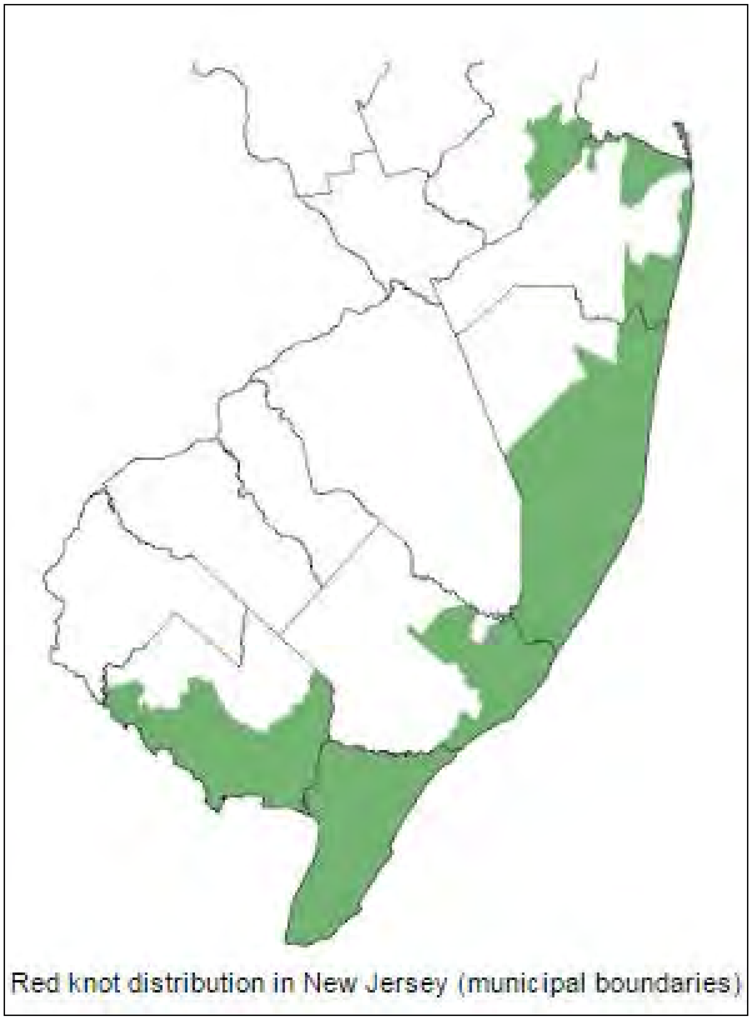
4.6.4 Piping Plover

The federally listed (threatened) bird piping plover *(Charadrius melodus)* nests approximately eight miles east in Gateway National Recreation Area, Sandy Hook Unit during the breeding season between March 15 and August 31 (USFWS, 2014a). The Union Beach project area has no history of nesting piping plovers (USFWS, 2014a).

4.6.5 Rufa Red Knot

The federally listed (threatened) bird rufa red knot (*Calidris canutus rufa)* is a large, bulky sandpiper with a short, straight, black bill. As with most shorebirds, the long-winged, strong-flying knots fly in groups, sometimes with other species. Red knots feed on invertebrates, especially small clams, mussels, and snails, but also crustaceans, marine worms, and horseshoe crab eggs. Small numbers of red knots may occur in New Jersey year-round, while large numbers of birds rely on New Jersey's coastal stopover habitats during the spring (mid-May through early June) and fall (late-July through November) migration periods (USFWS, 2016). Smaller numbers of knots may spend all or part of the winter in New Jersey (USFWS, 2016). Figure 26 shows the rufa red knot distribution in New Jersey (USFWS, 2016), including the project area.

Figure 26.
Municipal Boundaries of the Rufa Red Knot Distribution in New Jersey



4.6.6 Seabeach Amaranth

The federally listed (threatened) plant seabeach amaranth (*Amaranthus pumilus*) is an annual plant endemic to Atlantic Coast beaches and barrier islands that was documented occurring in nearby Keansburg in 2013 approximately 2.5 linear miles from the proposed project area; the Union Beach project area has no history of seabeach amaranth plants (USFWS, 2014a).

4.6.7 Northern Long-Eared Bat

The federally listed (threatened) northern long-eared bat (*Myotis septentrionalis)* is a medium-sized bat found across much of the eastern and north-central United States and is found state-wide in New Jersey. The northern long-eared bat predominantly overwinters in hibernacula that include caves and abandoned mines. During the summer, this species typically roosts singly or in colonies underneath bark or in cavities or crevices of both live trees and snags. Northern long-eared bats are also known to roost in human-made structures such as buildings, barns, sheds, and under eaves of windows (USFWS, 2014a). Threats to the northern long-eared bat include disease due to the emergence of white-nose syndrome, improper closure at hibernacula, degradation and destruction of summer habitat, and use of pesticides (USFWS, 2014a). Tree removal could affect this species by killing, injuring, or disturbing breeding or roosting bats if conducted between April 1 and September 30 (USFWS, 2014a).

4.7 State Threatened and Endangered Species

There are six known Osprey (*Pandion haliaetus*) nesting platforms in and around the project area (Center for Conservation Biology, 2014). The usage of each platform for nesting is unknown; however, the endangered ospreys have been seen in the area.

The USFWS notes that the State-listed (endangered) seabeach knotweed *(Polygonum glaucum),* seabeach sandwort *(Honckenya peploides),* and seabeach milkwort *(Glaux maritima),* as well as for the plant species of concern seabeach evening-primrose *(Oenothera humifusa)* could be found in the project area (USFWS, 2014a). The NJDEP list the endangered Least Tern (*Sternula antillarum*), endangered Black Skimmer (*Rynchops niger*), , endangered Pied-billed Grebe (*Podilymbus podiceps*), threatened Black-crowned night Heron (*Nycticorax nycticorax*), and species of special concern American Oystercatcher (*Haematopus palliatus*) avian species to potentially occur in the project area.

4.8 Essential Fish Habitat

Utilizing NMFS's essential fish habitat (EFH) designation and the EFH Mapper, one additional species, American plaice (*Hippoglossoides platessoides*) was identified that was not listed in the 2003 FEIS. The American plaice life stages in Raritan Bay and Sandy Hook bay are larvae, juveniles, and adults. The New York District conducted a finfish survey in 2004 (USACE, 2004). Beaches at Port Monmouth, Keansburg, and Union Beach were sampled at seven stations each. Fish captured in that survey had all been identified in the 2003 FEIS. Please see Appendix A for an EFH worksheet for the nearshore and Appendix E for a detailed EFH evaluation for the SBBA.

4.9 Offshore Borrow Area

The Sea Bright Borrow Area (SBBA) located in the Atlantic Ocean offshore of Sea Bright, New Jersey will be the only borrow area utilized for the initial beach renourishment. This is an existing borrow area that has been subjected to the NEPA and the Endangered Species Act (ESA) processes and has received all the necessary Federal and state permits, authorizations, and approvals for the previous uses. The SBBA was used recently for the Keansburg, and NJ Atlantic Coast – Sea Bright to Manasquan Flood Control and Coastal Emergencies projects.

4.9.1 Benthic Resources

Results of 991 bottom trawls within the New York Bight Apex conducted by the NMFS from 1986 – 1989 (Stuart et al., 1992) revealed 17 species of mega-invertebrates representing 14 families. Eight species longfin squid, (*Loligo pealeii*); northern shortfin squid, (*Lilex illecebrosus*); horseshoe crab, (*Limulus polyphemus*); American lobster, (*Homarus americanus*); Jonah crab; (*Cancer borealis*); Atlantic rock crab, (*Cancer irroratus*); lady crab, (*Ovalipes ocellatus*); and starfish, (*Asterias sp.*) comprised 99 percent of both total number and weight of all mega-invertebrates collected.

Sediment (grab) sample analysis revealed that the borrow area supports a sand fauna community with numerous macrobenthic organisms with bivalves dominating the biomass. The most important bivalve species were surf clams (*Spisula solidissima*), tellin (*Tellina agilis*), and razor clam (*Ensis directus*). Other macro benthic organisms included amphipods isopods, sand dollar, polychaete worms, mostly (*Spiophanes bombyx*) and (*Prionospio malmgreni*). All of the previously mentioned specimens are commonly occurring species in New Jersey Coastal waters, with no distinguishable difference within the SBBA. Within the SBBA commercial shellfish harvesting is prohibited, however, surf clam density within this borrow is generally considered too low to make it a viable area exploit.

4.9.2 Finfish

There is a diversity of important recreational and commercial and fishery resources associated within the regional waters of the New York Bight Apex, within which the SBBA is located. Results of 991 bottom trawls revealed that 58 species of fish representing 33 families were identified from the trawl catches. Eleven species (spiny dogfish, (*Squalus acanthias);* little skate, (*Raja erinacea);* silver hake, (*Merluccius bilinearis);* red hake, (*Urophycis chuss);* ocean pout, (*Macrozoarces americanus);* scup, (*Stenotomus chrysops);* cunner, (*Tautogolabrus adspersus);* butterfish, (*Peprilus triacanthus);* fourspot flounder, (*Paralichthys oblongus);* windowpane, (*Scophthalmus aquosus);* and winter flounder, *(Pleuronectes americanus)* comprised 90 percent of both total number and weight of all fish collected. Other important species that were captured include but were not limited to weakfish (*Cynoscion regalis*), black sea bass (*Centropristis striata*), summer flounder (*Paralicthys dentatus*), bluefish (*Pomatomus saltatrix)*, striped bass, Atlantic mackerel (*Scomber scombrus*), Atlantic menhaden (*Brevoortia tyrannu*), scup, and Atlantic herring (*Clupea harengus*). The state and federally endangered Atlantic sturgeon maintains a geographically distinct breeding population within the Hudson River and its estuary. The SBBA may fall within the migratory corridor utilized by both adult and subadult sturgeon, and or, this borrow area may be contiguous with or adjacent to areas where Atlantic sturgeon congregate outside the estuary.

4.10 Cultural Resources

The cultural resource study conducted by the New York District as part of the reconnaissance phase noted the potential for cultural resources within the project area (Brighton 1995). The subsequent Phase I cultural resource study conducted during feasibility identified no historic properties within the Area of Potential Effect (APE) as defined at the time of study (Panamerican Consultants, Inc. 2001). The Phase I included deep testing to identify buried paleo-surfaces however no such surfaces were encountered. A subsequent design change was also studied for the presence of cultural resources and no historic properties were identified. Of the proposed changes resulting from analysis conducted under the HSLRR only the proposed shift in the alignment to avoid the CBRS zone has the potential to impact cultural resources as all other proposed design changes are within the previously studied APE. Most of the proposed new alignment remains in the low-lying marsh where previous work in such environments, including deep testing, did not identify any significant resources or archeologically sensitive buried landforms. NJHPO concurred with the Corps that no further work would be undertaken in these low-lying locations. Further refinements to the alignment have been proposed to avoid the CBRS as delineated in 2016. These proposed realignments are on higher ground that may prove sensitive for archaeological resources. Surveys of these locations will be undertaken.

As a result of CBRS alignment modifications a section of floodwall is now proposed to run adjacent to the west side of Florence Avenue between Broadway and St. John’s Avenue. This location is across the street from two properties identified in the Monmouth County Historic Sites Inventory. These properties, car barns and a power house, are associated with the Jersey Central Traction Company which operated from the turn of the 20th-century until 1923. The power house was later used to supply electricity to the area and the car barn once housed the borough hall. Using “Google Earth” it appears that the car barns still stand but it not clear if the powerhouse is extant. The structures will not be directly impacted the project. The setting as it is today does not convey a sense of the buildings’ purpose as all evidence of the former trolley line is gone. A floodwall across the street will not impact the setting of the structures. NJHPO has concurred with the New York District’s opinion that a floodwall built across the street from Jersey Central Traction Company buildings will have no effect on the resources.

A potential historic resource not addressed in the project’s cultural resources survey reports or previous correspondence is the former Belford to Keyport extension of the New York and Atlantic Highlands Railroad. The right-of-way is now the Henry Hudson Trail, a paved bikeway in the Monmouth County Park system. The rail line was constructed sometime after 1889 to provide access to the already developing communities along the Raritan Bay shore. NJHPO has concurred with the New York District’s opinion that this late and relatively minor addition to the northern Monmouth County railroad network, now a paved bike path, is not eligible for the National Register of Historic Places.

The Sea Bright Borrow Area (SBBA) was identified as the source for sand. In the 2003 EIS it was indicated that monitoring will be conducted in the SBBA and in the beach renourishment area during construction to identify resources that might be pumped on the beach from the borrow area. Based on subsequent studies undertaken in the SBBA for other District projects the District and the NJHPO have developed protocols that will be followed in lieu of the monitoring previously stated in the 2003 FEIS (Panamerican Consultants, Inc. 2014).

Environmental mitigation sites have yet to be identified. Cultural resources studies of the sites will be undertaken.

4.11 Coastal Barrier Resource System (CBRS)

In the 1970s and 1980s, Congress recognized that certain actions and programs of the federal government have historically subsidized and encouraged development on coastal barriers, resulting in the loss of natural resources, threats to human life, health and property and the expenditure of millions of tax dollars each year. To remove the federal incentive to develop these areas, the Coastal Barrier Resource Act (CBRA) of 1982 designated relatively undeveloped coastal barriers along the Atlantic and Gulf Coasts as part of the John H. Chafee Coastal Barrier Resources System (CBRS), and made these areas ineligible for most new federal expenditures and financial assistance. The law encourages the conservation of hurricane prone, ecologically rich coastal barriers by restricting federal expenditures that encourage development, such as federal flood insurance. Private developers or other non-federal parties that bear the full non-federal cost can develop areas within the CBRS.

Section 5 of the CBRA (16 U.S.C. 3504) prohibits new federal expenditures within System Units of the CBRS. An expenditure or financial assistance is considered new under CBRA (16 U.S.C. 3504(b)), if:

- No money for construction or purchase purposes was appropriated before the date on which the relevant System Unit was included within the CBRS; or
- No legally binding commitment for the expenditure or financial assistance was made before such date, except as provided in Section 6 of CBRA (16 U.S.C. 3505), no new expenditures or new financial assistance may be made available under authority of any Federal law for any purpose within the CBRS, including, but not limited to, the following:
    - The construction or purchase of any structures, appurtenance, facility, or related infrastructure;
    - The construction or purchase of any road, airport, boat landing facility, or other facility on, or bridge or causeway to, any System Unit; and
    - The carrying out of any project to prevent the erosion of, or to otherwise stabilize, any inlet, shoreline, or inshore area, except that such assistance and expenditures may be made available on units designated pursuant to Section 3503 of this title on maps numbered S01 through S08 and LA-07 for purposes other than encouraging development and, in all units, in cases where any emergency threatens life, land and property immediately adjacent to that unit.

Section 6 of CBRA (16 U.S.C. 3505) permits certain federal expenditures and financial assistance within the CBRS after consultation with the USFWS. The exceptions are divided into two groups. The first group only requires that the proposed funding is in fact a listed exception. The second group requires that the exception also meet the three purposes of the CBRA. Those purposes are:

- To minimize the loss of human life;
- To minimize the wasteful expenditure of federal revenues; and
- To minimize the damage to fish, wildlife and other natural resources associated with coastal barriers.

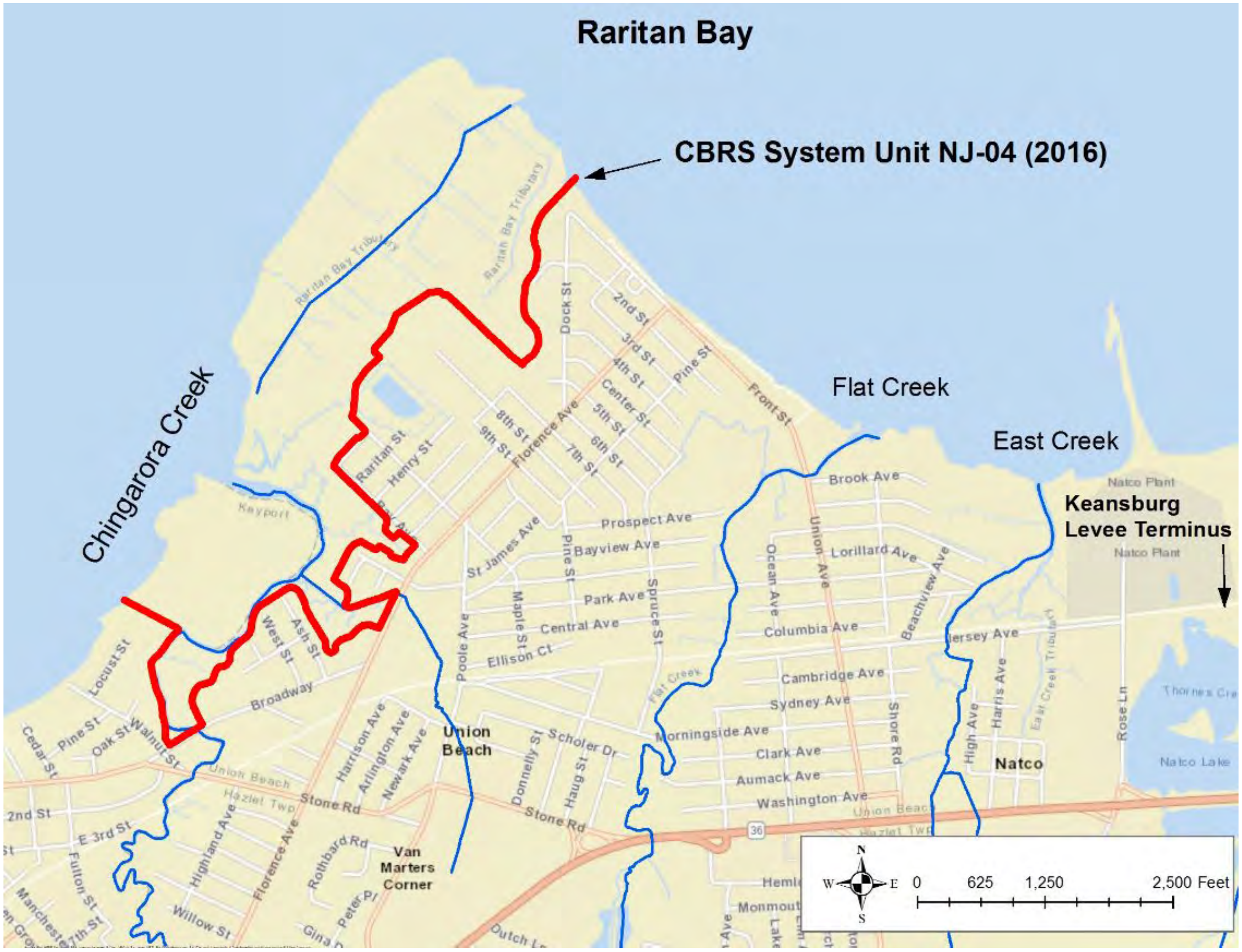
CBRS System Units are generally comprised of private lands that were relatively undeveloped at the time of their designations with the CBRS. The boundaries of these units are generally intended to follow geomorphic, development, or cultural features. Most new federal expenditures and financial assistance, including federal flood insurance, are prohibited within System Units.

4.11.1 2007 Authorized Plan Alignment and CBRS Boundaries

In the 2003 FEIS, compliance with the CBRA was identified as pending and the project's 2008 ROD did not reference this as an outstanding compliance issue. As a result, the compliance record has remained open. In 2013, when the HSLRR was initiated, USACE proceeded with acquiring a determination regarding CBRA from the USFWS. The USFWS stated that parts of the Union Beach project were within the Coastal Barrier Resources System (CBRS) Unit NJ-04. USACE requested an exemption from the 2008 unit alignment (see Appendix C) which the USFWS denied, though the USFWS informed USACE in 2014 that CBRS Unit NJ-04 was to be reevaluated based on effects from Hurricane Sandy.

The 2007 Authorized Plan contains a portion of the CBRS System Unit NJ-04 within its alignment. USFWS, in response to Hurricane Sandy drafted a revised alignment for CBRS Unit NJ-04, and published the alignment via announcement in the Federal Register on 7 July 2016 (and later modified as a result of the USFWS public comment period on the CBRS alignment). In the announcement, the USFWS stated that it is developing a new CBRS mapping protocol for critical facilities located within and immediately adjacent to the CBRS. A portion of Union Beach lies within the CBRS system Unit NJ-04 (as modified, July 2016 and following the USFWS public comment period) as shown in Figure 27.

Figure 27.
Coastal Barrier Resource System in the Study Area



In the 7 July 2016 announcement, the USFWS stated that it may consider mapping a CBRS area to allow for the protection of existing critical facilities (e.g., sewage treatment facilities) that primarily serve areas located outside of the CBRS.

The USFWS also states that in such cases, the following criteria must be met:

1. The protection of the facility must be consistent with the three purposes of the CBRA: To minimize the loss of human life, wasteful expenditure of Federal revenues, and damage to the fish, wildlife, and other natural resources associated with coastal barriers;
2. The protection of the facility should not encourage new development within the CBRS (e.g., a levee protecting a facility should not also unnecessarily protect an undeveloped area within the CBRS or an area within the CBRS that developed after the unit was established); and

3. There must be no reasonable alternative to protect the facility (e.g., nonstructural floodproofing, buyouts to allow for construction of levees and flood walls outside of the CBRS, alternative project design that does not infringe upon the CBRS, etc.).

For the purpose of this protocol, the USFWS defines "existing" as being on-the-ground as of the date the area was added to the CBRS and "critical facility" as a structure or other improvement that, because of its function, would likely cause catastrophic human health and safety impacts if it is destroyed or damaged or if its functionality is impaired. The USFWS developed this new protocol for critical facilities to allow for the protection of the Bayshore Regional Sewerage Authority Wastewater Treatment Facility in Monmouth County, New Jersey. In cases where the USFWS recommends the removal of an area from the CBRS in accordance with this protocol, the change will become effective only if the updated map is adopted through legislation enacted by Congress.

The 2007 Authorized Plan was evaluated against the 2016 CBRS Unit NJ-04 boundaries in order to determine whether any part of the 2007 Authorized Plan alignment fell within the new CBRS boundary. The evaluation is provided above in Section 3.1.1.

4.12 Coastal Zone Management

As a federally funded project within the coastal zone of New Jersey, the project must be reviewed by the NJDEP for consistency with the policies of the New Jersey State Coastal Zone Management (CZM) Plan. A new CZM statement was prepared. The applicable policies, along with an impact analysis and consistency determination are discussed within the environmental consequences section of this report as well CZM consistency review (state and local) that is presented in Appendix B.

4.13 Hazardous, Toxic, and Radioactive Wastes

As reported in the FEIS, soil borings were collected in May 2001 and 2002. A number of samples exceeded the NJDEP Residential Direct Contact Soil Cleanup Criteria (RDC-SCC) for arsenic and lead. These results were attributed in part to the geologic formations in this part of Monmouth County, which naturally occurring high levels of arsenic. For an older, urbanized area, such as Union Beach, with disturbed soils, such results were not unexpected. The samples with lead exceedance were collected in waterways known to be receptors for the area's storm sewers (USACE, 2003).

For this supplemental EA, a review of the state and federal data sources was conducted. The NJDEP list of Known Contaminated Sites (KCS) was consulted for Union Beach. The database identified nine active sites, no pending sites, and 30 closed sites (NJDEP, 2014). Active sites are sites having one or more actives cases, under the supervision of a NJDEP case manager, as well as pending and/or closed sites. Closed sites are those sites that have been closed. Most of the active sites involved underground storage tanks. Only one active site, the Bayshore Regional Sewerage Authority, is adjacent to the current project alignment. This site has a mix of active and closed actions involving underground storage tanks and potential groundwater contamination within the facility (NJDEP, 2014).

One of the NJDEP KCS active sites, the former International Flavors Fragrances (IFF) site, is also site listed under the USEPA Resource Conservation Recovery Act (RCRA) database. The site, now closed, is located on Rose Lane, on the east side of Union Beach. The IFF site was a source of volatile organics and polychlorinated biphenyls (PCBs) in the ground water and soil. With impacted groundwater migrating towards Raritan Bay an interceptor trench was installed on the property to treat this flow and several thousand tons of contaminated soil was removed from the site. The site is situated outside of the proposed project alignment.

4.14 Air Quality

In accordance with the Clean Air Act of 1977, as amended, the U. S. Environmental Protection Agency (USEPA) developed National Ambient Air Quality Standards (NAAQS) to establish the maximum allowable atmospheric concentrations of pollutants that may occur while ensuring protection of public health and welfare, and with a reasonable margin of safety.

The USEPA measures community-wide air quality based on daily measured concentrations of six criteria air pollutants; carbon monoxide, sulfur dioxide, respirable particulate matter, lead, nitrogen dioxide, and ozone. Based on these measurements of air quality, the USEPA designates attainment areas and non-attainment areas nationwide. Non-attainment areas are designated in areas where air pollution levels persistently exceed the national ambient air quality standards.

Based on the NAAQS, Monmouth County is located in the New York, Northern New Jersey, Long Island, Connecticut, nonattainment area, which is currently classified as moderate nonattainment for the 2008 8-hour ozone 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).

4.15 Navigation

A literature search for navigation in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for navigation in the project area.

4.16 Aesthetics and Scenic Resources

A literature search for aesthetics and scenic resources in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for aesthetics and scenic resources in the project area.

4.17 Recreation

A literature search for recreation in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for recreation in the project area.

4.18 Transportation

A literature search for transportation in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for transportation in the project area.

4.19 Noise

A literature search for noise in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for noise in the project area.

4.20 Land Use and Zoning

A literature search for land use and zoning in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for land use and zoning in the project area.

4.21 Socioeconomics

A literature search for socioeconomics in the area yielded no changes since the 2003 FEIS. Please see the 2003 FEIS for socioeconomics in the project area.

5 ENVIRONMENTAL CONSEQUENCES

Section 102.2 of the National Environmental Policy Act (NEPA) instructs that documents "*shall be analytic rather than encyclopedic".* Agencies are encouraged to concentrate on relevant environmental analysis in their NEPA documents and not to produce an encyclopedic summary of all applicable information (40 CFR 1500.4(b), 1502.2(b)). Instead, the environmental analysis should focus on significant issues, discussing insignificant issues only briefly and environmental impacts should be discussed in proportion to their significance.[11] If the environmental effects are not deemed significant, there should be only enough discussion to show why more study is not warranted (40 CFR 1502.2(b)).

This section describes the environmental consequences that would occur as a result of implementing the HSLRR Recommended Plan changes as described in Section 3. Where constructing the HSLRR Recommended Plan would result in changes for the effects analysis, the resulting changes are described. In addition, the environmental consequences from the original 2007 Authorized Plan, as described in the 2003 FEIS, are also summarized below.

5.1 Topography, Geology, and Soils

No impacts on geology would occur because bedrock elevation would be below the depth of the proposed beach/dune fill and periodic beach nourishment, as well as the levee and floodwall foundations (USACE, 2003).

No significant impacts on topography, geology, or soils would occur as a result of implementing the HSLRR Recommended Plan changes. A change in topography would occur as a result of levee, beach berm, and dune construction, but it is expected to be minimal. The change in elevation in the area of the levees would be + 15 feet NGVD29. Dune and beach berm construction would involve the placement of approximately 688,000 cubic yards of sand, increasing the existing topography to + 17 feet NGVD29 and + 9 feet NGVD29, respectively.

Soil erosion and sedimentation would be minimized during construction with a soil erosion and sediment control plan, and the final design of the project would conform to *The Standards for Soil Erosion and Sediment Control in New Jersey* (NJDA, 2014). No significant or long-term impacts would occur on native soil grain size, structure, nutrient status, or organic matter content, because only suitable, clean material of similar grain size would be used for the dune and beach construction/replenishment.

Impacts to topography from the HSLRR Recommended Plan changes would consist of a change of depth within the dredge footprint at SBBA coinciding with the concurrent increase in elevation specific to the accepted beach fill plans and specifications. The SBBA is roughly 3,719 acres in size. Its bottom elevation ranges in depths from - 24 feet to - 63 feet NGVD29 that slope from northwest to deeper water at its southeastern boundary. Approximately 4,532,000 cubic yards will be dredged from SBBA for the HSLRR Recommended Plan and will not make a cut deeper than 20 feet in the ocean floor. The material within the SBBA is 90 percent sand and therefore contains

[11] 40 CFR 1502.2(c); see also 40 CFR 1502.2(a)

no more than a minute level of fine grain sediments. Therefore, there is a very low association with the typical regional contaminants of concern that are generally linked to high concentrations of organic materials found in fine sediments such as mud and silts, but not in 90 percent or greater quartz sand (USACE, 1989).

There will be transportation of sand from the seabed at SBBA to the placement area on the beach and into the intertidal zone of the placement area. The removal of sand from SBBA and the changes to the topography of the placement area are each direct impacts to their respective areas. At the placement site, there will be a significant addition of sand, which will create a berm and beachfront changing the existing topography and adding elevation to these areas. Only suitable, clean sand will be used for the beach fill, and structure, nutrient status, and organic matter content is not expected to be significantly altered at the placement site. Indirect impacts to geology from the project will consist of initial winnowing of finer grain sizes into the nearshore, decreasing as the project beach settles in. Renourishment will be scheduled at intervals of about six years, but frequency and amount of renourishment will be dependent the rate of change to project specifications.

5.2 Water Resources

Direct impacts to (ocean) surface waters will include a temporary localized increase in turbidity and total suspended sediments during filling, regrading, and groin modification and pipe extension activities. Effects of beach fill operations on total suspended sediments appear to be limited to a narrow swath of beachfront with a lateral extent of several hundred feet (USACE, 2001). The construction and maintenance of the beach berm and dune, and periodic renourishments would have no significant impact on the existing regional hydrogeology and groundwater resources (USACE, 2003).

Additionally, construction and maintenance of the floodwalls and levees would have no direct impacts on regional hydrogeology and groundwater resources (USACE, 2003). Surface water quality would be temporarily impacted during construction of the levees, floodwalls, pump stations, and sluice gates, due to increased suspended sediments in the water column (USACE, 2003). However, implementation of soil erosion and sediment control measures and best management practices can minimize any adverse impacts. When storm gates are closed, impacts to salinity are expected to be minimal (USACE, 2003).

Since the SBBA is located near land, another potential indirect impact of dredging is change in wave refraction. The lowering of the ocean bottom can alter wave height, direction and angle potentially modifying the habitat of the nearby shoreline and intertidal zone. An analysis was performed using a numerical model that was subjected to various scenarios with respect to depth of dredging, frequency of wave occurrence and angle/direction of wave. The results showed that dredging at the SBBA altered wave refraction, but only nominally. Accordingly, significantly greater wave impacts to the nearby shoreline and intertidal zone are not expected (USACE 1989).

The HSLRR states that box culverts and sluice gates were determined to be less maintenance intensive and more operationally simple alternatives to the sector gates included in the 2007 Authorized Plan. With that change, the construction and maintenance of the proposed sluice gates, and pump stations would have no adverse impacts on regional hydrogeology and groundwater resources. However, sluice gate closures are anticipated to have a beneficial impact. Gate closure may temporarily reduce the possibility of groundwater contamination by saltwater intrusion, one of the most widespread water quality problems within the project area. Review of activities pursuant to Section 404 of the Clean Water Act (CWA) will include application of the guidelines under the authority of the Section 404 (b) (Appendix F) and a Water Quality Certificate has been obtained from the NJDEP in accordance with Section 401 of the CWA.

5.3 Tidal Influences and Floodplain Values

Construction and maintenance of the HSLRR Recommended Plan changes would have no significant negative impact on the existing tidal influences, floodplain values, and would have beneficial impacts related to flooding events. The proposed changes to the alignment do not encroach upon the CBRA boundary and utilize floodwall (see Figures 22, 23, and 24) resulting in the HSLRR Recommended Plan alignment following the perimeter of adjacent uplands and minimizing the effects to the tidally-influenced habitat. Gates have been designed to ensure that the same level of periodic tidal inundation of the estuary occurs as before construction to allow for the marsh to maintain itself (USACE, 2003). Due to careful consideration of results from the use of the UNET model, the construction of the storm gates would not result in any significant reduction of tidal exchange (USACE, 2003). All areas that receive tidal flows would continue to receive the same amount of tidal flows after construction and the gates are not expected to increase flooding or obstruct flows during most fluvial storm events (USACE, 2003).

The only indirect impact could be a localized reduction in the salinity of tidal water behind the closed storm gate (USACE, 2003). However, the storm gate would be closed only during unusually heavy coastal storms. Once the storm gate is open, normal circulation and tidal inundation patterns would be reestablished at the next tidal exchange (USACE, 2003). It is anticipated that the storm gates would be open at the beginning of the first low tide after each storm event to release fluvial flow to reduce costs of operating the pump stations (USACE, 2003). The potential alteration in salinity associated with the salt marsh is expected to be minute and short-term (USACE, 2003).

Construction and maintenance of the protective beach berm and dune would not affect existing tidal patterns, but would reduce the influence of ongoing tidal patterns along the Union Beach shoreline (USACE, 2003). The construction of the sluice gates, levees, floodwalls, and pump stations would have no significant effect on periodic tidal events (USACE, 2003).

The construction and maintenance of the dune and beach berm would result in long-term beneficial impacts on the project area’s ability to assimilate flooding events. The construction of the sluice gates, levees, floodwalls, and pump stations would also result in beneficial effects on how the project area experiences severe tidal flood events.

Construction and maintenance of the project would result in both temporary and permanent impacts to floodplain values. The temporary impacts would include the displacement of wildlife habitat, loss of recreational opportunities during the construction period, and the potential for erosion and sedimentation should a flood event occur during the construction period (USACE, 2003). The long-term beneficial impacts would include enhanced floodplain values, including storm surge protection, recreational opportunities, and wildlife habitat (USACE, 2003).

5.4 Vegetation and Wetlands

Construction of the storm gates, pump stations, and floodwalls would result in the permanent loss of vegetation within the footprint of these structures. According to the 2003 FEIS, "*the construction of the levees, floodwalls, gates, and pump stations would directly impact 20.62 acres of vegetated land (22.97 total acres including 2.35 acres of un-vegetated areas such as open water, sand, rock, and developed). A total of 8.39 ac of wetland and 12.23 ac of upland vegetation would be directly impacted by construction of the levees, floodwalls., pump stations, and a portion of the beach/dune construction that would be located in currently vegetated areas*" (USACE, 2003). Following construction, the levees would be stabilized, revegetated, and monitored. The current design and alignment changes acreage are anticipated to increase approximately 30-percent due to the design modifications as described in the HSLRR and a monitoring component to ensure vegetated success of the dune is planned (USACE, 2003).

Construction of the beach berm and dune would have minimal impact on vegetation since the footprint of these features consists of non-vegetated habitats such as sand, rock, and intertidal waters; only a small portion of the beach berm and dune would affect vegetation (USACE, 2003). These areas are located where the beach berm and dune tie into the levees at Chingarora and Flat Creeks.

Compliance with 2009 USACE Vegetation Management Policy has increased the width of the area affected by the HSLRR Recommended Plan. As such, the associated area of direct effects to wetlands would increase the wetland mitigation requirements from the 17.5 acres noted in the September 2003 FEIS to the current HSLRR estimate of 22.0 acres.

The final Union Beach, New Jersey Final Feasibility Report/Final Environmental Impact Statement was completed/approved in Sept 2003 and with the Record of Decision signed in July 2008. The recommended plan included a 17. 5 acre mitigation plan that would convert 12.0 acres of wetland Phragmites in the Flat Creek area to 10.0 acres of salt marsh and 2 acres of wetland scrub-shrub habitat. Also in the Flat Creek area, 2.5 acres of upland Phragmites would be converted to wetland herbaceous/scrub shrub habitat. For the East Creek area, 3.0 acres of wetland dominated by Phragmites would be converted to wetland scrub-shrub habitat. The Selected Mitigation Plan was based on using functional assessment methodology (EPW and HEP), calculating Total EPW FCUs and HEP HUs impacted - 25.42 and 11.84, respectively.

The analysis as part of the preparation of the Draft HSLRR and EA, noted that minor design changes and compliance with 2009 USACE Vegetation Management Policy resulted in an increase of the areal extent of wetlands affected by the HSLRR Recommended Plan. Due to the conceptual level estimate associated with the change in aerial impact, and due to the limited scope given as part of the HSLRR, a new functional assessment was not undertaken. It was noted in the HSLRR/EA, that during PED (when there is more detailed data available), the functional assessment analysis will be updated to confirm if additional acreage may be required. If so, the

Selected Mitigation Plan will be revised. However, due to the lower quality of the habitat to be impacted, it is not anticipated that there will be measurable increase in mitigation acreage needed.

Based on the results of a hydrological model to predict tidal flows and losses through constructed features, the gates have all been designed to cause no significant reduction or change in normal tidal flows (USACE, 2003). Therefore, the tidal wetlands in the study area are expected to receive the same frequency and levels of tidal inundation, allowing hydrological and vegetation patterns to remain the same and no significant impact on wetland hydrology are anticipated (USACE, 2003).

Temporary impacts to wetlands could occur during construction in areas that are used for haul roads and temporary workspaces. Best management practices for wetland protection measures (*e.g.,* low ground pressure equipment, erosion control, and/or operating equipment on mats or other temporarily stabilization measures) would be implemented wherever temporary impacts to wetlands are anticipated. Following construction, temporary workspaces would be stabilized, revegetated, and monitored.

The ponding areas, which are either wetlands or low-lying uplands currently receive, and temporarily store, stormwater. The function of these areas would not be discernably altered by implementation of the authorized plan.

5.4.1 Uplands

The construction of the project would permanently impact upland vegetation within the construction area. During the PED phase, the acreage will be determined. However, some upland habitat would be created as a side effect through the construction of the levee and beach dune. Following completion of construction, these areas would be stabilized and revegetated with native plant species.

Temporary impacts to uplands could occur during construction in areas that are used for haul roads and temporary workspaces. Following construction, temporary workspaces would be stabilized, revegetated, and monitored.

5.5 Fish and Wildlife

In general, construction of the HSLRR Recommended Plan could have minor, short-term, and long-term impacts on fish and wildlife habitat and populations occurring in the area (USACE, 2003). During construction, the clearing and grading of work areas could result in the loss of aquatic, vegetative, and some subsurface cover due to the movement and excavation of soil. These construction activities could result in the temporary and permanent loss of habitat and possible mortality of less mobile, burrowing, and denning species of wildlife such as mollusks, small rodents, snakes, turtles, and amphibians. Following construction, wildlife species are expected to resume their normal habits consistent with post-construction habitat availability in and around the project area.

Impacts to wildlife habitat would be fully compensated through implementation of the authorized mitigation plan as discussed in the 2003 FEIS. This will be updated during the PED phase in consultation with NJDEP Land Use Regulation.

5.5.1 Shellfish

Construction of the beach berm, revetments, terminal groins, and periodic re-nourishments would have an immediate adverse effect on the shellfish species within the project area (USACE, 2003). During construction of these components, any sessile shellfish in the immediate footprint would be buried while most mobile shellfish species would relocate to an area outside of the immediate impact area.

A temporary, short-term increase in sedimentation and turbidity is expected as a result of initial nourishment and periodic re-nourishments. However, sedimentation (mostly sand) is expected to settle quickly out of the water column, thus limiting the impacts to local shellfish species. Long-term shellfish presence would not be significantly impacted because local turbidity, current, and substrate material would not change following beach/dune construction, and new larval recruits (Marsh et al., 1980; Parr et al., 1978; Ragnarsson 1995; Smith and Brumsickle, 1989; and USACE, 2000) would colonize newly settled sediment rapidly (USACE, 2003).

Construction of the levees, floodwalls, pump stations, and gates would be limited to the upland areas adjacent to the salt marshes and some wetland areas along the edge of the marsh. In areas where levees or floodwalls are constructed in the wetlands, a short, one-time direct burial of existing shellfish may occur if any are present at the time (USACE, 2003). No long-term adverse impacts to the shellfish are expected as a result of the construction of these structures. The placement of the authorized revetments and terminal groins may have a long-term beneficial impact on shellfish by improving habitat for intertidal organisms (USACE, 2003).

5.5.2 Finfish

As described in the 2003 FEIS, construction of the revetments, terminal groins, and beach berm and periodic re-nourishments would have an indirect, short-term, negative impact on finfish species in the immediate project area. Motile species would likely avoid burial during construction by relocating outside of the placement area. However, the potential for some finfish mortality and burial of eggs may exist. Benthic feeding finfish species may also experience temporary displacement of food until appropriate food sources recolonize the impact area. However, these and other finfish that are present at the time of construction are expected to feed in the surrounding area and would be unaffected by the temporary localized reduction in available benthic food sources.

Construction of the revetments and terminal groins would result in a long-term beneficial impact to finfish species inside and outside the project area (USACE, 2003). The amount of benthic habitat lost underneath the revetments and terminal groins should more than compensate for the addition of these structures which would create areas of recruitment and protection for numerous plants and invertebrate species, thus providing habitat, food, and shelter for finfish species. The placement of the terminal revetments and groins may also provide fishery habitat in the form of nesting, spawning, nursery, or resting areas (USACE, 1989).

5.5.3 Benthic Resources

The construction of the revetments, terminal groins, beach berm, and periodic re-nourishments would result in short-term adverse impact on the benthic communities in the project area including direct smothering of sessile benthic invertebrates within the construction area (USACE, 2003). During initial nourishment and periodic re-nourishments, motile invertebrates would be expected to escape without injury (USACE, 2003).

Following sand placement, a short-term increase in diversity due to recruitment of opportunistic species is expected (Applied Biology, Inc. 1979; USACE 1996). These opportunistic species would generally be replaced by species common to the original community. In general, burial of benthic animals would not have any adverse impacts on the existing benthic invertebrate populations, unless it is a sensitive resource such as coral (USACE, 2003).

The construction of placement of the revetments and terminal groins would provide long-term beneficial impacts to the benthic community by increasing the area of hard substrate for attachment of sessile plants and animals (e.g., rockweed [*Fucus* spp.]), mussel, and barnacle]; providing more shelter for small fish; and, increasing food supply for predatory fish (Moore and Seed, 1986). In addition, the placement of the revetments and terminal groins would provide shelter to the existing and surrounding benthic communities near the revetment and terminal groin footprints from excessive wave action (USACE, 2003).

The construction of the levees, floodwalls, pump stations, and gates would be limited to the upland areas adjacent to the salt marshes and some other wetland areas. In areas where they are constructed in the wetlands, a short, one-time direct burial of existing marsh invertebrates would occur if any were present at the time. No long-term adverse impacts to the existing marsh surface benthic invertebrates are expected as a result of the construction of the levees and floodwalls (USACE, 2003).

5.5.4 Amphibians and Reptiles

Amphibian and reptilian mortality and habitat loss is expected to be minimal since construction impacts would be concentrated in and around saltwater marsh habitat types and the majority of the amphibians and reptiles that are likely to occur in the project area are freshwater species (USACE, 2003).

5.5.5 Birds

In New Jersey, the recommended seasonal restriction for tree or shrub removal that would prevent the destruction of active nests with eggs or unfledged chicks of migratory birds is March 15 to July 31 according to the New Jersey Division of Fish and Wildlife Manual for the Protection of Fish and Wildlife Resources dated July 2008 (USFWS, 2014a). As such, construction planning during PED would avoid tree and shrub removal during the recommended period. Birds that may be temporarily disturbed by the construction activity are expected to be common species, already acclimated to a certain noise and activity levels typical to this residential and commercial area. Avian species are highly mobile and are expected to avoid any serious direct impacts.

As part of the HEP study included in the 2003 FEIS, four bird species were used to evaluate short- and long-term impacts to the quality and quantity of wildlife habitats and develop the appropriate mitigation plan to offset these impacts: black duck, clapper rail, marsh wren, and yellow warbler. The authorized mitigation plan will be updated during the PED phase in consultation with NJDEP Land Use Regulation.

5.5.6 Mammals

As described in the 2003 FEIS, during construction, heavy machinery activity and increased noise levels may cause mortality of some individuals of less mobile species of small mammals, or indirectly cause displacement of individuals near construction activities. However, the mammals most likely to occur in the project area are mobile and tolerant to human activities (USACE, 2003).

From the 2003 FIES, four species of seals seasonally occur within the nearshore and offshore habitats of the project area. Harp seals (*Pagophilus groenlandicus*) and hooded seals (*Cystophora cristata*) are rarely encountered. The grey seal (*Halichoerus grypus*) and the harbor seal (*Phoca vitulina*) may be found both off shore and on shore in the project region during the winter. Both seal species may haul up on the beach or groins when they are seasonally present. Construction on the beach may dissuade them from doing so at a particular location. In general, having to move to a nearby suitable haul out area would represent an insignificant direct impact. During the winter months but potentially year round, the harbor porpoise (*Phocoena phocoena*) can be found in regional waters while the common dolphin (*Delphinus* spp) is more common during periods of warmer water (USACE, 2003).

All of these species are agile swimmers that will easily avoid the relatively slow moving dredges. The harbor porpoise and common dolphin are not benthic feeders and are not expected to be near the working draghead. Both species of seals may include benthic fish and invertebrates, such as crabs or shrimp in their diets (Wynne and Schwartz, 1999) therefore there is a possibility that they may be near an active draghead. However, as previously discussed their ability to avoid the draghead generally eliminates any related impacts (USACE, 2003).

5.6 Federal Threatened and Endangered Species

The following effect to threatened and endangered species is as described in the 2003 FEIS (USACE, 2003). The HSLRR Recommended Plan changes to the 2007 Authorized Plan are inconsequential with respect to potential effects to the listed species discussed in the 2003 FEIS. The summary of effects to listed species identified in the 2003 FEIS is included below; effects from the proposed modifications to the more recently listed northern long eared bat and rufa red knot are also included below.

5.6.1 Sea Turtles

Three of the turtle species (Kemp's ridley, green, and loggerhead) would most likely be present in the project area as they migrate to and from area estuaries (spring and fall respectively) to feed on the abundant benthic resources from approximately mid-June through mid-October (USACE, 2003). The leatherback turtle is not considered a benthic feeder and spends most of its time in the water column. The three benthic feeding species may be vulnerable to direct impacts via entrainment and draghead contact injury. However, the green turtle is primarily a vegetarian and the least abundant migrant in the region. Impacts to this species are highly unlikely. All four species may be vulnerable to surface or near surface vessel strikes.

The majority sea turtle dredge impacts takes, have occurred in southern waters where turtles are in general much more abundant and had congregated in somewhat spatially restricted areas such navigation channels, shipping berths, and shallow embayments. None of these circumstances applies to sea turtles seasonally migrating through open coastal waters in this north Atlantic project site. Turtle impacts are considered highly unlikely due to these differences and only one take has been recorded in the District while many millions of cubic yards of material have been dredged. However, NOAA and the ESA regulations still require special procedures to be implemented to protect sea turtles. Generally, this would include placing special turtle observers on board to look for evidence of entrainment into the hopper. However because of the potential unexploded ordinance at the borrow site, a special screen must be placed over the draghead opening.

Dredging sand for the project will temporarily remove much of the suitable prey base for loggerhead and Kemp's ridley sea turtles. However, the dredged area represents a tiny fraction of available benthic resources in and around the SBBA, and a benthic feeding turtle would be able to locate adequate prey by swimming through a recently dredged area to an adjacent, undisturbed benthic habitat.

5.6.2 Whales

In general, impacts to listed species of whales during sand mining are unlikely because the hopper dredge would move very slowly at no more than 2.6 knots, a speed at which whales can avoid contact with the dredge. At speeds below 11.8 knots, the probability decreases to less than 50-percent, and at 10 knots or less, the probability is further reduced to approximately 30-percent. The speed of the dredge is not expected to exceed 2.6 knots while dredging and 10 knots while transiting to/from the SBBA and project shoreline, thereby reducing the likelihood and magnitude of vessel collision impacts (USACE, 2003).

5.6.3 Atlantic Sturgeon

Direct impacts including impingement and mortality or other serious contact injury would have the potential to occur during periods when dredges and associated vessels were working at the SBBA (USACE, 2003). This potential for direct impact may increase during seasonal periods when adult and sub -adult sturgeon are congregating or actively migrating to or from the Hudson estuary. Direct impacts from entrainment (and other contact) appear to be rare occurrences. Sturgeon entrainment rates derived from USACE screening of dredged material from hopper dredging operations along the Atlantic coast (Virginia, New York, and New England) between 1990 and 2005 resulted in an observed take of 0.6 sturgeon per year (USACE, 2006, ASSRT, 2007). Additionally, there will be a turtle/sturgeon deflector on any hopper dredge working at the SBBA.

Vessel strikes also appear to be rare and the few that have been noted have occurred in situations where there was minimum depth in relation to draft of the vessel. Sturgeon are generally demersal and dredging and transit at SBBA will be occurring in unconfined open water. Impacts to sturgeon in the upper reaches of the water column due to vessel strikes are unlikely.

Oceanic Atlantic sturgeon feed on polychaetes, oligochaetes, amphipods, isopods, mollusks, shrimp, gastropods, and fish (Johnson et al., 1997; Haley, 1998). These benthic species will be lost along with the sand during dredging. The area of the SBBA utilized for the beach fill of the project will be lost as a foraging area to sturgeon until it can recover which is expected to take from 1 to 2.5 years. However, the areas adjacent to the SBBA (not including other locations recently dredged within the borrow area) are regional in size and offer similar types of prey (Clarke et al., 1991; Cerrato and Wiggins 1990, 1991). Sturgeon will be able to find prey outside the SBBA, therefore this temporary loss of forage is not a significant indirect impact to regional sturgeon (USACE, 2003).

5.6.4 NMFS-Listed Species Effects and Critical Habitat Determinations

With the implementation of NMFS recommended RMPs including use of the deflector head, the instituted take statement, dredging only between November and May, and a long record of little to no dredge related impacts to any ESA species over the past 25 years significant impacts that would jeopardize any local or regional population of ESA species is not anticipated. The National Marine Fisheries Service makes the same conclusion as they state in section 10 of their BO:

"*the proposed actions may adversely affect but are not likely to jeopardize the continued existence of any DPS of Atlantic sturgeon, Kemp's ridley and loggerhead sea turtles and is not likely to adversely affect leatherback or green sea turtles or right, humpback or fin whales. Because no critical habitat is designated in the action area, none will be affected by the action.*"

5.6.5 Piping Plover

Although the threatened piping plover does not currently nest in the project area due to the absence of suitable habitat, the Service lists them as a potential concern because construction of the Bay Shore component of the project may create suitable nesting habitat (USFWS, 2014). Consultation with the USFWS has determined that the project will have no effect on the piping plover.

5.6.6 Seabeach Amaranth

The seabeach amaranth does not currently grow in the project area due to the absence of suitable habitat (Solberg and Staples 2002). However, the Service lists them as a potential concern because construction of the Bay Shore component of the project may create suitable growing habitat (USFWS, 2014). In 2013 a single plant of seabeach amaranth was observed in Keansburg, NJ just east of Union Beach and six plants were identified in Port Monmouth approximately 2.8-3.5 miles from the project area in 2014 (USFWS, 2014a).

Prior to initiating construction on the project, the entire project area would be surveyed for presence/absence of seabeach amaranth by a qualified botanist and the survey results provided to the USFWS' New Jersey Field Office. In the event that seabeach amaranth is found within the project area, information including plant locations, number of plants, and size of plants shall be recorded and provided to the USFWS and to the New Jersey Natural Heritage Program. Should the plant be identified in the project area, all areas where the plant is found would be avoided and protected from disturbance by erection of symbolic fencing (post and string) providing at least a 10-foot buffer around plants (USFWS, 2014a). Construction activities would avoid any delineated locations of seabeach amaranth, and no materials or equipment would be stockpiled or stored within 330 feet of known seabeach amaranth sites (USFWS, 2014a).

Because the process of beach nourishments may provide suitable habitat for seabeach amaranth to become established within the project area, the New York District would perform annual botanical surveys for seabeach amaranth for the first five years of project implementation. If seabeach amaranth is found to occur within the project area, the Corps will re-initiate consultation with the Service pursuant to Section 7 of the ESA (USFWS, 2014a).

5.6.7 Rufa Red Knot

Although the Rufa Red Knot does not nest within the project area, the Rufa Red Knot may utilize the area as stopover habitat during the spring (mid-May through early June) and fall (late-July through November) migration periods. Coordination and consultation on the Rufa Red Knot with USFWS has determined that the project will have discountable effects on the red knot.

5.6.8 Northern Long-Eared Bat

The project area is delineated as summer migratory range for the northern long-eared bat *(Myotis septentrionalis) (USACE, 2014a).* The New York District will incorporate a seasonal restriction on tree cutting between April 1 and September 30 during the PED planning. If the seasonal restriction cannot be incorporated into project planning, the New York District would conduct a summer survey for this species consistent with the USFWS recommendations for avoiding effects to the northern long-eared bat (USACE, 2014a).

5.6.9 USFWS Listed Species Effects

In accordance with the Service recommendations, the District will survey the beach prior to construction for seabeach amaranth. If seabeach amaranth is observed the District will consult with the Service. In addition, if sightings of piping plovers occur prior and during construction, the District will consult with the Service and implement approved Service monitoring methods.

The finding is a determination of no affect, to the piping plover.

The finding is a determination of no affect to the seabeach amaranth.

The finding is a determination of may affect, but is not likely to adversely affect the rufa red knot.

The finding is a determination of no affect to the northern long-eared bat.

5.7 State Threatened and Endangered Species

From the 2003 FEIS, the District anticipates moving six osprey platforms out of construction zone, due to the construction buffer zones. To avoid potentially breeding ospreys utilizing the platforms, the District would move the platforms during the non-breeding season. There would be no impacts to any other state-listed endangered or threatened species from construction and maintenance of the authorized plan.

During the PED phase of the project, the New York District would conduct searches for the state-listed (endangered) seabeach knotweed (*Polygonum glaucum*), seabeach sandwort (*Honckenya peploides*), and seabeach milkwort (*Glaux maritima*), as well as for the plant species of concern seabeach evening-primrose (*Oenothera humifusa*).

5.8 Essential Fish Habitat

Construction of the beach berm, terminal groins, and periodic re-nourishments would not cause any adverse effects to EFH designated species. Essential Fish Habitat assessments have been completed and can be found in Appendices A and F for the project and SBBA, respectively.

5.9 Offshore Borrow Area

The use of the SBBA for the HSLRR-proposed project would be substantially the same as was described for the 2003 FEIS; the effects analysis as described in the FEIS is summarized below (USACE, 2003).

5.9.1 Essential Fish Habitat

Some EFH species may be directly impacted by the project operations, which could include entrainment, contact injury, and displacement. All adult EFH species except the ocean quahog (*Artica islandica*), a bivalve, have the mobility to avoid impingement or contact impacts from single or multiple dredges active at the SBBA. It is expected that some individuals will be entrained into the dredge but the numbers are not anticipated to be significant. Use of the rigid deflector greatly decreases the potential for impingement into the dredge. Of the 27 EFH fish species potentially existing at the project borrow site, those, which are considered highly demersal, may be at greater risk from dredge related direct impacts in comparison to those, which spend most of their time higher in the water column**.** Specialized demersal species which spend most of their time at or in contact with the bottom such as flounder, skates, and the goose fish, a lie in wait predator may be at greater risk of entrainment or draghead contact injury. The SBBA EFH species potentially at higher risk of direct impact from hopper dredging include: whiting (*Merluccius bilinearis*, red hake (*Urophycis chuss*), witch flounder (*Glyptocephalus cynoglossus*), winter flounder (*Pleuronectes americanus*), yellowtail flounder (*Pleuronectes ferruginea*), windowpane flounder (*Scopthalmus aquosus*), goosefish (*Lophius americanus*), summer flounder (*Paralicthys dentatus*), clearnose skate (*Raja eglanteria*), little skate (*Leucoraja erinacea*), and winter skate (*Leucoraja ocellata*).

Water quality impacts including turbidity, salinity, temperature, dissolved oxygen or any other to water quality parameter will not be significant. Once loaded the hopper dredge will transit to the pump out station. Significant direct or indirect impacts to EFH species from transit operations are not anticipated. Dredging will alter the topography and bathymetry and sediment character with of EFH habitat as well as remove most of the benthic organisms within the area dredged. The first two changes represent direct impacts to EFH while all three represent indirect impacts to EFH finfish species.

There will be indirect adverse impacts to EFH species stemming from alterations of the bottom habitat, as a result of dredging in the SBBA. The most apparent impact to fin fish will be the loss of benthic invertebrate forage species that will be entrained with the sediment. This is a temporary, indirect impact. This loss is considered minimal because of SBBA is surrounded by areas of compatible forage of a regional scale (Stuart et al., 1992). The project footprint is expected to recover within 1 to 2.5 years depending on the type of community and dominant species, according studies conducted in similar New Jersey borrow area habitats (USACE, 2001; Stuart et al 1992). Resident EFH species will disperse to surrounding areas to forage; species migrating through will simply continue to forage elsewhere when required.

Indirect EFH impacts to fish species will also include changes to bathymetry and bottom characteristics. These differences may change the dredged areas functional capacity regarding how it can be utilized for a particular EFH species. For example, temporary changes to sediment type from course to fine may make it incompatible for the ocean quahog but make a good foraging area for summer flounder.

5.9.2 Water Quality

No significant impacts to water quality area expected from the actions of the dredge. There may be a minor, localized increase in total suspended sediment along the path that the draghead takes as it entrains sediment.

5.9.3 Benthic Invertebrates

There would be a temporary, indirect impact to the benthic invertebrates. This loss is considered minimal because of SBBA is surrounded by areas of compatible invertebrates scale (Stuart et al., 1992). The project footprint is expected to recover within 1 to 2.5 years depending on the type of community and dominant species, according studies conducted in similar New Jersey borrow area habitats (USACE, 2001; Stuart et al., 1992).

5.9.4 Finfish

The direct impacts to finfish as a result of dredging of the SBBA for the project may include impingement, or other dredge or draghead contact injuries as well as disturbance and displacement adults and juveniles of species present. Eggs, larvae and very early juveniles that are associated with the benthos and present may be much more susceptible to impingement but this has not been studied.

Because the dredge is working in course sands and the draghead and sediments are being drawn into the dredge there is very little dispersion of the bottom sediments and impacts to fish from this temporary and highly localized increase in suspended sediments will not be significant. No other direct water quality issues are expected. Entrainment and resulting mortality is the most serious potential issue regarding the use of hopper dredges. This is most likely to occur to demersal species, especially resident flatfish and skate species, most of which are designated as EFH species in these respective quadrants. Adult and older juvenile life stages of demersal fish can be found at SBBA throughout much of the year. These life stages area highly mobile and with the addition of the deflector device on the draghead avoidance of the dredge is the expected response of most individuals. However, some mortality is likely to occur.

Benthic oriented eggs, larvae, and early stage juveniles are assumed highly susceptible to a hopper dredge even with a deflector shield attached to the draghead. However, these life stages may only be present and susceptible for a short period at or near the bottom. As the fish matures, it may leave the benthic zone or be more capable of avoidance. Only those species with demersal post larval stages such as summer and winter flounder, windowpane flounder, and the skates would remain at risk at the SBBA. Fish larvae are known to occur in New Jersey waters regionally adjacent to the SBBA. The District (USACE, 2001) collected larval fish, which documented a diverse assemblage of fishes representing 33 families. However, the majority of larval capture was observed to take place in the upper portion of the water column, away from the impacted sea floor. In general, although entrainment of ichthyoplankton is likely, is not expected to have a detectable effect to finfish species (USACE, 2001).

There is potential for indirect adverse impacts to finfish to occur stemming from alterations of the bottom habitat, as a result of dredging in the SBBA. Indirect impacts would include changes to bathymetry, the potential for temporary or moderate long-term changes to sediment character, and the temporarily azoic benthic surface conditions equating to the temporary loss of forage for finfish. Due to the nature of the dredging plan, which includes a relatively shallow, gently sloping cut below surrounding depths, and the nature of the SBBA sediments (>90-percent, coarse sand with very low organic content) no significant adverse indirect impacts to salinity, temperature, dissolved oxygen, or any other water quality parameter are expected as result of the dredging action.

The most apparent potential impact to finfish will be the loss of benthic invertebrate forage species that will be entrained with the sediment. This is a temporary, indirect impact. During the time it takes for the dredged footprint to recover its benthic resources, finfish will prey in areas of compatible forage that surround the SBBA on a regional scale (Stuart et al., 1992). The project footprint is expected to fully recover within 1 to 2.5 years depending on type of benthic community that existed prior to dredging according studies conducted in similar New Jersey borrow area habitats (Wilber and Clarke 2007; USACE 2001; Clarke et al., 1991; USACE, 2001).

5.10 Cultural Resources

No historic properties were identified in the APE previously subject to investigation. NJHPO has since concurred that no known historic properties will be impacted in the locations modified through the HSLRR study. Cultural resources investigations, however, will be undertaken for proposed wetland mitigation sites, once defined, and for those alignment changes now proposed on high ground. A Programmatic Agreement (PA) was prepared to address the need for further study (Appendix H). It also includes stipulations addressing potential impacts with use of the SBBA that will be followed in lieu of the monitoring previously stated in the 2003 FEIS. Any refinements to design developed during PED will be subject to a cultural resources evaluation.

Coordination at all phases of study was conducted with the NJHPO and other parties (Appendix C). The Draft PA was coordinated with the NJHPO, Advisory Council on Historic Places (ACHP), the Delaware Nation, and the Delaware Tribe of Indians. The ACHP and Tribes declined to participate as signatories to the agreement. The Draft PA was revised following the 2016 CBRS changes to include archaeological testing on high ground. The Revised Draft PA was coordinated with the NJHPO. Public review of the Revised Draft PA was conducted as part of the public review of the Draft SEA and served as the New York District's Section 106 public coordination. No comments were received regarding cultural resources or the PA. The NJHPO and the District signed and finalized the PA on January 10, 2017.

5.11 Coastal Barrier Resources System

As stated in Section 4.11, the USFWS stated that parts of the Union Beach project were within the Coastal Barrier Resources System (CBRS) Unit NJ-04 (2008 Unit Alignment). USACE requested an exemption from the 2008 unit alignment (see Appendix C) which the USFWS denied, though the USFWS informed USACE in 2014 that CBRS Unit NJ-04 was to be reevaluated based on effects from Hurricane Sandy.

USFWS, in response to Hurricane Sandy, drafted a revised alignment for CBRS Unit NJ-04. On 7 July 2016, the USFWS announced in the Federal Register that it is developing a new CBRS mapping protocol for critical facilities located within and immediately adjacent to the CBRS. In the announcement, the USFWS stated that it may consider mapping a CBRS area to allow for the protection of existing critical facilities (e.g., sewage treatment facilities) that primarily serve areas located outside of the CBRS. The USFWS developed this new protocol for critical facilities to allow for the protection of the Bayshore Regional Sewerage Authority Wastewater Treatment Facility (located within the project area). In cases where the USFWS recommends the removal of an area from the CBRS in accordance with the new protocol, the change becomes effective only if the updated map is adopted through legislation enacted by Congress.

In response to the revised alignment for CBRS Unit NJ-04 (July 2016 – subsequently revised during the USFWS public comment period), the USACE modified the alignment along the Chingarora Creek element of the project to avoid encroachment on the CBRS. The modifications increase the overall length of the Chingarora Creek element from 11,384 feet to 13,220 feet (an overall increase of 1,836 feet). Specifically, the modifications to the Chingarora Creek element include 10,977 linear feet of floodwall (an increase of 6,021 linear feet from the 2007 Authorized Plan) and 2,243 linear feet of levee (a decrease of 4,185 linear feet from the 2007 Authorized Plan). Additional information on the modified alignment is provided above in Section 3.5.1 (Alignment Shift to Avoid CBRS Boundary) and Section 3.6 (HSLRR Summary of Alignment and Design Changes).

The purpose of CBRA is to minimize the loss of human life, wasteful expenditure of federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf coasts. The Act achieves this by restricting federal expenditures and financial assistance, which have the effect of encouraging development of coastal barriers, and by considering the means and measures by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved.

The alignment for CBRS Unit NJ-04 the Service announced in the Federal Register on 7 July 2016 was as made effective on December 16, 2016, via Public Law 114-314. With this, the District is in compliance with CBRA.

5.12 Coastal Zone Management

The authorized project was reviewed and analyzed by the District to determine its consistency with the New Jersey Coastal Management Rules (NJAC 7:7E). An evaluation of the project’s consistency with applicable policies is provided in Appendices B (shore) and C (inland). The NJDEP has determined that the shore component is consistent with New Jersey Coastal Management Rules (NJAC 7:7E) and provided a Water Quality Certificate. The NJDEP has determined that the shore component “appears to be consistent with the State's Coastal Zone Management policies and the State will withhold the final Federal Consistency determination until review of the final plan details.”

5.13 Hazardous, Toxic, and Radioactive Wastes

There is no known contamination within the current alignment. Additional coordination and/or testing may be required as the alignment is refined. An assessment of any mitigation sites will occur as these sites are identified.

5.14 Air Quality

The project has been evaluated for compliance with Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40 CFR§93 Subpart B). The requirements of this rule do not apply because the total direct and indirect emissions from this project are below the 100 tons trigger levels for NOx or Carbon Monoxide (CO) for each project year and below the 50 tons trigger level for VOCs for each project year (40 CFR§93.153(b)(1)&(2)). The estimated total NOx emissions for the project are 91.4 tons for each year of construction. Volatile organic compounds and CO emissions are significantly lower than the NOx emission estimates, as NOx is the primary mass criteria pollutant from diesel equipment (Appendix D).

The project is presumed to conform to the General Conformity requirements and is exempted from Subpart B under 40CFR§93.153(c)(1).

5.15 Navigation

Impacts on local navigation are expected to be minimal and only occur during the dredging operation and placing sand on the beach.

5.16 Aesthetics and Scenic Resources

Short-term, permanent, and temporary adverse impacts to aesthetic and scenic resources are expected to result from implementation of the authorized plan as described in the 2003 FEIS.

5.17 Recreation

Construction of the authorized plan could result in the short-term disturbance of recreation within the project area as described in the 2003 FEIS.

5.18 Transportation

Transportation effects would be adversely minimal and improved during flooding events as described in the 2003 FEIS.

5.19 Noise

Noise impacts will be minimal and short term as described in the 2003 FEIS.

5.20 Land Use and Zoning

The construction, operation, and maintenance of the levees, floodwalls, sluice gates, pump stations, and the road closure gate is consistent with existing land uses, which include recreational, residential, and commercial uses in the project area. In addition, the authorized plan would maintain the goals established by the Borough of Union Beach Zoning and Planning Board to protect and maintain floodplain and tidal wetland functions and uses in the project area.

The implementation of the project would have a direct positive impact on the existing residential and commercial areas located in the project area, by reducing potential flood damage. The project would have no impact on future development in the area of the levee and floodwall footprint because of the restrictions associated with current land use in the area. Existing wetlands already restrict extensive development in those areas that border the project area to the west by Chingarora Creek, and to the east by Flat and East Creeks. The construction of the levees and floodwalls would not significantly induce future development in residential or commercial area adjacent the project area, because these areas are currently almost fully developed.

The HSLRR Recommended plan's levee and floodwall locations would not displace or remove any residences in the project area. However, the levee and floodwall footprint would be located in developed areas and would require the acquisition of both permanent and temporary easements for the levee and floodwall footprint and construction workspace. The shoreline protection measure of the authorized plan would not displace any residence or commercial establishments in the project area. The dune and beach berm would be located along the existing beachfront in an area zoned for recreational land use.

5.21 Socioeconomics

5.21.1 Demographic Characterization

The project would neither induce growth nor inhibit growth of existing or future population in the Borough of Union Beach because the area is almost completely developed, with no real potential for significant expansion. Furthermore, the project would have no impact on the number, density, and racial composition of the residents living within the project area.

5.21.2 Economy and Income

The project would have a positive direct economic impact on existing business in the project area, due to reduced potential for future flood damages and improved accessibility to business during storm events. There also would be minor, indirect beneficial economic impact on the local economy during construction of the project from of the introduction of construction workers and the resulting purchase of supplies and food during the construction phase.

5.21.3 Housing

The project would have a direct positive impact on housing and structures in the Borough of Union Beach due to a reduction in potential flood damage to existing properties, and the subsequent reduction in associated costs to repair such damages. The project may have an indirect positive impact on residential property values in the project area due to the increase in flood protection and the presence of an enhanced beach area.

5.21.4 Environmental Justice

There is no disproportionately high and adverse human health or environmental effects on minority populations and low-income populations as described in the 2003 FEIS.

6 CUMULATIVE IMPACTS

The purpose of accounting for cumulative impacts is to analyze the incremental affects from all recent, current, or future projects that occur within the same functional ecological area as the Union Beach project. In this regard, the potential cumulative dredging impacts and placement projects relating to the project will include seven other projects, all requiring sand from the Sea Bright Offshore Borrow Area. Of these seven projects, two will have Raritan Bay placement actions similar to Union Beach project that must be taken into account for that aspect of cumulative impact analysis. The five excluded (placement site) projects, Sea Bright to Monmouth, Belmar to Manasquan, Long Branch, Asbury Park to Avon, and Elberon to Loch Arbour, are Flood Control and Coastal Engineers (FCCE) and Authorized but Unconstructed (ABU) coastal storm risk management projects that are located on the New Jersey shoreline of Atlantic Ocean, therefore it is the District's position that these project construction locations are located in an environment distinct and isolated from the Raritan Bay projects. Thus, they are not being considered within the aforementioned cumulative functional geographic resource placement impact analysis.

Concerning dredging and transit activities in and around the SBBA, Hurricane Sandy actions have been in progress since July of 2013 (Sea Bright to Manasquan) and project operations will be continuous and largely concurrent until about February 2019. Sequence and periods of concurrent construction can be viewed via the schedules in Table 2. In consideration of the projected continuous dredging activity for the above-described projects at SBBA, the Union Beach project is anticipated to be the final project commencing in January 2018.

Table 2.
Schedule of Dredging Operations within the Sea Bright Borrow Area

Location of Placement	Approximate Duration	Volume*	Acres
Sea Bright to Monmouth Beach	July 2013 - November 2013	2.2 mcy	138
Belmar to Manasquan	November 2013-March 2014	1.5 mcy	133
Keansburg	February 2014 – June 2014	1.1 mcy	120
Long Branch	November 2013-March 2014	3.5 mcy	181
Asbury Park to Avon	January 2014 – April 2014	1.0 mcy	115
Port Monmouth	August 2014- September 2014	400 kcy	46
Elberon to Loch Arbour	March 2015 – July 2016	4.57 mcy	307
Union Beach	January 2018 – February 2019	700 kcy	130

**mcy – million cubic yards; kcy – thousand cubic yards*

6.1 Topography, Geology and Soils

Assuming that all eight of the projects listed in Table 2 will be completed as planned; a cumulative dredging footprint of approximately 1,170 acres of the 3,700-acre SBBA will be affected. This represents about 32-percent of the delineated previously sanctioned borrow area, of which, Union Beach (130 acres) corresponds to about 4-percent. The entire borrow area (3,700 acres) is regarded as only a small fraction of the available region wide, comparable benthic habitat resource (USACE, 2010).

In the corresponding, but converse action of placement, the sand dredged from SBBA and placed along the Raritan Bay of New Jersey will cover approximately 300 acres of intertidal and sub-tidal bottom. This too represents only a fraction of this type of coastal habitat. Dredging and placement activities the Raritan Bay projects will be take place incrementally over a period of approximately three years and are not expected to result in any long term significant adverse impacts to soils or topography cumulatively or individually.

6.2 Water Resources: Groundwater, Surface Water, and Water Quality

No groundwater impacts (direct or indirect) are predicted when considering possible cumulative impacts from the Raritan Bay projects. Direct impacts to (ocean) surface waters including water quality will consist of continuous localized increases in nearshore turbidity and total suspended sediments total suspended sediment, which will be correlated to each placement operation according to the schedule displayed by Table 2. Activities including filling, regrading, groin modification, and pipe extension activities will contribute to this impact. Another impact of the placement operation will be the movement ocean-ward of the high tide demarcation by the increase in beach width. All elements of the beach and intertidal morphology will adjust to this new alignment. At the SBBA, other than minimal, localized increases of turbidity due to the draghead moving across the bottom, adverse direct water quality impacts are not expected. Under the authorized gently graded slope of the dredging plan, no cumulative adverse indirect changes to DO, temperature, or salinity gradients are expected.

6.3 Tidal Influences and Floodplain Values

Cumulative effects of the construction and maintenance of plans would have no significant negative impact on the existing tidal influences, floodplain values, and would have beneficial impacts related to flooding events.

Construction and maintenance of the protective beach berms and dunes would not affect existing tidal patterns but would reduce the influence of ongoing tidal patterns along the shorelines. The construction of the sluice gates, levees, floodwalls, and pump stations would have no significant effect on periodic tidal events.

The construction and maintenance of the dune and beach berms would result in long-term beneficial impacts on the project area’s ability to assimilate flooding events. The construction of the sluice gates, levees, floodwalls, and pump stations would also result in beneficial effects on how the project area experiences severe tidal flood events.

Construction and maintenance of the plans would result in both temporary and permanent cumulative impacts to floodplain values. The temporary impacts would include the displacement of wildlife habitat, loss of recreational opportunities during the construction period, and the potential for erosion and sedimentation should a flood event occur during the construction period. The long-term beneficial impacts would include enhanced floodplain values, including storm surge protection, recreational opportunities, and wildlife habitat.

6.3.1 Vegetation

The state and federally protected plant, seabeach amaranth has been found in Keansburg only for the Raritan Bay projects. Monitoring will continue to be conducted in season to locate any plants in any active project areas or newly restored reaches. Analogous protective state and federal regulations will implemented to protect the species from any direct impacts.

Newly established beaches may provide productive habitat for these plant species. After the initial nourishment of Sandy Hook to Barnegat Inlet Sections I and II, sea beach amaranth proliferated possibly due to an offshore seed source pumped to the beach during nourishment. It is possible that a similar positive indirect impact may again occur; however, that project was on the Atlantic coast and not in Raritan Bay.

Significant cumulative adverse direct impacts to vegetation either terrestrial or submerged aquatic vegetation (SAV) are not expected. Terrestrial vegetation on the sections of that will be nourished were scoured by Sandy, and most of the vegetation was lost. Little, if any, dune grass or similar berm vegetation will be adversely affected. Areas that retain vegetation do so because the width of the berm in those areas was sufficient to protect the plants from wave run up and scouring. Areas such as these will be landward the beach berm. Because sand placement will be reconstructing the berm, it is likely that it will be re-colonized by various common seaside plants. Thus, the secondary impacts to vegetation as a result of the placement would include proliferation of berm vegetation, which in turn will help stabilize the beach.

There will little direct impact to any SAV. There are no areas of eelgrass within any of the project placement sites, including the Union Beach project. Due to the depth of the offshore borrow area, ambient turbidity attenuates the sunlight, inhibiting photosynthesis, and plant growth. Because there is little in the way of SAV at the borrow area any direct adverse direct impact including loss of vegetation is considered insignificant. No significant cumulative indirect impacts to SAV are expected in regard dredging at the borrow site.

The Port Monmouth project is another project in Raritan Bay that consists of Levees and Floodwalls that will impact wetlands. As with this project, the impacts from the Port Monmouth project have not been calculated. However, like Union Beach, Port Monmouth will fully mitigate wetland impacts in consultation with NJDEP Land Use Regulation.

6.4 Fish and Wildlife

6.5 Shellfish

Construction of the beach berms, revetments, terminal groins, and periodic re-nourishments would have a cumulative immediate adverse effect on the shellfish species within the project area. During construction of these components, any sessile shellfish in the immediate footprint would be buried while most mobile shellfish species would relocate to an area outside of the immediate impact area.

A temporary, short-term increase in sedimentation and turbidity is expected as a result of initial nourishment and periodic re-nourishments. However, sedimentation (mostly sand) is expected to settle quickly out of the water column, thus limiting the impacts to local shellfish species. Cumulative long-term shellfish presence would not be significantly impacted because local turbidity, current, and substrate material would not change following beach/dune construction, and new larval recruits (Marsh et al., 1980; Parr et al., 1978; Ragnarsson, 1995; Smith and Brumsickle 1989; and USACE 2000) would colonize newly settled sediment rapidly.

Construction of the levees, floodwalls, pump stations, and gates would be limited to the upland areas adjacent to the salt marshes and some wetland areas along the edge of the marsh. In areas where levees or floodwalls are constructed in the wetlands, a short, one-time direct burial of existing shellfish may occur if any are present at the time. No long-term adverse impacts to the shellfish are expected as a result of the construction of these structures.

6.5.1 Finfish

No significant cumulative adverse direct impacts to common species frequenting nearshore and surf zone are expected from placement operations. Nearshore species adults and juveniles are expected to avoid direct impacts including burial, contact with equipment or respiration impacts by redistributing to unaffected areas. Eggs and larvae may be more susceptible to adverse impacts including burial and respiratory stress and mortality.

6.5.2 Benthic Resources

Approximately 50 acres of intertidal and nearshore (placement sites) will be covered with sand from the SBBA. Some of the more active benthic invertebrates such as the swimming crabs may escape the draghead. No significant water quality impacts are anticipated due to the low content of fine sediments and associated organic materials within the sand to be dredged. The areas to be dredged are typical benthic habitats available outside the SBBA on a regional scale.

Secondary impacts relating to benthic community recovery may include initial accretion within the dredge footprint of sediments finer than those removed by the dredge, resulting changes in the benthic community. Early benthic recovery will be characterized decreased biomass of the dominant sessile forms (sand dollars, surf clams, etc.) and increased abundance and biomass pioneering species of marine worms such as the spionid polychaete (*Spiophanes bombyx*). Previous monitoring studies (USACE 2001) have shown that abundance, biomass, and taxa richness recovered within about 1 year while recovery of assemblage biomass composition may take from 1.5 to 2.5 years.

Total construction time for the three Raritan Bay of New Jersey projects is approximately 2 years starting in February of 2014 and with completion expected by December 2015. As the project schedules progress, intertidal and near shore recovery will occur sequentially within each project site as each localized section is completed. Thus, individual projects may have partially recovered prior to the stated completion date depending on duration of the project.

6.5.3 Reptiles and Amphibians

No significant cumulative impacts to terrestrial reptiles or amphibians are anticipated.

6.5.4 Birds

No significant cumulative direct or indirect impacts to birds are expected to occur at the SBBA.

The most frequent cumulative direct impact to birds will be disturbance of shorebirds foraging or loafing on the beach due to the movement of equipment and construction activity related to placement procedures or groin modification. Birds most commonly disturbed will consist of various species of gulls and other common shorebirds. Since it will take approximately two years to complete all of the projects, migrating transients may also experience disturbance by the land based coastal storm risk management activities. All adult and fledged juvenile birds will move off to suitable areas. There would be no significant adverse impacts adult birds.

6.5.5 Mammals

Loss of berm and associated vegetation has greatly decreased small foraging and refuge habitats and this has likely reduced the numbers of animals in the placement area. Any remaining small mammals would be expected avoid impacts from typical project construction equipment and activities. Direct impacts to small, mammals would consist of disturbance by construction activities, which would result in their dispersal to an undisturbed area. There will be no significant direct cumulative project impacts to small mammals at placement sites. Seals will not be impacted.

6.5.6 Federal Threatened and Endangered Species

The piping plover is not anticipated to occur in the Raritan Bay or NJ Atlantic coast project areas. Therefore, no cumulative impacts are anticipated. If piping plovers are observed the District will consult with the Service and implement an approved monitoring plan.

For this cumulative impact section, the NOAA Biological Opinion (BO) (NMFS, 2014) covers federally listed species under the jurisdiction of the NMFS, potentially affected by the Port Monmouth and Union Beach projects under Section 7 of the ESA. The other five projects will be in compliance with Section 7 under Emergency Consultation procedures pertaining to P.L. 84-99.

6.5.7 Sea Turtles

No significant cumulative direct or indirect impacts are expected the project area for sea turtles regarding placement site operations. Sea turtles are not expected to enter these very shallow nearshore waters.

Large areas of potential forage for loggerhead and Kemp's ridley sea turtles will be removed by dredging. This would represent a decrease in available prey resources inclusive of all the project dredge footprints. However, the cumulative dredged areas still represent a tiny fraction of available benthic resources adjacent to the SBBA and a turtle would be able to swim past a recently dredged area in a matter of minutes. Therefore, these are not significant indirect impacts to sea turtles.

6.5.8 Whales

No significant cumulative direct or indirect impacts are expected the project area for endangered whales regarding placement site operations.

At or near the SBBA, all three species of whales previously described in the Affected Environment Section will continue to be susceptible to vessel strikes. Vessels and dredges traveling through or near the SBBA may also result in disturbances to whales by causing a change in whale behavior such as swimming direction.

Direct impact injuries from hopper dredges dredging or transiting to or from SBBA are possible, but recommended protocols for vessel speeds as recommended in the 2014 NOAA Biological Opinion (NMFS, 2014) will range from about 2.6 and to about 10 mph, which is considered slow enough for whales to avoid collisions. Other NOAA recommendations include observers on board watching for whale activity who will implement with dredge procedures for avoiding and protecting any whales within 1,600 feet.

6.5.9 Atlantic Sturgeon

No significant cumulative direct or indirect impacts are expected in the project area for the endangered federally endangered Atlantic sturgeon regarding placement site operations.

The SBBA falls within an area that may harbor Atlantic sturgeon year round, including individuals from any of the east coast sturgeon DPS. Duration of dredging and related vessel activities, will last for approximately 18 months (June 2013 through January 2015) with the potential direct impacts of impingement or other contact injury.

Use of the deflector head, slow draghead speed, and past monitoring records showing a very low probability of entrainment, provide methods and evidence respectively that this type of impact will be kept to a minimum. The Atlantic sturgeons generally demersal behavior and the depth open ocean environment of the borrow area and transit routes make dredge or vessel strikes highly unlikely. Project interference with migration routes is also improbable due to the open ocean situation.

During the cumulative project, dredging of sand from SBBA surface sediments including benthic invertebrates will be removed along with the fill sand. As sturgeon feed on many of these types of organisms this loss of forage would be considered a secondary impact, but would not be considered significant because of the proximity of adjacent coast wide areas of compatible forage which sturgeon can easily reach. Recovery of the benthic populations is expected in 1-2.5 years.

6.5.10 State Threatened and Endangered Species

There are breeding ospreys within the Raritan Bay project areas. There are no known ospreys within the NJ Atlantic coast projects. Through the relocation during construction and sequencing of construction, no osprey platform will be impacted. There would be no cumulative impacts to any other state-listed endangered or threatened species from construction and maintenance of the Raritan Bay and NJ Atlantic coast projects.

6.5.11 Essential Fish Habitat

Approximately 50 acres of intertidal and nearshore EFH will be sequentially altered by burial and localized increases in turbidity. EFH alteration impacts also include temporary loss of most benthic fauna as each worksite reach is covered. Benthic recovery of each completed reach will begin almost immediately and follow in that same sequence as construction. Complete placement site recovery can occur as quickly as three to six months, but may take up to a year depending on the date of fill. Recovery may be enhanced by recruitment of organisms introduced by the placement operation.

Nearshore species adults and juveniles are expected to avoid direct impacts including burial, contact with equipment or turbidity related respiration impacts by redistributing to unaffected areas. Juvenile bluefish have been noted as the most common EFH species in the surf and nearshore zones.

Eggs, larvae may be more susceptible to adverse impacts including burial and respiratory stress. February through June may represent the period of highest risk to eggs and larvae along the nearshore during placement operations.

6.6 Offshore Borrow Area

6.6.1 Essential Fish Habitat

Approximately 1,170 acres of offshore EFH will be sequentially dredged and altered. Alteration includes deepening, and loss of benthic forage species. Significant adverse water quality impacts are not expected. Recovery of the benthic ecosystem is anticipated to occur within 1- 2.5 years.

Adult EFH species on or near the bottom at the SBBA are expected to avoid direct impacts by avoiding the draghead which will include a deflector device. Some adult mortality is likely to occur. EFH species including winter, summer, and windowpane flounder along with little, winter and clearnose skates may be most susceptible. October through May will be the period of most activity and possibly highest risk to these species. Any EFH species early life stages at or near the bottom will be highly susceptible to entrainment by the dredge.

The SBBA has been subject to regular dredging disturbances since 1994. The SBBA is not unique habitat, and it surrounded by areas of similar ecological function regional in dimension. EFH species are expected to leave any areas that are disturbed or temporarily depleted of abundant prey resources and move to undisturbed adjacent forage rich habitats. Although it is recognized that recreational opportunities such as fishing, surfing, and swimming will be impacted, through coordination with the local municipalities and the State of New Jersey, it has been determined no significant adverse cumulative long term direct or indirect adverse impacts are expected to occur to EFH or associated species.

6.6.2 Water Quality

No cumulative impacts to water quality area expected from the actions of the dredge. There may be a minor, localized increase in total suspended sediment along the path that the draghead takes as it entrains sediment.

Regarding the information previously discussed and assuming all of the projects in Table 1 will be completed within the time frame presented, direct impacts to the benthic community will consist of mortality to most of the slow moving or sessile benthic invertebrates within each projects site's dredging footprint (total 1,170 acres). Benthic fauna will be drawn into the dredge and lost to the placement site beach fill location. There will be an immediate decrease in abundance, biomass, and taxa richness (USACE, 2001).

6.6.3 Benthic Resources

Secondary impacts relating to benthic invertebrates may include initial deposition within dredge footprint of sediments finer than those removed by the dredge, resulting in initial recolonization by species adapted to finer sediments. The extent of accretion and duration of the layer of finer surface sediments will be dependent on the depth of the dredge foot print, tidal currents and frequency of weather events that are capable of causing significant sediment movement. Early benthic recovery will be characterized decreased biomass of the dominant sessile forms (sand dollars, bivalve clams, etc.) and increased abundance and biomass pioneering species of marine worms such as the *spionid polychaetes.* Previous monitoring studies (USACE, 2001) have shown that abundance, biomass, and taxa richness recovered within about 1 year while recovery of assemblage biomass composition may take from 1.5 to 2.5 years.

6.6.4 Finfish

Eight dredging projects will utilize the SBBA sediments for coastal storm risk management measures and are expected to move forward having started in 2013. Each of these projects has a beach nourishment element and the volume of sand required and related area dredged SBBA. Most adult finfish are expected to avoid direct impact with the dredge (draghead) due to their mobility, the relatively slow movement of the draghead (at 2.5 mph), and the use of the deflector head. Highly adapted demersal species, which spend most of their time in contact with or very close to the bottom such as the various flounder species, skates, and lie in wait predators such as the goosefish may be at greater risk of entrainment or draghead contact injuries than those species constantly swimming in the water column.

The most apparent impact to finfish will be the loss of benthic invertebrate prey species that will be entrained into the dredge with the sediment. This is a temporary, indirect impact (to fish). Assuming all of the projects in Table 1 will be completed; there would be an incremental reduction in benthic resources within 1,170 acres of the 3,700 acre SBBA. The type of benthic habitat impacted by these projects is common and available adjacent to SBBA on regional scale. This impact is not considered significant. Each project footprint is expected to fully recover within 1 to 2.5 years according studies conducted in similar New Jersey borrow area habitats (USACE, 2001). Fish seeking forage prior to the beginning of recovery will find it by swimming out of the affected areas. The 1 to 2.5 year recovery time is dependent on the time of year during which the dredging was implemented and completed and, type of benthic community that existed prior to dredging (USACE, 2001).

6.7 Cultural Resources

There are no anticipated cumulative effects on the inland and nearshore historic resources. The use of the SBBA by multiple projects will however increase the likelihood that a significant resource may be impacted by dredging. The PA stipulates that potentially significant wrecks will be buffered. Buffer zones will be included on construction plans.

6.8 Coastal Barrier Resources System

There are no other projects in the Raritan Bay that infringe upon the CBRS and design changes in the HSLRR avoid effects to the CBRS. Therefore, there are no anticipated cumulative effects on the CBRS.

6.9 Coastal Zone Management

Because all of the project included in the cumulative actions will have been evaluated and found consistent with their appropriate state and local CZM policies, not adverse impacts to related CZM issues are anticipated. Because the all of the projects were implemented to preserve and protect life, property, and environmental resources, the cumulative impact of completing these actions will result in promoting the beneficial aspects of CZM.

6.10 Hazardous, Toxic, and Radioactive Waste

There a no anticipated cumulative HTRW effects.

6.11 Air Quality

Emission calculations based upon the equipment inventory developed for construction of each federal project within the Raritan and Sandy Hook Bays area were determined via each project General Conformity analyses. There will be no cumulative impacts resulting from theses project since all emissions resulting from each USACE project are within the NAAQS for the area.

6.12 Navigation

There are no anticipated cumulative navigation effects.

6.13 Aesthetics and Scenic Resources

Completion of the three projects will result in region wide cumulative beneficial direct and indirect impacts to aesthetic and scenic coastal resources.

6.14 Recreation

Concerning recreation, the results of the cumulative project actions will generally be increased benefits, greatly due to an enlarged berm and beach area. This will include passive activities such as sunbathing and walking to more active past times including windsurfing and swimming. Depending on the location, the quality of surfing and surf fishing may be reduced.

6.15 Transportation

There a no anticipated cumulative transportation effects.

6.16 Noise

There will be negligible increases in noise levels in the immediate vicinity of each project placement site for each of the project locations evaluated for the cumulative impacts. The increase of noise will be produced by heavy equipment and construction activities. Most of these impacts are expected to be of minimal consequence. Because these projects are isolated geographically from one another, collective/additive noise impacts from concurrently operating projects is not expected. Increased noise levels will last only as long as each project’s construction duration. Construction elements that require pile driving will cause greater noise impacts on land and in water, dependent on the location of the installation. No long-term noise impacts anticipated.

6.17 Land Use and Zoning

Other than the temporary and sequential staging, set up and movement of equipment as implementation of each work plan progresses, no permanent impacts to land use or zoning are expected.

6.18 Socioeconomics

Cumulative impacts to socioeconomics will include region wide improved protection against catastrophic damages to life, property, infrastructure, and economic stability. These in turn should increase the property values and the desirability of living in these areas.

6.19 Environmental Justice

There a no anticipated cumulative environmental justice effects.

7 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

Table 3.
List of Agencies, Organizations, and Persons Consulted

Agency	Contact	Subject
U.S. Fish and Wildlife Service	Eric Schrading, Field Supervisor, New Jersey Field Office	Endangered Species Act, FWCA, Coastal Barrier Resource Act Areas
U.S. Fish and Wildlife Service	Carlo Popolizio, CBRA Coordinator for New Jersey	Coastal Barrier Resource Act Areas, Endangered Species Act, FWCA
U.S. Fish and Wildlife Service	Dana Wright, Program Specialist	Coastal Barrier Resource Act Areas
U.S. Fish and Wildlife Service	Eric Davis, New Jersey Field Office	Endangered Species Act, Section 7 Consultation
N.J. State Historic Preservation Office	Daniel Saunders, Deputy State Historic Preservation Officer	Section 106, National Historic Preservation Act
N.J. State Historic Preservation Office	Dorothy Guzzo, Deputy State Historic Preservation Officer	Section 106, National Historic Preservation Act
New Jersey Department of Environmental Protection	Debbie Voelbel, Environmental Specialist	Non-Federal Project Sponsor
New Jersey Department of Environmental Protection	Ruth W. Foster, Acting Director Permit Coordination and Environmental Review	State Environmental Review
Monmouth County Parks	Gail Hunton	Historic Preservation
Delaware Tribe Historic Preservation Representative	Blair Fink	Delaware Tribe Historic Preservation
Delaware Nation	Ms. Tamara Francis-Fourkiller	Delaware Tribe Historic Preservation
Advisory Council on Historic Preservation	Raymond V. Wallace, Historic Preservation Technician	Programmatic Agreement
Delaware Nation Historic Preservation Office	Nekole Alligood, Director	Consultation with the Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge Munsee Band of Mohican Indians

National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries)	John Bullard, Northeast Regional Administrator for NOAA Fisheries	Endangered Species Act Coordination for the Sea Bright Offshore Borrow Area
National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries)	Karen Green, Mid-Atlantic Field Office Supervisor	Essential Fish Habitat

8 COORDINATION AND COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

Implementing the project modifications, as described in the HSLRR, would occur after compliance has been achieved with the applicable laws and regulations as described in Table 4. Environmental compliance for the proposed action would be achieved upon coordination of this supplemental environmental assessment with appropriate agencies, organizations, and individuals for their review and comments.

Table 4.
Compliance with Environmental Laws and Regulations

Legislative Title	U. S. Code/Other	Compliance
Clean Air Act	42 U.S.C. §§ 7401-7671g	A General Conformity Rule analyses and determination which resulted in a RONA are included in this supplemental EA in Appendix D. Any changes to the project that may affect air quality will result in a reevaluation, as required.
Clean Water Act	33 U.S.C. §§ 1251 et seq.	The District produced a Clean Water Act evaluation and is located in Appendix F.
Coastal Barrier Resources Act	16 U.S.C. § 3501 et seq; 12 U.S.C. § 1441 et seq	In compliance.
Coastal Zone Management Act	16 U.S.C. §§ 1451-1464 N.J.A.C. 7:7 and N.J.A.C. 7:7E	A CZM Determination was prepared and is located in Appendix B. NJDEP has determined consistency and issued a Water Quality Certificate for the shore component. NJDEP has determined the shore component appears to be consistent with the State's Coastal Zone Management policies and the State will withhold the final Federal Consistency determination until review of the final plan details.

Legislative Title	U. S. Code/Other	Compliance
Endangered Species Act of 1973	16 U.S.C. §§ 1531 et seq.	The District has completed Section 7 Coordination with NMFS and USFWS regarding endangered species. Biological Assessments (BAs) for use of the Sea Bright Borrow Area (NMFS) and the placement site (USFWS) were submitted. Agency BO's were completed for the project and received by the District. All Section 7 documents are included in Appendix C.
Environmental Justice in Minority and Low Income Populations	Executive Order 12898	The District performed an analysis and has determined that a disproportionate negative impact on minority or low-income groups in the community is not anticipated and a full evaluation of Environmental Justice issues is not required.
Fish and Wildlife Coordination Act	16 U.S.C. § 661 et seq.	In compliance. Utilizing 2003 FWCAR with updates from current design included in Appendix I.
Magnuson-Stevens Act Fishery Conservation and Management Act	Section 305(b)(2) 1996 Amendments	EFH Assessments (nearshore and offshore) were prepared in Appendix A and E, respectively.
National Environmental Policy Act of 1969	42 U.S.C. §§ 4321-4347	This supplemental environmental assessment has been prepared and circulated as required.
National Historic Preservation Act of 1966	16 U.S.C. §§ 470 et seq.	The District coordinated with the State Historic Preservation Office to fulfill requirements of this act. The signed Programmatic Agreement for the SBBA satisfies the District's Section 106 responsibilities and is located in the Appendix C.
Executive Order 11990, Protection of Wetlands	May 24, 1977	Circulation of this report for public and agency review fulfills the requirements of this order.
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks	April 21, 1997	Implementation of this project will reduce environmental health risks. Circulation of this report for public and agency review fulfills the requirements of this order.

The District hosted a public meeting on October 20, 2016 in Union Beach, NJ. The District presented the HSLRR and the Draft SEA and solicited public comment. Below are the public comments and the District response. Comments were edited for brevity.

Public Comment	**District Response**
My property abuts Chingarora Creek and there is a flood wall planned to run along my property line. Since Sandy, there has been a significant amount of erosion to the point the trees are now compromised and leaning sideways toward the creek. Will this be alleviated in the near term?	This project would consider the erosion as part of the next phase, when the floodwall would be designed and also considered during the physical construction. Design will be initiated in 2017 and construction scheduled to start for the Chingarora Creek project elements in July 2019. Construction duration would be approximately 33 months.
Will there be access to launch a vessel at Flat Creek after the completion of phase 2 of the project? Are there plans to dredge Flat Creek during the installation of levees?	Existing facilities will be replaced as part of the project. The location of the launch site may change but will be located within the same general area serving the same purpose. During the design phase the exact relocation will be determined. There are no plans to dredge Flat Creek.
Do you have an accurate timeline as to when the phase 1 will start? Will all this information be available online for the residents of this town to see? Why were both Port Monmouth and Keansburg projects fully funded whereas Union Beach is only being federally funded for 65% of the project?	Phase 1 design (beach/dune/groins) will start in January 2017 with construction initiation scheduled to begin in January 2018. Construction duration is estimated to be 14 months for this first phase. Please refer to pages 67-69 of the main report that was posted on the Corps website for public review for more scheduling information. A final version of the report will be posted on the Districts website once the final report is approved early 2017. In regards to the funding, when Congress passed the "Hurricane Sandy Bill", those projects that had received construction funding within 3 years prior to Hurricane Sandy were eligible for full federal funding (such as Port Monmouth at the time). However, the Union Beach project had not been appropriated construction funds within the 3 years prior to Hurricane Sandy. Therefore, there is only 65% federal funding available for the Union Beach project. 35% would be paid by a combination of the State, County, and/or Borough of Union Beach of which they will have 30 years to pay.

	Any revision to this funding issue would need to be amended by Congress.
Public Comment	**District Response**
What will be built behind my home? Will it be a wall or berm? How high would this structure be? And where exactly would it be placed? I am quite uncomfortable and upset with the proximity of the potential new structure to my house. The plans displayed indicated that a portion of my property would be needed for the structure. When attendants asked why the structure could not be pushed out 15-20 feet, no concrete answer was provided; the only explanation offered was that by pushing the structure out further it would be invading protected wetlands. I do not see the logic in this whatsoever, seeing as no matter where this structure is built, be it right on top of my yard or several more feet out, you will be disturbing wetland ecosystems. Now as I understand it, the Army Corps found it necessary to conceptualize this structure within my property because it would "cost too much" to push it back out into the protected wetlands where, I may add, it will be less likely to have financial implications when it comes time for me to sell my house. Furthermore, after hearing the information provided at the 10/20 meeting, I do believe that a project of this magnitude is no longer warranted as FEMA has required that I lift my house (an so many other homes in Union Beach) 10+ feet higher than it originally was. When asked if and how this project would affect FEMA standards and regulations, I was appalled to hear that it will have little to no affect and that it was suggested to reach out to FEMA with these questions, as the Army Corps has nothing to do with those determinations. Perhaps the Army Corps needs to re-evaluate their plans to include the fact that so many of these properties have already been elevated and adjusted to protect against future flooding.	The Plan Sheets provided for public review indicate that your address is located right at a transition point between the floodwall and levee. Based on existing information, the existing grade at the back of your property is +7 ft. NAVD88 and the crest elevation of the levee is +15 ft. NAVD. That equates to approximately 8 feet above ground. It also looks like the levee toe is not over the property line. However, please note that during the design phase of the project, a site specific survey and coordination with each individual homeowner will be conducted to minimize any impact of the project on the property owners and residents by adjusting the alignment as necessary while not infringing on the Coastal Resource Barrier System. The USACE must evaluate the alternative impacts to the environmental resources including wetlands. The wetlands are regulated federally by section 404 of the Clean Water Act, Executive Order 11988: Floodplain Management, Executive Order 11990: Protection of Wetlands, National Environmental Policy Act, Pub.L. 91–190, and through the state of NJ with N.J.A.C. 7:7A Freshwater Wetlands Protection Act Rules. Impacts to wetlands must be mitigated. The amount of mitigation includes the footprint of the line of protection and any wetlands on the "dry" side of the line of protection as those wetlands may be hydrologically disconnected and no longer remain wet. The USACE attempts to minimize impacts to private property and wetlands often resulting in minimal impacts to each. The intent of the project is to provide flood protection to local residences during coastal storm events. While the hindrance of a levee/floodwall on a property may have implications on its property value, so will the benefit of having a flood protection structure safeguarding a home during flood events. Although the project was authorized prior to Hurricane Sandy, the Corps was required to reevaluate the authorized project to determine if it was still technically feasible, economically justified, and environmentally acceptable. The results of this reevaluation were presented at the public meeting on October 20, 2016. This reevaluation took into account the large number of

	structures that were demolished or elevated and still found the plan to be economically justified (as well as technically feasible and environmentally acceptable).
Public Comment	**District Response**
My name and property were listed on your document entitled Appendix H - Real Estate Plan posted to the Union Beach website. It appears that I, along with numerous other residents of the Harris Gardens area going to be adversely affected in some way by your proposed flood protection project. I then attended the Public Information Meeting held on October 20 by the USACE and various other representatives. The information I did obtain was that the "green line" drawn behind my home (Fig 9) is going to be a flood protection levee which is being constructed during Phases 2 and 3 of the Project. My main concern is that the "green line" drawn for the levee makes an unexplainable direct turn into my yard. I also learned that the NJDEP and the NJ Division of Fish and Wildlife are concerned about preserving the wetlands and wildlife, but as stated above, there is more than enough square footage of dead vegetation to build whatever is necessary for flood protection so as to not encroach on our personal property or affect the wetlands/wildlife. My other greater concern is that I have an 8 year old son, a 100 pound German Sheppard, as well as a Police Officer husband who works the night shift and sleeps during the day. Years of construction behind our home, along with the potential partial loss of and/or use of our backyard and fencing will greatly affect our quality of life. Please also note that our lot is one of the smallest in Harris Gardens at 75 x 100, whereas all others are 100 x 100 or greater. We do not wish to make our backyard any smaller. Superstorm Sandy has been a 4 year nightmare for Union Beach, especially Harris Gardens. As you know, Harris Gardens was the hardest hit areas with almost 6+ feet of water flooding all homes. After Sandy, I truly believed that Harris Gardens would have been elected to be "bought out" in the Blue Acres program, but that idea was unilaterally rejected by representatives of Union Beach. Now, most homeowners have had to rebuild their homes to new elevated flood standards, some homes are left unfinished, and some have been abandoned to now zombie foreclosures. Years of construction, possible loss of portions of our property, loss of the enjoyment of our backyard, as well as the proposed 6+ foot levee to be built through our backyards is making this nightmare worse. I was assured at the Public Meeting that representatives of the USACE will be speaking to all the affected homeowners individually, and I will await to hear from them.	The USACE must evaluate the alternative impacts to the environmental resources including wetlands. The wetlands are regulated federally by section 404 of the Clean Water Act, Executive Order 11988: Floodplain Management, Executive Order 11990: Protection of Wetlands, National Environmental Policy Act, Pub.L. 91–190, and through the state of NJ with N.J.A.C. 7:7A Freshwater Wetlands Protection Act Rules. Impacts to wetlands must be mitigated. The amount of mitigation includes the footprint of the line of protection and any wetlands on the "dry" side of the line of protection as those wetlands may be hydrologically disconnected and no longer remain wet. The USACE attempts to minimize impacts to private property and wetlands often resulting in minimal impacts to each. With respect to the "jog" in the project alignment indicated by the "green line" that takes a direct turn into your property, USACE will coordinate with each individual homeowner regarding any impact to their property. During the design phase, a site specific survey will be conducted, designs modified, and the impact to any homeowner, minimized to the maximum extent practicable.

Public Comment	**District Response**
Hi I live in Union Beach and I want to know what is going on, I see my address listed on you page and I am a little concerned with what's going on? Thank you for this it was a huge help. But if my name is on the list then that mean I'm one of the house this project wants? Or it is worst case scenario, and I can keep my home? Also I would have never known about this meeting, it is not posted anywhere. The town of union beach or your company should send flyers out to let residents know because this is really important.	The Real Estate Plan identifies locations where there is a need to obtain the right from a property owner to construct a proposed project feature. That right will be in the form of a real estate agreement between the Borough of Union Beach and the property owner. For lands needed for the project, property owners will be compensated at the fair market value as determined by a licensed appraiser hired by the Borough of Union Beach. Homeowners will have the right to accompany the Appraiser during his/her inspection to provide them with their feedback. Generally, the project requires an easement from property owners over a portion of their property, not the purchase of their home. There are few instances where there may be a need to purchase the entire property from an owner. If it's determined that the purchase of an entire lot is needed to construct the project, homeowners will be entitled to Federal financial relocation assistance under Public Law 91-646. However, the Real Estate Plan identifies these areas as a worst case scenario. Every reasonable effort will be made during the project's detailed design phase to minimize the impact on homeowners to avoid a full purchase.
I live on Harris Avenue, one of the main areas you plan to destroy. We were hit badly by Sandy 2012. We lost everything but the clothes on are backs. Our home of over 30 years was destroyed. We worked for the last 3 years to bring our property back to what it was and now you plan to destroy it. First you need to redo the plan with a 2016 map, not a 2007 map. The paper street, formally Cambridge Ave. was vacated by the Town, Aug. 2005, resulting in a 50/50 split of an additional 20 feet by 100 feet to ourselves and our neighbor. You're not using it to store your equipment. You have no right to destroy what took us 4 years to rebuild. We don't need your help we needed it in 2007. Perhaps dredging the creeks would stop the overflow,	The Real Estate Plan identifies locations where there is a need to obtain the right from a property owner to construct a proposed project feature. That right will be in the form of a real estate agreement between the Borough of Union Beach and the property owner. For lands needed for the project, property owners will be compensated at the fair market value as determined by a licensed appraiser hired by the Borough of Union Beach. Homeowners will have the right to accompany the appraiser during his/her inspection to provide them with their feedback. Generally, the project requires an easement from property owners over a portion of their property, not the purchase of their home. There are few instances where there may be a need to purchase the entire property from an owner. If it's determined that the purchase of an entire lot is needed to construct the project, homeowners will be entitled to Federal financial relocation assistance under Public Law 91-646. However, the Real Estate Plan identifies these areas as a worst case scenario. Every reasonable effort will be made during the project's detailed design phase

this would be a lot better than what is proposed.	to minimize the impact on homeowners to avoid a full purchase.
Public Comment	**District Response**
I want clarification of what a pond easement is and what it will do to my property. If you are building walls to keep out tide water then water will lay in these pond easements and cause flooding to my property and needless to say mosquito infested.	An easement is an agreement between a landowner and another party, where the landowner gives the right to the other party to use and/or enter onto their land for a specific purpose. As it relates to the Union Beach flood protection project, the Borough of Union Beach will purchase easement agreements from property owners to construct, maintain, and operate a certain project element. Property owners will be compensated at the fair market value of the easement as determined by a licensed appraiser hired by the Borough. A "ponding" easement will be an agreement between the landowner and Borough of Union Beach to allow the runoff from rainfall to settle on a specified area of a landowner's property. The runoff from rainfall will only build up within the ponds when the outlets are closed during coastal storms. Once the coastal storm ends, the runoff will leave the ponds thru culverts and the ponds will empty. There will be no permanent settlement of water at ponding areas. Water will only settle temporarily during storm events.
I am grateful that this project is going forward! As a property owner affected by the easements I will have some questions but as I am part of the 4th phase I believe there is time for answers. My only concern was the lack of correspondence regarding this project. I am a Pastor in Sea Bright and have a residence there as well, if not for the casual mention of the assembly on the 20th (a conversation which took place on the 17th) I would have known nothing about it. Please increase the awareness of your project and the coming Public meetings.	The USACE advertised the meeting and reports on their website and emailed local government officials.

Public Comment	District Response
We own a home located at Front street in Union Beach. Our backyard currently includes an easement which is currently the "boardwalk" along the existing seawall. Can you please let us know if the new project will: 1. begin at the existing seawall and do away with existing boardwalk 2. how far out will the 17 foot dune be from the existing seawall 3. how much higher than the existing seawall (railing included??) will the dune be 4. Will the dune have only 3 overwalks? How high will the dune boardwalk be? Will it stretch the entire length of the new beach?	The design will not be finalized until the next phase. Conceptually the dune would end 10-15ft in front of the boardwalk. The Dune's other end would be 400 to 450ft into the water. Surveys indicate that in the vicinity of your home the boardwalk is at an elevation of about 9 ft. Additional surveys will be conducted in the design phase of this project. At this time we have not surveyed the handrail. Further, there are 3 cross overs currently proposed with the boardwalk extending the entire length of the beach.
I own a Front St house in Union Beach. I am directly on the water. My question is myself and several waterfront neighbors own up to the high-water tide and have riparian rights. Will the town or someone be purchasing this portion of the property form us? We would also need beach access over dune.	The State of New Jersey is the Non-Federal Sponsor on the Project. The State will enter into a Project Partnership Agreement (PPA) with the NY Army Corps (Corps) of engineers prior to the start of the engineering and design phase of the project. The agreement will require the State to be responsible for acquiring all Real Estate needed to construct, operate, and maintain the project. Concurrent with PPA execution, the State will enter into a State Aid Agreement (SAA) with the Municipality. The SAA will spell out the responsibilities of the State and the Municipality regarding funding obligations, operation and maintenance responsibilities, and real estate acquisition. The Army Corps of Engineers provides the State with a real estate plan which lists the affected properties. There are three types of easements that could be required of a property owner if impacted. They are 1) a permanent easement; 2) a temporary easement; or 3) in-fee acquisition. All real estate transactions are required to follow the Federal Real Estate Standards. Per the Federal Standards, the property owner is entitled to fair market value minus the monetary benefit the project provides. The first step will be for the property owner to be approached and asked if they would be willing to provide their easement voluntarily. If not, then additional steps will be taken to acquire the necessary property in accordance with the Federal Real Estate Acquisition

	Standards, which will include surveys, appraisals, good faith negotiations and, if required, condemnation.
Public Comment	**District Response**
I and several of the water front property owners have a few questions regarding our riparian rights. We all own from the street to the high tide water line or roughly 25ft passed our bulkheads, is this where the berm begin ?	The design will not be finalized until the next phase. The bulkhead line varies at this side of Front St. In the conceptual design the dune is generally closer than 25ft to the bulkhead. Concurrent with PPA execution, the State will enter into a State Aid Agreement (SAA) with the Municipality. The SAA will spell out the responsibilities of the State and the Municipality regarding funding obligations, operation and maintenance responsibilities, and real estate acquisition. The Army Corps of Engineers provides the State with a real estate plan which lists the affected properties. There are three types of easements that could be required of a property owner if impacted. They are 1) a permanent easement; 2) a temporary easement; or 3) in-fee acquisition. All real estate transactions are required to follow the Federal Real Estate Standards. Per the Federal Standards, the property owner is entitled to fair market value minus the monetary benefit the project provides. The first step will be for the property owner to be approached and asked if they would be willing to provide their easement voluntarily. If not, then additional steps will be taken to acquire the necessary property in accordance with the Federal Real Estate Acquisition Standards, which will include surveys, appraisals, good faith negotiations and, if required, condemnation.

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APPENDIX A

ESSENTIAL FISH HABITAT NEARSHORE

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME: Raritan Bay and Sandy Hook Bay, Hurricane and Storm

DATE: 11/30/2016

PROJECT NO.: NA

LOCATION (Water body, county, physical address): Raritan Bay, Union Beach, NJ

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

<u>Step 1</u>: Use the Habitat Conservation Division EFH webpage's Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest (http://www.greateratlantic.fisheries.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS

EFH Designations	Yes	No
Is the action located in or adjacent to EFH designated for eggs? **List the species:** winter flounder, windowpane flounder, scup, king makeral, Spanish macke	✔	
Is the action located in or adjacent to EFH designated for larvae? **List the species:** red hake, winter flounder, windowpane flounder, Atlantic sea herring, Atlar	✔	
Is the action located in or adjacent to EFH designated for juveniles? **List the species:** red hake, winter flounder, windowpane flounder, american plaice, Atlantic	✔	
Is the action located in or adjacent to EFH designated for adults or spawning adults? List the species: red hake, winter flounder, windowpane flounder, Atlantic sea herring, bluefish, Atlantic butterfish,	✔	
If you answered no to all questions above, then EFH consultation is not required - go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

<u>Step 2</u>: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	Sluice gate: water column, sub-tidal Beach: intertidal, sub-tidal Levee/Floodwall/Dune: intertidal, water column
What are the sediment characteristics?	Sluice gate: water column, sub-tidal Beach: intertidal, sub-tidal Levee/Floodwall/Dune: intertidal, water column
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	No
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	Yes. The wetlands generally extent as creeks from the bay inland right up to development of housing and roadways. The wetlands are salt marsh dominated with phragmites mostly classified as E2EM1Pd.
Is there shellfish present at or adjacent to the project site? If so, please describe the spatial extent and species present.	There are shellfish adjacent to project site within the subtidal and intertidal areas. Within the line of protection the shellfish presence is minimal the line of protection is at the wetland upland interface.
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	No
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	No
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	No
What is the typical salinity, depth and water temperature regime/range?	Based on NJDEP Marine Water Monitoring, Station 26A Salinity (ppt): range 29.1 - 10.1, average 22.2 Temperature (C°): range 22.5 – 3.0, average 13.7
What is the normal frequency of site disturbance, both natural and man-made?	Sand that remains in eroded nearshore zone builds up in intertidal zone in summer and is moved offshore in winter by wave action.

What is the area of proposed impact (work footprint & far afield)?	Sluice gate: river/estuarine wetland Beach/Dune: 3,160 linear FT long and 50 – 164 ft wide Levee/Floodwall/Dune: 10,932 linear feet of levee and 6,925 linear feet of floodwall. Total area of 117.28 acres of real estate needed to

Step 3: This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			Sand from Sea Bright borrow area will be placed on beach and graded as well as the construction of two groins and revetments. Total construction time estimated 1 year. 14,000 linear feet of floodwall or levee constructed along the wetland and roadway or backward property line. Street closure gate, sluice gates
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.	✔		Burial of benthic infauna and some epifauna and small fish in intertidal zone and small portion of sub-tidal zone. New sand will be re-colonized within a year but benthic community structure (species composition and abundance) may change. Beach nourishment will reduce slightly width of inter-tidal zone. Construction of
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.		✔	None present
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?	✔		Construction of the levees and floodwalls will permanently impact 22 acres of wetlands. The bayshore component will not impact wetlands. The impacted areas are at the wetland upland interface. The effects to the wetlands will be permanent along the levees and floodwalls; however the wetlands will be mitigated.
Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		✔	Mudflat habitat is not present
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact?	✔		Construction of the beach berm, revetments, terminal groins, and periodic renourishments would have an immediate adverse effect on the shellfish species within the Study area. During construction of these components, any sessile shellfish in the immediate footprint would be buried while most mobile shellfish species (e.g., crabs and shrimp) would relocate to an

Provide details of any shellfish survey conducted at the site.			The District conducted a survey at Union Beach in 1999 and found gem shells (Gemma gemma), soft-shelled clams, mud dog whelks (1/ynassa obsolete), and common slipper shells (Crepidula fornicata) to be the
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?		✔	
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.		✔	Soil erosion and sedimentation would be minimized during construction through the use of a soil erosion and sediment control plan. Beach sand fill will be of similar sediments.
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.	✔		Temporarily near the construction site. Could cause visually oriented species to relocate to find prey. Effects on EFH will be localized, short-term, and temporary only occurring during the physical construction within the waters
Will water depth change? What are the current and proposed depths?		✔	
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.		✔	
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.	✔		Construction and maintenance of the protective beach berm and dune would not significantly impact existing tidal patterns but would reduce the influence of ongoing tidal patterns along the Union Beach shoreline. Increased slope of intertidal and sub-tidal zones may [illegible]
Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.		✔	Construction and maintenance of the floodwalls and levees would have no direct impacts on water quality. Surface water quality would be temporarily impacted during construction of the levees, floodwalls, pump stations, storm gates, dune, and beach berm due to increased suspended sediments in the water column. However, implementation of soil erosion and sediment control measures and best management practices can
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.	✔		Noise levels will increase locally during construction activities. This increase will be locally temporary and be completely gone after construction is complete. The impacts will be minor, localized and temporary.

Does the action have the potential to impact prey species of federally managed fish with EFH designations?	☐	☑	

<u>Step 4</u>: This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (<u>http://www.greateratlantic.fisheries.noaa.gov/hcd/list.htm</u>) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and Values	**Y**	**N**	**Describe habitat type, species and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			
<u>Spawning</u> **If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**	☑	☐	Addition of sand to coastal zone could improve quality of spawning habitat for winter flounder and cause offshore displacement of spawning habitat. Placement of sand in sub-tidal zone in winter would bury winter flounder eggs. Impacts will be temporary. Other species not affected
<u>Nursery</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	☐	☑	Prey for juvenile winter flounder may be buried under new sand causing temporary loss of nursery habitat, but flounder will re-locate to undisturbed areas, as will bluefish. No adverse effects anticipated in the levee/floodwall area as the area is not in a nursery area.
<u>Forage</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	☐	☑	Although small forage fish might be temporarily displaced during construction, this will not affect the feeding success of piscivorous EFH-designated species, since they would simply re-locate to nearby shallow water areas where they could continue to feed successfully.
<u>Shelter</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	☐	☑	

Will impacts be temporary or permanent? Describe the duration of the impacts.			
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.	☐	✔	Effects will be minimal and temporary. Benthos will recolonize after the beach, dunes, and groins are constructed. The construction of the levees and floodwalls will occur from the upland minimizing the impacts to the wetlands to the actual line of protection.

Step 5: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT

	/	Federal Agency's EFH Determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**	☐	**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required**
	✔	**The adverse effect on EFH is not substantial. This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations.** **This is a request for an abbreviated EFH consultation.**
	☐	**The adverse effect on EFH is substantial.** **This is a request for an expanded EFH consultation**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT

Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.
alewife	NA
American eel	NA
American shad	NA
Atlantic menhaden	NA
blue crab	NA
blue mussel	NA
blueback herring	NA
Eastern oyster	NA
horseshoe crab	NA
quahog	NA
soft-shell clams	NA
striped bass	NA
other species:	NA

APPENDIX B

NEW JERSEY COASTAL ZONE ACT CONSISTENCY STATEMENT

COASTAL ZONE MANAGEMENT ACT CONSISTENCY STATEMENT

Raritan Bay and Sandy Hook Bay
Union Beach, New Jersey
Coastal Storm Risk Management Project

I Background

A Coastal Zone Management Act Consistency Statement was prepared as part of the National Environmental Policy Act (NEPA) documentation for Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey, Coastal Storm Risk Management Project. Two NEPA documents were prepared for this project and the Consistency Statement was included with both:

1. Environmental Impact Statement in 2003 with a signed Record of Decision in 2008.
2. Draft Supplemental Environmental Assessment – September 2016 due to engineering design changes and compliance with regulatory agencies.

The Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey Coastal Storm Risk Management Project is to be constructed in multiple phases. The first phase consists of constructing the selected Bay Shoreline Protection Reach. The subsequent phases will consist of floodwall and levee construction. As part of compliance, the U. S. Army Corps of Engineers, New York District (District) has determined that a Federal Consistency Determination and a Water Quality Certificate are needed for the project. The District prepared this Consistency Determination for phase 1, the selected Bay Shoreline Protection Reach plan. In coordination with the New Jersey Department of Environmental Protection (NJDEP), the District will prepare a Consistency Determination for the subsequent phases separately, as the design of those phases progress.

II Introduction

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. §§1451-1464) was enacted by Congress in an effort to balance the often competing demands of growth and development with the protection of coastal resources. Its stated purpose is to "...preserve, protect, and develop, where possible, to restore or enhance the resources of the nation's coastal zone..." The Act established the framework for achieving this balance by encouraging the states to develop coastal zone management programs, consistent with minimum federal standards, designed to regulate land use activities that could impact coastal resources. The Coastal Zone Act Reauthorization Act Amendments of 1990 further strengthened the act by requiring the state programs to focus more on controlling land use activities and the cumulative effects of activities within designated coastal zones.

The State of New Jersey administers its federally approved coastal zone program through the NJDEP Land Use Regulation Program (LURP). Pursuant to the federal CZMA, New Jersey has defined its coastal zone boundaries and developed policies to be utilized to evaluate projects within the designated coastal zone, as set forth in New Jersey's Rules on Coastal Zone Management (CZM) (N.J.A.C. 7:7, 7:7E, dated July 18, 1994, last amended October 17, 2016). The Waterfront Development Law (N.J.S.A. 12:5-3) and related requirements (N.J.A.C. 7:7-23) provide the authority for issuance of permits for, among other activities, the placement or construction of structures, pilings, or other obstructions in any tidal waterway. The State’s Land Use Regulation Program in the review of permit applications and coastal decision-making employs New Jersey’s Rules on Coastal Zone Management; they address issues of location, use, and resources. New Jersey’s rules provide for a balance between economic development and coastal resource protection, recognizing that coastal management involves explicit consideration of a broad range of concerns, in contrast to other resource management programs that have a more limited scope of concern.

The Union Beach project site is located within the coastal zone of New Jersey. The Bay Shoreline Protection Reach plan will utilize sand from the Sea Bright Offshore Borrow Area, which has previously received Federal Consistency for the Section I, Sea Bright to Ocean Township, Beach Erosion Control Project. The borrow site is located east of Sandy Hook, in the southwest corner of the Seabright ’88 footprint. The grain size from the borrow area varies from fine sand (0.17mm median grain size) to coarse gravel (~32mm) consistent with the current Union Beach beach sand. This borrow site is approximately 18 miles from Union Beach (15.5 miles haul distance and 2.1 miles pumping distance). This assessment is based on feasibility level conceptual plans and will be updated during the Preconstruction Engineering Design Phase as more detailed plans are developed and permits applications are submitted.

The selected plan is referred to in this application as the “Bay Shoreline Protection Reach plan”. The following assessment identifies the coastal zone management policies relevant to the proposed Bay Shoreline Protection Reach plan, phase 1 of the project.

III DISCUSSION OF NEW JERSEY COASTAL ZONE MANAGEMENT POLICIES APPLICABLE TO THE PROPOSED PROJECT

The following section identifies the New Jersey CZM policies, identifies how they are applicable to the proposed project, and discusses the project issues relevant to each.

a. SUBCHAPTER 9. SPECIAL AREAS

7:7-9.1 PURPOSE AND SCOPE

Special areas are areas that are so naturally valuable, important for human use, hazardous, sensitive to impact, or particular in their planning requirements, as to merit focused attention and special management rules**.**

7:7-9.2 Shellfish Habitat
This policy generally limits disturbance of shellfish habitat.

Based on a review of the NJ Shellfish Growing Water Classification Charts developed by the NJDEP, the project area is designated “Prohibited” (Appendix A), waters where the harvest of shellfish is not allowed. The NJDEP (NJDEP Shellfisheries, 2014) surveyed clam stock in Raritan and Sandy Hook Bays. The study (NJDEP Shellfisheries, 2014) found the project area has a hard clam (*Mercenaria mercenaria*) abundance of “occurrence” (Appendix A). No long-term adverse effects to shellfish are expected from the project. Placement of beach sand will affect the mean low tide line by moving it further out into the bay. Long-term benefits to horseshoe crabs are likely from sand placement through a potential increase in the suitability of the area for spawning. Construction of the stone groin will improve habitat diversity for sessile shellfish to attach themselves upon and grow. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.3 Surf Clam Areas
This policy prohibits development that would destroy or contaminate surf clam areas.

The NJDEP Shellfisheries (2014) found no surf clams (*Spisula solidissima*) in the project area (Appendix A). The selected Bay Shoreline Protection Reach plan is not located in a surf clam area nor will it contaminate surface water. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.4 Prime Fishing Areas
This policy prohibits sand or gravel submarine mining, which would alter existing bathymetry in a manner that would significantly reduce high fishery productivity in prime fishing areas. Prime fishing areas include tidal water areas and water's edge areas, which have a demonstrable history of supporting a significant local intensity of recreational or commercial fishing activity. These areas include all coastal jetties, groins, public fishing piers or docks, and artificial reefs. Prime fishing areas also include features such as rock outcroppings, sand ridges or lumps, rough bottoms, aggregates such as cobblestones, coral, shell and tubeworms, slough areas and offshore canyons. Prime fishing areas also include areas identified in "New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay and Delaware Bay” and “The Shellfish Resources of Raritan Bay and Sandy Hook Bay" Figley and McCloy (1988) and those areas identified on the map titled, "New Jersey's Specific Sport Ocean Fishing Grounds."

Construction of the beach fill, groins and revetments are not located in prime fishing areas as defined above (Appendix A). Construction of the groins has the potential to create prime fishing areas as described by the rule. The selected plan will use sand from the Sea Bright Offshore Borrow Area, which has previously received Federal Consistency for the Section I, Sea Bright to Ocean Township, Beach Erosion Control Project. The Sea Bright borrow area has been used as a sand source since 1989 and is not a prime fishing area. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.5 Finfish Migratory Pathways

Finfish migratory pathways are waterways (rivers, streams, creeks, bays and inlets) which can be determined to serve as passageways for diadromous fish to or from seasonal spawning areas, including juvenile anadromous fish which migrate in autumn and those listed by H.E. Zich (1977) "New Jersey Anadromous Fish Inventory" NJDEP Miscellaneous Report No. 41, and including those portions of the Hudson and Delaware Rivers within the coastal zone boundary. This policy prohibits development such as dams or dikes which would create physical barriers to migratory fish. Development, which would lower water quality so as to interfere with fish movement, is also prohibited.

While the project area is not a designated finfish migratory pathway, migratory fish use it. The proposed project will not significantly impact water quality and it will not occur in a situation that would cause a bottleneck or barrier. Migratory fish may need to move away from any activity at the borrow area but a detour such as this will not significantly deter them from their destination. A short-term localized increase in turbidity during beach fill operations is expected; however, any adverse effects are anticipated to be minimal because these zones are extremely dynamic and very energetic areas subject to periods of naturally occurring high turbidity and sediment movement. Erosion and sediment control best management practices will be implemented during construction to minimize impacts to water quality. The proposed project will have no permanent adverse impacts to water quality. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.6 Submerged Vegetation Habitat

This policy prohibits or restricts development at or near submerged vegetation habitats unless compensation efforts establish self-sustaining habitat for the appropriate species. As defined by the State, submerged vegetation consists of an area that supports or is documented as supporting rooted, submerged vascular plants such as widgeongrass (*Ruppia maritima*), sago pondweed (*Stuckenia pectinata*), horned pondweed (*Zannichellia palustris*), and eelgrass (*Zostera marina*). N.J.A.C. 7:7-9.6 states that in New Jersey, submerged vegetation is most prevalent in the shallow portions of the Navesink, Shrewsbury, Manasquan, and Metedeconk Rivers, and in Barnegat, Manahawkin, and Little Egg Harbor Bays.

Based on a review of New Jersey Submerged Aquatic Vegetation Distribution (NJDEP, 1979) mapping, the selected Bay Shoreline Protection Reach plan is not located in water areas supporting or documented as previously supporting rooted, submerged vascular plants. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.7 Navigation Channels

This policy prohibits construction that would extend into a navigation channel or would result in the loss of navigability. This policy discourages the placement of structures within 50 feet of any authorized navigation channel, unless it can be demonstrated that the proposed structure will not hinder navigation. This policy requires appropriate mitigation measures for development which would cause terrestrial soil and shoreline erosion and siltation in navigation channels.

Navigation along the Raritan Bay primarily consists of recreational and small commercial crafts associated with marinas. The eastern revetment is near a canoe launch site. The construction of the revetment will not impact the launch site. The selected Bay Shoreline Protection Reach plan is not within any navigation channels and will not impact any navigations channels. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.8 CANALS
This policy prohibits actions that would interfere with boat traffic in canals used for navigation, defined as navigation channels for boat traffic through land areas which are created by cutting and dredging or other human construction technique sometimes enlarging existing natural surface water channels.

The Bay Shoreline Protection Reach plan does not involve or affect navigation canals used for boat traffic through land areas. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.9 INLETS
This policy prohibits filling and discourages submerged infrastructure in inlets, which are natural channels through barrier islands allowing movement of fresh and salt water between the ocean and the back-bay system.

The selected Bay Shoreline Protection Reach plan is not located in an inlet as defined by this policy. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.10 MARINA MOORINGS
This policy prohibits non-water dependent development in marina mooring areas and discourages any use that would detract from existing or proposed recreational boating use in marina mooring areas.

The selected Bay Shoreline Protection Reach plan will not involve development in any marina mooring areas nor is it non-water dependent. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.11 PORTS
This policy prohibits actions that would preempt or interfere with port uses. Ports are water areas having, or lying immediately adjacent to, concentrations of shoreside marine terminals and transfer facilities for the movement of waterborne cargo (including fluids), and including facilities for loading, unloading and temporary storage.

The selected Bay Shoreline Protection Reach plan is not located in or near a port, marine terminal, or transfer facility. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.12 SUBMERGED INFRASTRUCTURE ROUTES

This policy prohibits any activity that would increase the likelihood of submerged infrastructure damage, or interfere with maintenance operations.

There is an existing storm outfall near Florence Avenue extending out into the bay. This outfall will be extended and repaired based on the structure's current design. This extension and repair will not negatively impact the outfall but will improve the outfall. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.13 SHIPWRECKS AND ARTIFICIAL REEFS

This policy restricts the use of special areas with shipwrecks and artificial reefs that would adversely affect the usefulness of the area as a fisheries resource.

The selected Bay Shoreline Protection Reach plan does not contain any artificial reefs or shipwrecks. The borrow area is permitted and has been surveyed and there are known shipwrecks and sensitive soils in the area. The shipwrecks and sensitive soil areas are mapped and will be avoided during the dredging process. The District has recently used the borrow area, without incident for the Port Monmouth project. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.14 WET BORROW PITS

Wet borrow pits are scattered artificially created lakes that are the results of surface mining for coastal minerals extending below groundwater level to create a permanently flooded depression. This includes, but is not limited to, flooded sand, gravel, and clay pits, and stone quarries. Where a wet borrow pit is also a wetland and/or wetlands buffer, the wetlands rule, N.J.A.C. 7:7-9.27, and/or wetlands buffers rule, N.J.A.C. 7:7-9.28, shall apply.

The selected Bay Shoreline Protection Reach plan does not contain any known wet borrow pits nor will make use of any wet borrow pits. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.15 INTERTIDAL AND SUBTIDAL SHALLOWS

This policy discourages disturbance of shallow water areas (i.e., permanently or twice daily submerged areas from the spring high tide to a depth of four feet below mean low water). Development, filling, new dredging, or other disturbance is discouraged but may be permitted in accordance with (c), (d), (e), (f), (g), and (h) below and with N.J.A.C. 7:7-12.2 through 12.24.

The Bay Shoreline Protection Reach plan involves initial and periodic beach nourishment, which will cover existing intertidal areas and create new ones. Most sessile or slow moving organisms that reside in intertidal zone will be buried however rapid recruitment and recovery is expect in this constantly changing dynamic habitat. The grain size from the borrow area varies from fine sand (0.17mm median grain size) to coarse gravel (~32mm), consistent with current beach grain size. The beach, dune, and berm are engineered to specific height, width, slope, and length, in accordance with a dune design template. The dune design template is width 50 ft., elevation 17 ft. (NGVD29), landward slope 1V:5H, and seaward slope 1V:10H. The Bay Shoreline Protection Reach plan meets the requirements of the filling rule at N.J.A.C. 7:7-12.11(f), the coastal engineering rule at N.J.A.C. 7:7-15.11(f), and with N.J.A.C. 7:7-12.2 through 12.24 as described in (f) above. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.16 DUNES

This policy prohibits development on dunes and removal of vegetation from dunes. The creation of dunes for the purpose of shore protection is strongly encouraged. A dune is a wind or wave deposited or man-made formation of sand (mound or ridge), that lies generally parallel to, and landward of, the beach and the foot of the most inland dune slope.

The current dune is almost nonexistent due to storms and erosion. The selected Bay Shoreline Protection Reach plan includes constructing an engineered dune to specific height, width, slope, and length, in accordance with a dune design template. The dune design template is width 50 ft., elevation 17 ft. (NGVD29), landward slope 1V:5H, and seaward slope 1V:10H. The dune will be constructed with material from the Sea Bright Borrow area as described above in section **II** above. The dune will be stabilized with the planting of native vegetation and fencing. Three wood on dune walkovers located across and between Dock Street and Beach Street, across from Florence Avenue and across from Pine Street, will be constructed to allow for access to the beach, and to protect dune vegetation from pedestrian damage. A walkway connecting the overwalks will run along the crest of the dune to provide views of the bayfront. The dune is scheduled for periodic renourishment every nine years with an upland sand source. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.17 OVERWASH AREAS

This policy restricts development in over-wash areas, an area subject to accumulation of sediment, usually sand, that is deposited landward of the beach or dune by the rush of water over the crest of the beach berm, a dune or a structure. Development is prohibited on overwash areas, except for development that has no prudent or feasible alternative in an area other than an overwash area, and that will not cause significant adverse long-term impacts on the natural functioning of the beach and dune system, either individually or in combination with other existing or proposed structures, land disturbances or activities.

There is no other reasonable or prudent alternative as described in the Districts Reevaluation Report (USACE, 2016a) except to construct the Bay Shoreline Protection Reach plan. The dune and associated walkovers will be constructed in accordance with N.J.A.C. 7:7-10 and N.J.A.C. 7:7-13 as described above and the coastal engineering rule at N.J.A.C. 7:7-15.11(g) and N.J.A.C. 7:7-9.16(c) described below. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.18 COASTAL HIGH HAZARD AREAS

This policy restricts development in coastal high hazard areas. Coastal high hazard areas are defined as flood prone areas subject to high velocity waters (V zones) as delineated on the FIRM, and areas within 25 feet of oceanfront shore protection structures, which are subject to wave run-up and overtopping. The coastal high hazard area extends from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. The inland limit of the V zone is defined as the V zone boundary line as designated on the FIRM or the inland limit of the primary frontal dune, whichever is most landward.

The selected Bay Shoreline Protection Reach plan involves construction of shore protection methods. However, the intent of identifying high velocity areas is to limit residential and commercial development for public safety and does not apply to shore protection structures. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.19 EROSION HAZARD AREAS

This policy prohibits development in erosion hazard areas under most circumstances, to protect public safety. Erosion hazard areas are shoreline areas that are eroding and or have a history of erosion, causing them to be highly susceptible to further erosion, and damage from storms.

The selected Bay Shoreline Protection Reach plan does not encourage development in an erosion hazard area. The selected Bay Shoreline Protection Reach plan involves acceptable shore protection activities including restoration of erosion hazard, beachfill, groins and revetments, and dune creation with walkovers, which meet the appropriate rule, N.J.A.C. 7:7-10 and 7:7-13 as described above and 7:7-15.11 as described below. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.20 BARRIER ISLAND CORRIDOR

This policy restricts new development on barrier islands. Barrier island corridors are the interior portions of oceanfront barrier islands, spits and peninsulas.

The Bay Shoreline Protection Reach plan is not within the barrier island corridor. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.21 BAY ISLANDS
This policy restricts development on bay islands, islands or filled areas surrounded by tidal waters, wetlands, beaches or dunes, lying between the mainland and barrier island.

The Bay Shoreline Protection Reach plan is not in an area defined as a bay island. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.22 BEACHES
This policy restricts development on beach areas. Beaches are gently sloping areas of sand or other unconsolidated material, found on all tidal shorelines, including ocean, bay, and river shorelines that extend landward from the mean high water line.

The selected Bay Shoreline Protection Reach plan involves dune creation, related sand fencing, planting of vegetation for stabilization, and beach fill in accordance with N.J.A.C. 7:7-10 and N.J.A.C. 7:7-15.11(g) as described below. The beach is designed to a specific height, width, slope, and length, in accordance with a beach berm design template. Beach access will comply with N.J.A.C. 7:7-9.4 and N.J.A.C. 7:7-16.9 as described below. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.23 FILLED WATER'S EDGE
This policy seeks to promote water dependent uses at areas along the waterfront that have been previously filled. Filled water's edge areas are existing filled areas lying between wetlands or water areas, and either the upland limit of fill, or the first paved public road or railroad landward of the adjacent water area, whichever is closer to the water.

The area for the Bay Shoreline Protection Reach plan contains historically filled areas on the eastern edge of the project. Specifically, the area where Front Street and Union Avenue meet forward to the water. The proposed activities will not reduce or adversely affect the area currently or recently devoted to any water dependent use and complies with N.J.A.C. 7:7- 16.9 as public access will be maintained via dune walkovers. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.24 EXISTING LAGOON EDGES
This policy restricts development at lagoon edges. Existing lagoon edges are defined as existing manmade land areas resulting from the dredging and filling of wetlands, bay bottom, and other estuarine water areas for the purpose of creating waterfront lots along lagoons for residential and commercial development.

The Bay Shoreline Protection plan is not located along any lagoon edges. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.25 FLOOD HAZARD AREAS
This policy is designed to restrict development in flood hazard areas to ensure that the

waterfront is not pre-empted by uses that could function equally at inland locations. The goal of this rule is to reduce losses of life and property resulting from unwise development of flood hazard areas, and allow uses compatible with periodic flooding. Flood hazard areas are areas subject to flooding from the flood hazard area design flood, as defined by NJDEP under the Flood Hazard Area Control Act rules at N.J.A.C. 7:13. Flood hazard areas include those areas mapped as such by the NJDEP, areas defined or delineated as an A or a V zone by the FEMA, and any unmapped areas subject to flooding by the flood hazard area design flood.

Per the FEMA Flood Insurance Rate Map for Union Beach, the Bay Shoreline Protection plan is located in Flood Zone VE with a base flood elevation of 14. Since the proposed project is a shore protection project, the project must meet the requirements for this policy in that the project design must meet the applicable sections of the Flood Hazard Control Act Rules N.J.A.C 7:7-13. The proposed project has been designed to meet the applicable sections of the Flood Hazard Area Control Act Rules. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.26 RIPARIAN ZONE

This policy is designed to restrict contamination into the riparian zone to ensure trout habitat and threatened and endangered species.

Per 7:13-4.1 (c) of the Flood Hazard Area Control Act Rules, the regulated riparian zone is 50 feet. All elements of the proposed project are outside of this zone. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.27 WETLANDS

This policy restricts disturbance in wetland areas and requires mitigation if wetlands are destroyed or disturbed.

The selected Bay Shoreline Protection Reach plan will not impact wetlands either directly or indirectly. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.28 WETLAND BUFFERS

This policy restricts development in wetland buffer areas in order to protect wetlands.

The selected Bay Shoreline Protection Reach plan will not impact wetland buffers. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.29 COASTAL BLUFFS

This policy restricts development on coastal bluffs. A coastal bluff is a steep slope (greater than 15 percent) of consolidated (rock) or unconsolidated (sand, gravel) sediment which is adjacent to the shoreline or which is demonstrably associated with shoreline processes.

The Bay Shoreline Protection plan is not located along any coastal bluffs. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.30 Intermittent Stream Corridors
This policy restricts actions in intermittent stream corridors.

The Bay Shoreline Protection plan is not located in intermittent stream corridors. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.31 Farmland Conservation Areas
This policy seeks to preserve large parcels of land used for farming.

The Bay Shoreline Protection plan does not contain farmland conservation areas. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.32 Steep Slopes
This policy seeks to preserve steep slopes by restricting development in such areas.

The selected Bay Shoreline Protection Reach plan does not contain any steep slopes. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7 -9.33 Dry Borrow Pits
This policy restricts the use and provides maintenance of dry borrow pits within acceptable limits.

The selected Bay Shoreline Protection Reach plan area does not contain any dry borrow pits. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.34 Historic and Archaeological Resources
This policy protects the value of historic and archaeological resources and may require cultural resource surveys and other protective measures. Historic and archaeological resources include objects, structures, neighborhoods, districts, man-made features on the landscape or seascape or other features which are on or are eligible for inclusion on the New Jersey or National Register of Historic Places

Cultural resource surveys have determined there are no historic resources within the selected Bay Shoreline Protection Reach plan (USACE, 2016b). The NJ Historic Preservation Office concurred with the NY Districts assessment that the selected Bay Shoreline Protection Reach plan will have no effect on historic or archaeological resources. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-3.35 Specimen Trees
This policy seeks to protect specimen trees, as defined by NJDEP. Specimen trees are defined as the largest known individual trees of each species in New Jersey or trees with a circumference equal to or greater than 85 percent of the circumference of the record tree.

The selected Bay Shoreline Protection Reach plan does not contain any known specimen trees. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.36 ENDANGERED OR THREATENED WILDLIFE OR VEGETATION SPECIES HABITATS

This policy restricts development in endangered or threatened wildlife or vegetation species habitat areas.

Endangered or threatened wildlife or plant species habitats are terrestrial and aquatic (marine, estuarine, or freshwater) areas known to be inhabited on a seasonal or permanent basis by or to be critical at any stage in the life cycle of any wildlife or plant identified as “endangered” or “threatened” species on official federal or state lists of endangered or threatened species, or under active consideration for state or federal listing. The definition of endangered or threatened wildlife or plant species habitats includes a sufficient buffer area to ensure continued survival of the population of the species as well as areas that serve an essential role as corridors for movement of endangered or threatened wildlife. Absence of such a buffer area does not preclude an area from being endangered or threatened wildlife or plant species habitat.

Development of endangered or threatened wildlife or plant species habitat is prohibited unless it can be demonstrated, through an endangered or threatened wildlife or plant species impact assessment as described at N.J.A.C. 7:7-11, that endangered or threatened wildlife or plant species habitat would not directly or through secondary impacts on the relevant site or in the surrounding area be adversely affected.

No federally listed species have been identified in the Bay Shoreline Protection Reach plan. However the USFWS identified the federally threatened northern long-eared bat (*Myotis septentrionalis*), federally threatened piping plover (*Charadrius melodus*), federally threatened red knot (*Calidris canutus rufa*), and the federally threatened seabeach amaranth (*Amaranthus pumilus*) as potentially occurring in the project area. The District has determined, under Section 7 of the Endangered Species Act (ESA) of 1973, as Amended, that the Bay Shoreline Protection plan is not likely to adversely affect the above species. The Service has concurred with that determination (Appendix B). The Service has requested, and the District will conduct, a survey for seabeach amaranth prior to the construction of the beach.

The District has coordinated a Biological Assessment/Biological Opinion with National Oceanic Atmospheric and Administration (NOAA) National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA) of 1973, as Amended (Appendix B). National Oceanic Atmospheric and Administration has determined that the plan may affect the following species:

Sea Turtles	
Northwest Atlantic DPS of Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered

Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered/Threatened
Cetaceans	
North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)	
Gulf of Maine DPS	Threatened
New York Bight DPS	Endangered
Chesapeake Bay DPS	Endangered
South Atlantic DPS	Endangered
Carolina DPS	Endangered

After reviewing the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is NMFS' biological opinion that the proposed actions may adversely affect but are not likely to jeopardize the continued existence of any DPS of Atlantic sturgeon, Kemp's ridley and loggerhead sea turtles and is not likely to adversely affect leatherback or green sea turtles or right, humpback or fin whales. Because no critical habitat is designated in the action area, none will be affected by the action.

Six state listed species, including the endangered black skimmer (*Rynchops niger*), the endangered least tern (*Sterna antillarum*), the endangered pied-billed grebe (*Podilymbus podiceps*), the threatened black-crowned night heron (*Nycticorax nycticorax),* the threatened Osprey (*Pandion haliaetus*) and the threatened Cooper's Hawk (*Accipiter cooperii*), may occur within the Raritan and Sandy Hook Bays.

The Bay Shoreline Protection Reach plan is not expected to cause an adverse impact to any federal or state listed species due to the mobility of all species and capability to avoid activities; the temporary and highly localized nature of the disturbance; and availability of habitat surrounding the structures. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.37 CRITICAL WILDLIFE HABITATS

This policy discourages development that would adversely affect critical wildlife habitat.

The selected Bay Shoreline Protection Reach plan would not affect any existing critical habitats, but may create or enhance potential habitat for the piping plover and seabeach amaranth as described in 7:7-9.36. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.38 PUBLIC OPEN SPACE
This policy encourages new public open spaces and discourages development that might adversely affect existing public open space. Public open space refers to lands owned or maintained by federal, state, or local agencies and which are dedicated to the conservation of public recreation, natural resources, visual or physical public access, and/or the protection and management of wildlife. Development that adversely affects existing public open space is discouraged. Development within existing public open space is conditionally acceptable, provided that the development is consistent with the character and purpose of public open space, as described by the park master plan when such a plan exists. All new development adjacent to public open space will be required to provide an adequate buffer area.

Currently the borough of Union Beach provides public access along a majority of the shoreline for fishing, swimming, viewing, and passive recreation. Public waterfront facilities, including parking lots, restrooms, beach, parks, are located along the long walkway adjacent to Front Street. The District has developed a Public Access Plan, which includes an agreement that states the Non-Federal Sponsor, NJDEP, shall ensure the continued public use of such shores compatible with the authorized purpose of the Project and will be required to provide certification of real estate for these access points. The project would serves to protect public open space from storms and floods. The selected Bay Shoreline Protection Reach plan will not influence development but will restore public space via the beachfill, dune, and berm. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.39 SPECIAL HAZARD AREAS
This policy discourages development in hazard areas. Special hazard areas include areas with a known actual or potential hazard to public health, safety, and welfare, or to public or private property, including areas where hazardous substances are used or disposed, including adjacent areas and areas of hazardous material contamination.

This policy discourages development in hazard areas. The Bay Shoreline Protection Reach plan does not contain any known special hazard areas. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.40 EXCLUDED FEDERAL LANDS
Excluded federal lands are those lands, the use of which is, by law, subject solely to the discretion of or held in trust by the federal government, its officers, or agents. New Jersey has the authority to review activities on Federal lands if impacts may occur in New Jersey's Coastal Zone.

The Bay Shoreline Protection Reach plan does not involve actions on or disturbance to Federal land. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.41 SPECIAL URBAN AREAS
This policy seeks to encourage development that would help to restore the economic and social viability of certain municipalities that receive state aid. Special urban areas are those municipalities defined in urban aid legislation (N.J.S.A.52:27D-178) qualified to receive state aid to enable them to maintain and upgrade municipal services and offset local property taxes.

The Bay Shoreline Protection Reach plan does not involve special urban areas. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.42 PINELANDS NATIONAL RESERVE AND PINELANDS PROTECTION AREA
This policy allows the Pinelands Commission to serve as the reviewing agency for actions within the Pinelands National Reserve.

The Bay Shoreline Protection Reach plan is not within the Pinelands National Reserve. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.43 HACKENSACK MEADOWLANDS DISTRICT
This policy allows the Hackensack Meadowlands Development Commission to serve as the reviewing agency for actions within the Hackensack Meadowlands District.

The Bay Shoreline Protection Reach plan is not within the Hackensack Meadowlands District. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.44 WILD AND SCENIC RIVER CORRIDORS
This policy recognizes the outstanding value of certain rivers in New Jersey by restricting development to compatible uses. Wild and scenic river corridors are all rivers designated into the National Wild and Scenic Rivers System and any rivers or segments thereof being studied for possible designation into that system pursuant to the National Wild and Scenic Rivers Act (16 U.S.C. 1271-1278).

The Bay Shoreline Protection Reach plan does not contain any wildland scenic river corridors. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7E-9.47 GEODETIC CONTROL REFERENCE MARKS
This policy discourages the disturbance of geodetic control reference marks. Geodetic control reference marks are traverse stations and benchmarks established or used by the New Jersey Geodetic Control Survey pursuant to P.L. 1934, c.116. They include monuments, disks, points, rivets, and marks.

The Bay Shoreline Protection Reach plan does not contain any geodetic control reference marks. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-3.46 Hudson River Waterfront Area

This policy restricts development along the Hudson River Waterfront and requires development, maintenance, and management of a section of the Hudson Waterfront Walkway coincident with the shoreline of the development property.

The selected Bay Shoreline Protection Reach plan is not located within the Hudson River Waterfront Area. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.47 Atlantic City

This policy is applicable to lands within the municipal boundary of the City of Atlantic City.

The selected Bay Shoreline Protection Reach plan is not within Atlantic City. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-9.48 Lands and Waters Subject to Public Trust Rights

This policy restricts development that adversely affects lands and waters subject to public trust rights. Lands and waters subject to public trust rights are tidal waterways and their shores, including both lands now or formerly below the mean high water line, and shores above the mean high water line. Tidal waterways and their shores are subject to the Public Trust Doctrine and are held in trust by the state for the benefit of all the people, allowing the public to fully enjoy these lands and waters for a variety of public uses.

The Bay Shoreline Protection Reach plan will not impair the public access and will enhance access as discussed in 7:7-9.38 above. Public access to the bayfront will be maintained during and after construction. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7:9.49 Dredged Material Management Areas

A dredged material management area is an area documented through historical data, including, but not limited to, aerial photography, historic surveys, and/or previously issued permits, as having been previously used for the placement of sediment associated with the dredging of State and/or Federal navigation channels and marinas.

The Bay Shoreline Protection Reach plan is not within or near any dredge material management areas. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

b. SUBCHAPTER 10. STANDARDS FOR BEACH AND DUNE ACTIVITIES

This subchapter sets forth the standards applicable to routine beach maintenance, emergency post-storm restoration, dune creation and maintenance, and construction of boardwalks. These standards are referenced at N.J.A.C. 7:7-9.16, Dunes; N.J.A.C. 7:7 9.17, Overwash areas; N.J.A.C. 7:7-9.19, Erosion hazard areas; N.J.A.C. 7:7-9.22, Beaches; and N.J.A.C. 7:7-15.11, Coastal engineering. In addition, N.J.A.C. 7:7-10.2, 10.3, and 10.4 are the standards for the general permit for beach and dune maintenance activities, N.J.A.C. 7:7-6.2.

7:7-10.2 STANDARDS APPLICABLE TO ROUTINE BEACH MAINTENANCE

This policy set forth standards to routine beach maintenance which includes debris removal and clean-up; mechanical sifting and raking; maintenance of accessways; removal of sand accumulated beneath a boardwalk; removal of sand from street ends, boardwalks/promenades, and residential properties; the repair or reconstruction of existing boardwalks, gazebos, and dune walkover structures; and limited sand transfers from the lower beach to the upper beach or alongshore (shore parallel).

The Bay Shoreline Protection Reach plan does not involve routine beach maintenance as described by this policy. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-10.3 STANDARDS APPLICABLE TO EMERGENCY POST-STORM BEACH RESTORATION

This policy set forth standards for emergency post-storm beach restoration, which are impacted by coastal storms with a recurrence interval equal to or exceeding a five-year storm event. Emergency post-storm beach restoration projects not specifically identified in this section may be authorized by the Department through an emergency authorization pursuant to N.J.A.C.

The Bay Shoreline Protection Reach plan is not due to emergency post-storm beach restoration as described by this policy. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-10.4 STANDARDS APPLICABLE TO DUNE CREATION AND MAINTENANCE

This policy sets forth standards for dune creation and maintenance defined as the placement and/or repair of sand fencing (including wooden support posts), the planting and fertilization of appropriate dune vegetation, the maintenance and clearing of beach access pathways less than eight feet in width, and the construction or repair of approved dune walkover structures. All dune creation and maintenance activities should be conducted in accordance with the specifications found in Guidelines and Recommendations for Coastal Dune Restoration and Creation Projects (DEP, 1985), and/or Restoration of Sand Dunes Along the Mid-Atlantic Coast (Soil Conservation Service, 1992).

As described in 7:7-9.16 above, the selected Bay Shoreline Protection Reach plan includes constructing an engineered dune to specific height, width, slope, and length, in accordance with a dune design template. The dune design template is width 50 ft., elevation 17 ft. (NGVD29), landward slope 1V:5H, and seaward slope 1V:10H. The dune will be stabilized with the planting of native vegetation and fencing. This design follow the Guidelines and Recommendations for Coastal Dune Restoration and Creation Projects (DEP, 1985), and/or Restoration of Sand Dunes Along the Mid-Atlantic Coast (Soil Conservation Service, 1992).

Three wood on dune walkovers located across and between Dock Street and Beach Street, across from Florence Avenue and across from Pine Street, will be constructed to allow for access to the beach, and to protect dune vegetation from pedestrian damage. A walkway connecting the overwalks will run along the crest of the dune to provide views of the bayfront. The dune is scheduled for periodic renourishment every nine years with an upland sand source. The walkovers will be constructed in accordance with the standards and specifications (or similar specifications) described in the Beach Dune Walkover Structures (Florida Sea Grant, 1981). Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-10.5 STANDARDS APPLICABLE TO THE CONSTRUCTION OF BOARDWALKS

This policy sets standards for the construction of oceanfront or bayfront boardwalks addressing a number of engineering concerns related to structural support, resistance to vertical and horizontal water and wind loads, and scouring.

The Bay Shoreline Protection Reach plan is constructing dune overwalks. The design of these overwalks will comply with this policy. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

c. SUBCHAPTER 11. STANDARDS FOR CONDUCTING AND REPORTING THE RESULTS OF AN ENDANGERED OR THREATENED WILDLIFE OR PLANT SPECIES HABITAT IMPACT ASSESSMENT AND/OR ENDANGERED OR THREATENED WILDLIFE SPECIES HABITAT EVALUATION

This section details the performance and reporting standards for impact assessments for endangered and threatened wildlife species. If required, based on updated relevant agency correspondence, habitat/impact assessments for endangered and threatened species will conform to the performance and reporting standards listed. This policy restricts development in endangered or threatened wildlife or vegetation species habitat areas.

Refer to Section 7:7-9:36. The District will continue coordination with the U.S. Fish and Wildlife Service, NOAA-Fisheries, and NJDEP during construction of the project.

d. SUBCHAPTER 12. GENERAL WATER AREAS

7:7-12.1 PURPOSE AND SCOPE

General water areas are all water areas which are located below either the spring high water line or the normal water level of non-tidal waters. General water areas are subject to this subchapter and to special area rules.

7:7-12.2 SHELLFISH AQUACULTURE

This policy sets standards for shellfish aquaculture. Shellfish aquaculture means the propagation, rearing, and subsequent harvesting of shellfish in controlled or selected environments, and the processing, packaging and marketing of the harvested shellfish. Shellfish aquaculture includes activities that intervene in the rearing process to increase production such as stocking, feeding, transplanting, and providing for protection from predators. For the purposes of this section, shellfish means any species of benthic mollusks including hard clams (*Mercenaria mercenaria*), soft clams (*Mya arenaria*), surf clams (*Spisula solidissma*), bay scallops (*Aequipectin irradians*), and oysters (*Crassostrea virginica*). Shellfish shall not include conch, specifically, knobbed whelks (*Busycon carica*)*,*lightning whelks (*Busycon contrarium*)*,* and channeled whelks (*Busycotypus canaliculatus*).

Based on a review of the NJ Shellfish Growing Water Classification Charts developed by the NJDEP, the project area is designated “Prohibited” (Appendix A), waters where the harvest of shellfish is not allowed. The Bay Shoreline Protection Reach plan is not located within or near any shellfish aquaculture areas. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.3 BOAT RAMPS

This policy sets standards for the installation of boat ramps.

The Bay Shoreline Protection Reach plan is not constructing any boat ramps. The eastern revetment is near a canoe launch site. The construction of the revetment will not impact the launch site. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.4 DOCKS AND PIERS FOR CARGO AND COMMERCIAL FISHERIES

This policy sets standards for the installation of docks and piers specific for cargo and passenger movement either supported on pilings driven into the bottom substrate or floating on the water surface, used for loading and unlocking passengers or cargo and ensure they do not interfere with navigation.

The Bay Shoreline Protection Reach plan is not constructing any docks or piers for cargo and commercial fisheries and there are no docks or piers within the plan footprint. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.5 RECREATIONAL DOCKS AND PIERS

This policy sets standards for recreational and fishing docks and piers supported on pilings driven into the bottom substrate or floating on the water surface or cantilevered over water, which are used for recreation fishing or for the mooring of boats or jet skis used for fishing or recreation.

The Bay Shoreline Protection Reach plan is not constructing recreational docks or piers and there are no such docks or piers in the plan area. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.6 MAINTENANCE DREDGING

This policy sets standards for maintenance dredging defined as the periodic removal of accumulated sediment from previously legally dredged navigation and access channels, marinas, lagoons, canals, or boat moorings for the purpose of safe navigation.

The Bay Shoreline Protection Reach plan does not involve maintenance dredging. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.7 NEW DREDGING

New dredging is the removal of sediment that does not meet the definition of maintenance dredging at N.J.A.C. 7:7-12.6 or the definition of environmental dredging at N.J.A.C. 7:7-12.8.

The beachfill material is being dredged from the Sea Bright Borrow Area, which is currently permitted for dredging by the NJDEP. The dredging will be conducted in accordance with Appendix G; The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.8 ENVIRONMENTAL DREDGING

Environmental dredging means new dredging performed in a special hazard area designated as such pursuant to N.J.A.C. 7:7-9.39 specifically to remove contaminated sediments for the purpose of remediating to an environmental standard as specified in the Department’s Technical Requirements for Site Remediation, N.J.A.C. 7:26E.

The Bay Shoreline Protection Reach plan does not involve environmental dredging. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.9 DREDGED MATERIAL DISPOSAL

Dredged material disposal is the discharge of sediments removed during dredging operations in water areas. Dredged material disposal does not include the beneficial use of dredged material for the purposes of habitat creation, restoration, or enhancement, artificial reef construction, or the establishment of living shorelines.

The dredge material will be utilized to create the beach, dune, and berm and will conform to all standards as described in this document. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.10 Solid Waste Or Sludge Dumping

This policy prohibits the dumping of solid waste or sludge into a water areas. Solid waste or sludge is defined as the discharge of solid or semi-solid waste material from industrial or domestic sources or sewage treatment operations into a water area.

The Bay Shoreline Protection Reach plan will not dump solid waste or sludge. The construction contractor will be required to prepare an Environmental Protection Plan that will outlined measures taken to prevent any unregulated discharges. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.11 Filling

This policy sets standards related to fill activities within water areas. Filling is defined as the deposition of material including, but not limited to, sand, soil, earth, and dredged material, into water areas for the purpose of raising water bottom elevations to create land areas.

In cases where there is no alternative to filling, filling is conditionally acceptable provided:

1) The use that requires the fill is water-dependent;
2) There is a demonstrated need that cannot be satisfied by existing facilities;
3) There is no feasible or practicable alternative site on an existing water's edge;
4) The minimum practicable area is filled;
5) The adverse environmental impacts are minimized;
6) Minimal feasible interference is caused to special areas, as defined at N.J.A.C. 7:7-9; and
7) Pilings and columnar support or floating structures are unsuitable for engineering or environmental reasons.

The Bay Shoreline Protection Reach plan is a water-dependent project whose function cannot be accomplished at an alternate location. An alternatives analysis evaluating various non-structural and structural alternatives was conducted and is discussed in the main report of the draft Feasibility Report and Supplemental Environmental Assessment. The most practicable overall alternative plan that met the planning objectives, maximized socioeconomic benefits, and avoided or minimized environmental impacts has been selected. Further evaluations to minimize impacts on environmental resources and avoid impacts on protected resources to the extent possible will occur in the Preconstruction Engineering Design Phase. This policy states that mitigation shall not be required for beach nourishment in accordance with N.J.A.C. 7:7-15.11(f). The plan is consistent with 7:7-15.11(f). Grain size from the borrow area varies from fine sand (0.17mm median grain size) to coarse gravel (~32mm), consistent with current beach grain size. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12:12 MOORING
This policy sets standards for mooring structures. A boat mooring is a temporary or permanently fixed or floating anchored facility in a water body for the purpose of attaching a boat.

The Bay Shoreline Protection Reach plan does not involve the installation of any mooring structures. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7 12.13 SAND AND GRAVEL MINING
This policy sets standards for sand and gravel mining in water bodies. Sand and gravel mining is the removal of sand or gravel from the water bottom substrate, usually by suction dredge, for the purpose of using the sand or gravel at another location.

The borrow area is permitted by the NJDEP and is in compliance with this policy. As stated in section c) of this policy sand mining is acceptable for beach nourishment provided it complies with coastal engineering rule N.J.A.C. 7:7-15.11(f). The plan will also minimize impacts to fishes, will not increase shoreline erosion but will reduce the risk of erosion, and will not create anoxic conditions. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.14 BRIDGES
This policy sets standards for the construction of bridges located within the CZM area.

The Bay Shoreline Protection Reach plan does not involve the construction or modification of any bridges. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7 -12:15 SUBMERGED PIPELINES
This policy sets standards for Submerged pipelines (pipelines) are underwater pipelines which transmit liquids or gas, including crude oil, natural gas, water petroleum products or sewerage.

The plan will repair and extend an existing storm outfall that runs from Florence Avenue under the beach into the bay. The outfall will continue to be buried to avoid exposure or hazard. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12:16 OVERHEAD TRANSMISSION LINES
This policy sets standards for overhead transmission lines installed along or within waterbodies.

There are not overhead transmission lines within the Bay Shoreline Protection Reach plan. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12:17 Dams And Impoundments

Dams and impoundments are structures that obstruct natural water flow patterns for the purpose of forming a contained volume of water. Impoundments include dikes with sluice gates and other structures to control the flow of water. Dams and impoundments are conditionally acceptable in medium rivers, creeks, and streams provided:

1) The structures are essential for water supply purposes or for creation of special wildlife habitats;
2) Adverse impacts are minimized; and
3) The structures will not adversely affect navigation routes.

The proposed groins and associated revetments are necessary to manage coastal storm risk within the Borough of Union Beach. The groins and revetments will reduce beach fill loss and drift. The groins and revetments will be designed to minimize impacts on environmental resources and avoid impacts on protected resources to the extent possible, and may provide habitat for fishes and shellfish as well as recreational fishing. Additionally, the project will not adversely affect any navigation routes. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12:18 Outfalls And Intakes

This policy sets standards for the installation of outfalls and intakes within waterways. Outfalls and intakes are pipe openings that are located in water areas for the purpose of intake of water or discharge of effluent including sewage, stormwater and industrial effluents.

The plan will repair and extend an existing storm outfall that runs from Florence Avenue under the beach into the bay. The outfall will continue to be buried to avoid exposure or hazard. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.19 Realignment Of Water Areas

Realignment of water areas means the physical alteration or relocation of the surface configuration of any water area.

The Bay Shoreline Protection Reach plan will place approximately 688,000 cubic yards of sand on the beach. This will manage flood risk and create recreational opportunities for the public. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.20 Vertical Wake Or Wave Attenuation Structures

Vertical wake or wave attenuation structures are structures designed to protect boat moorings, including those at marinas, by intercepting wakes or waves and reducing the wake or wave energy which would normally impact the adjacent boat mooring areas. Typically, timber, metal, or vinyl wake or wave attenuation structures are designed and utilized to protect boat moorings. For the purposes of this section, a vertical wake or wave attenuation structure does not include a breakwater constructed of concrete or rubble mound. Breakwaters designed to protect shoreline areas shall comply with the filling rule, N.J.A.C. 7:7-12.11, and the coastal engineering rule at N.J.A.C. 7:7-15.11.

The Bay Shoreline Protection Reach plan is not constructing a vertical wake or wave attenuation structure as defined above. The Bay Shoreline Protection Reach plan is designed to protect the shoreline and complies with the filling rule, N.J.A.C. 7:7-12.11, and the coastal engineering rule at N.J.A.C. 7:7-15.11. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-21 SUBMERGED CABLES

This policy sets standards for the construction of submerged cables such as underwater telecommunication cables, and all associated structures in the water such as repeaters.

The Bay Shoreline Protection Reach plan does not involve the installation of submerged cables. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.22 ARTIFICIAL REEFS

This policy sets standards for the construction of artificial reefs. Artificial reefs are man-made structures intended to simulate the characteristics and functions of natural reefs created by placing hard structures on the sea-floor for the purpose of enhancing fish habitat and/or fisheries. In time, an artificial reef will attain many of the biological and ecological attributes of a natural reef. Artificial reefs do not include shore protection structures, pipelines, fish aggregating devices, and other structures not constructed for the sole purpose of fish habitat.

The Bay Shoreline Protection Reach plan does not involve the creation of artificial reefs. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.23 LIVING SHORELINES

This policy sets to standards to the creation of living shorelines. Living shorelines are a shoreline management practice that addresses the loss of vegetated shorelines and habitat in the littoral zone by providing for the protection, restoration or enhancement of these habitats. This is accomplished through the strategic placement of vegetation, sand or other structural and organic materials.

The Bay Shoreline Protection Reach plan does not involve the creation of living shorelines. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-12.24 MISCELLANEOUS USES

Miscellaneous uses are uses of water areas not specifically defined in this section or addressed in the use rules, N.J.A.C. 7:7-15.

The Bay Shoreline Protection Reach plan is already defined in section 12. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

e. SUBCHAPTER 13. REQUIREMENTS FOR IMPERVIOUS COVER AND VEGETATIVE COVER FOR GENERAL LAND USE AREAS AND CERTAIN SPECIAL AREAS

This policy sets forth requirements for impervious cover and vegetative cover on sites in the upland waterfront development area and CAFRA areas.

The Bay Shoreline Protection Reach plan is within the CAFRA area does not contain impervious cover as defied in N.J.A.C. 7:7-1.5. Therefore, this policy is not applicable

f. SUBCHAPTER 14. GENERAL LOCATION RULES

7:7-14.1 LOCATION OF LINEAR DEVELOPMENT

This policy sets conditions for acceptability of linear development (e.g., roads, walkways, pipelines). A linear development shall comply with the specific location rules to determine the most acceptable route, to the maximum extent practicable.

The Bay Shore Protection Reach plan will repair and extend an existing storm outfall that runs from Florence Avenue under the beach into the bay. The outfall will continue to be buried to avoid exposure or hazard, will not adversely impact the environment, and there is no other alternative. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-14.2 BASIC LOCATION

This policy states that the NJDEP may reject or conditionally approve a project for safety, protection of certain property, or preservation of the environment.

The Bay Shoreline Protection Reach plan outfall improvement would protect public health and protect the environment by assisting in the removal of stormwater. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-14.3 SECONDARY IMPACTS

This policy sets the requirements for secondary impact analysis from the effects of additional development likely to be constructed as a result of the approval of a particular proposal. Secondary impacts are the effects of additional development likely to be constructed as a result of the approval of a particular proposal. Secondary impacts can also include traffic increases, increased recreational demand and any other offsite impacts generated by onsite activities which affect the site and surrounding region.

The Bay Shoreline Protection Reach plan would not involve additional development nor would induce additional development. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

g. SUBCHAPTER 15. USE RULES

7:7-15.1 PURPOSE AND SCOPE

Use rules are rules and conditions applicable to particular kinds of development. In general, conditions contained in the use rules must be satisfied in addition to the location rules (N.J.A.C. 7:7-9 through 14), and the resource rules described in the following subchapter (N.J.A.C. 7:7-16).

7:7-15.2 HOUSING

This policy sets standards for housing construction in coastal areas.

The Bay Shoreline Protection Reach plan does not involve housing construction. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.3 RESORT/RECREATIONAL

This policy sets standards for resort and recreational uses in the coastal area.

The Bay Shoreline Protection Reach plan does not involve resort or recreational uses. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.4 ENERGY FACILITY

This policy sets standards for energy uses in coastal areas.

The Bay Shoreline Protection Reach plan does not involve new construction that would require long-term energy use. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.5 TRANSPORTATION

This policy sets standards for roads, public transportation, footpaths and parking facilities in coastal areas.

The Bay Shoreline Protection Reach plan does not involve construction of roads, public transportation, footpaths and/or parking facilities. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.6 PUBLIC FACILITY

This policy sets standards for public facilities (e.g., solid waste facilities) in coastal areas.

The Bay Shoreline Protection Reach plan does not involve construction of a public facility. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.7 INDUSTRY

This policy sets standards for industrial uses in coastal areas.

The Bay Shoreline Protection Reach plan does not involve construction of industrial facilities. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.8 MINING
This policy sets standards for mining in coastal areas.

The Bay Shoreline Protection Reach plan does not involve mining. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.9 PORT
This policy sets standards for port uses and port-related development.

The Bay Shoreline Protection Reach plan does not involve port use or the construction of a port. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.10 COMMERCIAL FACILITY
This policy sets standards for commercial facilities such as hotels, and other retail services in the coastal zone.

The Bay Shoreline Protection Reach plan does not involve construction of commercial facilities. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.11 COASTAL ENGINEERING
This policy sets standards to protect the shoreline, maintain dunes, and provide beach nourishment. Coastal engineering measures include a variety of non-structural, hybrid, and structural shore protection and storm damage reduction measures to manage water areas and protect the shoreline from the effects of erosion, storms, and sediment and sand movement. Beach nourishment, sand fences, pedestrian crossing of dunes, stabilization of dunes, dune restoration projects, dredged material management, living shorelines, and the construction of retaining structures such as bulkheads, gabions, revetments, and seawalls are all examples of coastal engineering measures.

The Bay Shoreline Protection Reach plan includes the construction of an engineered beach, dune, berm, groins, revetments, vegetation planting, and fencing. Therefore, the Coastal Engineering Use Rule applies. The construction of the dune, berm, beach fill, revegetation, fencing, groins, and revetments complies with public trust rights rule, N.J.A.C. 7:7-9.48, public access rule, N.J.A.C. 7:7-16.9., and N.J.A.C. 7:7-10, Standards for Beach and Dune Activities. The dune, berm, and beach fill will use non-toxic particle size and type of the fill material compatible with the existing beach material. The groins and revetments will reduce the downdrift of sediments into navigation channels, have negilable adverse impacts to the environment and its resources, and is essential to storm risk management. Public access will continue during and after the construction of the plan elements. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.12 DREDGED MATERIAL PLACEMENT ON LAND

This policy sets standards for disposal of dredged materials. This rule applies to the placement of dredged material landward of the spring high water line. The standards for dredged material disposal in water areas are found at N.J.A.C. 7:7-12.9. The future contractor will dispose of the sediments in a suitable authorized upland facility in accordance with NJDEP regulations.

During construction, the contractor will be required to adhere to an Erosion and Sediment Control Plan and develop an Environmental Protection Plan. The beach fill will consist of appropriate quality and particle size similar to existing conditions. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.13 NATIONAL DEFENSE FACILITIES

This policy sets standards for the location of defense facilities in the coastal zone.

The Bay Shoreline Protection Reach plan policy does not involve national defense facilities. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-15.14 HIGH RISE STRUCTURES

This policy sets standards for high-rise structures in the coastal zone.

The Bay Shoreline Protection Reach plan does not involve high-rise structures. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

h. SUBCHAPTER 16. RESOURCE RULES

7:7-16.1: PURPOSE AND SCOPE

This subchapter contains the standards the Department utilizes to analyze the proposed development in terms of its effects on various resources of the built and natural environment of the coastal zone, both at the proposed site as well as in its surrounding region.

7:7-16.2 MARINE FISH AND FISHERIES

This policy sets standards of acceptability so as to cause minimal feasible interference with the reproductive and migratory fish patterns of estuarine and marine species of finfish and shellfish.

The Bay Shoreline Protection Reach plan is in compliance with N.J.A.C 7:7-12 and the beach nourishment is in the public interest. Construction would not directly or intentionally involve the catching, taking or harvesting of marine fish. It is anticipated that fish would avoid any equipment used for the plan. During construction, slow moving/sessile marine animals living may be inadvertently buried or crushed; however, it is anticipated that abundance or diversity of these animals would not be impacted because the size of the construction area and access paths would represent a small percentage compared to the surrounding habitat. Additionally, the nature of this disturbance would be temporary. Expanses of identical adjacent habitat will be available to fisheries resources throughout the duration of the project. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.3 WATER QUALITY
This policy sets standards for coastal development to limit effects on water quality.

Short-term water quality impacts resulting from construction activities are expected. There will be localized increases in total suspended sediment and turbidity proximal to the placement area. As clean, previously tested sand is the placement material no other water quality impacts area anticipated. Erosion and sediment control best management practices will be implemented during construction to minimize impacts to water quality. No long-term impacts to the offshore or nearshore water quality are predicted as a result of the construction of the selected Bay Shoreline Protection Reach plan. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.4 SURFACE WATER USE
This policy sets standards for coastal development so as to limit effects on surface water.
Coastal development shall demonstrate that the anticipated surface water demand of the
facility will not exceed the capacity, including phased planned increases, of the local potable water supply system or reserve capacity, and that construction of the facility will not cause unacceptable surface water disturbances, such as drawdown, bottom scour, or alteration of flow patterns.

As stated in 7:7-16.3 short-term water quality impacts resulting from construction activities are expected and are anticipated to be localized proximal to the footprint. Erosion and sediment control best management practices will be implemented during construction to minimize impacts to surface water. The project does not propose any withdrawals of surface or groundwater and the proposed project will not deplete the water table in any given area. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy

7:7-16.5 GROUNDWATER USE
This policy sets standards for coastal development so as to limit effects on groundwater supplies.

The Bay Shoreline Protection Reach plan does not involve or effect future use of groundwater supplies. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy

7:7-16.6 Stormwater Management
This policy sets standards for coastal development if a project or activity that meets the definition of “major development” at N.J.A.C. 7:8-1.2, then the project or activity shall comply with the Stormwater Management rules at N.J.A.C. 7:8.

The Bay Shoreline Protection Reach plan does not meet the definition of “major development”. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.7 Vegetation
This policy sets standards for coastal development while protecting native vegetation. Vegetation is the plant life or total plant cover that is found on a specific area, whether indigenous or introduced by humans. Coastal development shall preserve, to the maximum extent practicable, existing vegetation within a development site. Coastal development shall plant new vegetation, particularly appropriate coastal species, native to New Jersey to the maximum extent practicable.

The Bay Shoreline Protection Reach plan involves the restoration of sandy dune habitat and will provide long-term protection to the existing dune, which is currently being lost due to erosion. Restoration of the sandy dune will include planting of native vegetation to help stabilize the dune. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy

7:7-16.8 Air Quality
This policy sets standards for coastal development with requirements that projects must meet applicable air quality standards.

Emissions to construct the Bay Shoreline Protection Reach plan do not exceed threshold levels for any emission variable. As a result, the District prepared a Clean Air Act Record of Non-Applicability (Appendix C). The total direct and indirect emissions from the selected Bay Shoreline Protection Reach plan are below the 100 tons trigger levels for NO_x or Carbon Monoxide (CO) for each project year and below the 50 tons trigger level for VOCs for each project year. The Bay Shoreline Protection Reach plan is not anticipated to increase air emissions above existing levels. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.9 Public Access
This policy requires that coastal development adjacent to the waterfront provide perpendicular and linear access to the waterfront to the extent practicable, including both visual and physical access.

The Bay Shoreline Protection Reach plan will temporarily block access to portions of the beach and shoreline during construction activities. Construction activities will be segmented allowing access to some part of the beach and shoreline at all times. Walkovers will be built over the dune to provide beach access. Access to the canoe launch site near the eastern revetment may temporarily be inaccessible during construction but will be accessible when construction is complete. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.10 Scenic Resources And Design

This policy sets standards that new coastal development be visually compatible with its surroundings. Adverse impacts to scenic resources as a result of the constructed project features are expected to be of minimal significance to the surrounding natural and manmade landscape. Structures would be consistent with existing man-made structures in the general vicinity. Access to the shorefront would continue to be maintained by stairs and walkways across the dune, ensuring continuous availability of the shore for aesthetic and scenic enjoyment of the shore front area.

The Bay Shoreline Protection Reach plan will construct a dune, berm, engineered beach, groins, and revetments. Currently project area contains an eroding dune, berm and beach. Currently here is an outfall that acts as a small groin. The construction of the two groins and revetments are typical of beach fill projects and can be found throughout the Raritan Bay. The Bay Shoreline Protection Reach plan will be visually compatible with its surroundings. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.11 Buffers And Compatibility Of Uses

This policy sets standards for adequate buffers between compatible land uses. Buffers are natural or man-made areas, structures, or objects that serve to separate distinct uses are areas. Compatibility of uses is the ability for uses to exist together without aesthetic or functional conflicts.

Adjacent land use includes the current beach, parking lot, restaurant, playground, and fishing access. The Bay Shoreline Protection Reach plan is compatible with adjacent land uses as it will enlarge the current beach and create more access to the shoreline. Buffers are not necessary as adjacent uses are similar to the plan. Therefore, the Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.12 Traffic

This policy sets standards that restrict coastal development that would disturb traffic systems.

The Bay Shoreline Protection Reach plan's goal is to lessen the impact of storm induced coastal flooding which will help to prevent impacts to traffic. Project construction activities may on occasion temporarily affect traffic. The plan will make every effort possible to mitigate temporary impacts on traffic during construction.

Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy.

7:7-16.13 Subsurface Sewage Disposal Systems

This policy sets standards for subsurface sewage disposal systems in the coastal zone.

The Bay Shoreline Protection Reach plan does not involve sewage disposal or the development of a subsurface sewage disposal system. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy

7:7-16.14 Solid And Hazardous Waste

This policy sets standards for handling and disposal of solid and hazardous waste.

The selected Bay Shoreline Protection Reach plan does not involve solid and hazardous waste. The construction contractor will be required to develop an Environmental Protection Plan that details the prevention of accidental discharge of any solid waste during construction. Therefore, the selected Bay Shoreline Protection Reach plan is consistent with this policy.

IV References

NJDEP. (1979). *The New Jersey Submersed Aquatic Vegetation Distribution Atlas Final Report.* Trenton: New Jersey Department of Environmental Protection.

NJDEP Shellfisheries, (2014). *INVENTORY OF NEW JERSEY'S ESTUARINE SHELLFISH RESOURCES: HARD CLAM STOCK ASSESSMENT.* Trenton: New Jersey Department of Environmental Protection.

USACE. (2016a). *Raritan Bay and Sandy Hook Bay, New Jersey Hurrican Sandy Limited Reevaluation for Coastal Storm Risk Management Union Beach New Jerse.* New York: U. S. Army Corps of Engineers.

USACE. (2016b). *Raritan Bay and Sandy Hook Bay, New Jersey, Supplemental Environmental Assessment for Hurricane Sandy Limited Reevaluation for Coastal Storm Risk Management Union Beach New Jersey.* New York: U. S. Army Corps of Engineers.

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RE: Federal Consistency Determination and Water Quality Certificate
File No.: 1350-17-0001.1 CDT 170001
Raritan Bay and Sandy Hook Bay Coastal Storm Risk Management Project
Union Beach Borough, Monmouth County

Dear Mr. Weppler and Mr. Dixon:

The New Jersey Department of Environmental Protection (NJDEP), Division of Land Use Regulation (Division), acting under Section 307 of the Federal Coastal Zone Management Act (P.L. 92-583) as amended, has reviewed the Army Corps of Engineers (ACOE) and NJDEP Bureau of Coastal Engineering's (NJDEP BCE) request for authorization to construct the Raritan Bay and Sandy Hook Bay Coastal Storm Risk Management Project.

The Division has determined that the project is conditionally consistent with New Jersey's Coastal Zone Management Rules N.J.A.C. 7:7-1.1 et seq., (amended on June 20, 2016), and the applicable Rules guiding issuance for a Section 401 Water Quality Certificate, provided that the conditions outlined below are met to the satisfaction of the Department of Environmental Protection.

Project Description

The Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey Coastal Storm Risk Management Project is to be constructed in multiple phases. Phase I, which is the subject of this Federal Consistency Determination, consists of constructing the Bay Shoreline Protection Reach, which involves the re-construction of a pre-existing dune with plantings, placement of approximately 688,000 cubic yards of initial sand fill with periodic renourishment (21,000 cubic yards) and the construction of two terminal groins and revetments to terminate the beach fill. Phases II-IV will consist of the construction of a levee and floodwall system including pump stations, roller gate, and sluice gates with box culverts.

The Bay Shoreline Protection Reach is shown on site plans in three (3) sheets entitled:

Figure Numbers 05, 06 and 07, entitled "RARITAN BAY AND SANDY HOOK BAY, NJ, HURRICANE AND STORM DAMAGE REDUCTION, HURRICANE SANDY LIMITED REEVALUATION REPORT, UNION BEACH, NEW JERSEY, SELECTED PLAN", undated, unrevised, and prepared by U.S. Army Corps of Engineers, New York District.

This consistency determination is issued subject to compliance with the following conditions:

1. The permittee shall coordinate with the US Fish & Wildlife Service, New Jersey Field Office (USFWS-NJFO) and the State Division of Fish & Wildlife, Endangered and Nongame Species Program (NJDWF-ENSP) should the use of the subject shorefront by State-listed beach-nesting birds be discovered. This coordination will include the establishment of a "Beach Management Plan" for the protection and management of State and/or federally listed species that occur at the subject site; signed by the USFWS-NJFO, NJDFW-ENSP and the municipality.

2. Based on the review of submitted documents, it has been represented that the District will utilize a qualified botanist to survey for Seabeach amaranth prior to construction and the results are to be provided to the USFW-NJFO. If the plant is identified, all areas where the plant is found shall be avoided and protected from disturbance.

3. Upon completion of the project, all temporary disturbed areas shall be restored to pre-disturbance conditions.

4. This Federal Consistency Determination authorizes work only on properties where the necessary project real estate easement has been obtained. Work on additional lots may require additional permits and approval from appropriate property owners.

5. The permittee shall continue to coordinate with the NJDEP Green Acres Program to ensure the proposed project does not constitute a diversion of parkland requiring prior NJDEP Commissioner and State House Commission approval under *N.J.A.C. 7:36.*

6. This Federal Consistency Determination applies to Phase I only. **The future flood control project appears to be consistent with the State of New Jersey's Coastal Zone Management Rules; however, a Federal Consistency Determination will be required to be obtained from the State for Phases II through IV, and the State will withhold the final Federal Consistency Determination until review of the final plan details.**

This Federal Consistency is authorized pursuant to all parties following the guidelines set forth, and agreed upon, for the construction of the proposed structures.

Pursuant to 15 CFR 930.44, the Division reserves the right to object and request remedial action if this proposal is conducted in a manner, or is having an effect on, the coastal zone that is substantially different than originally proposed.

Thank you for your attention to and cooperation with New Jersey's Coastal Zone Management Program. If you have any questions regarding this determination, please do not hesitate to call Eric Virostek of our staff at (609) 633-2289.

Sincerely,

Colleen Keller, Assistant Director
Division of Land Use Regulation

Date 6/5/17

c: Kim Springer, Coastal Planning
Bureau of Coastal and Land Use Enforcement

SCALE: 1 IN.= 200 FT.

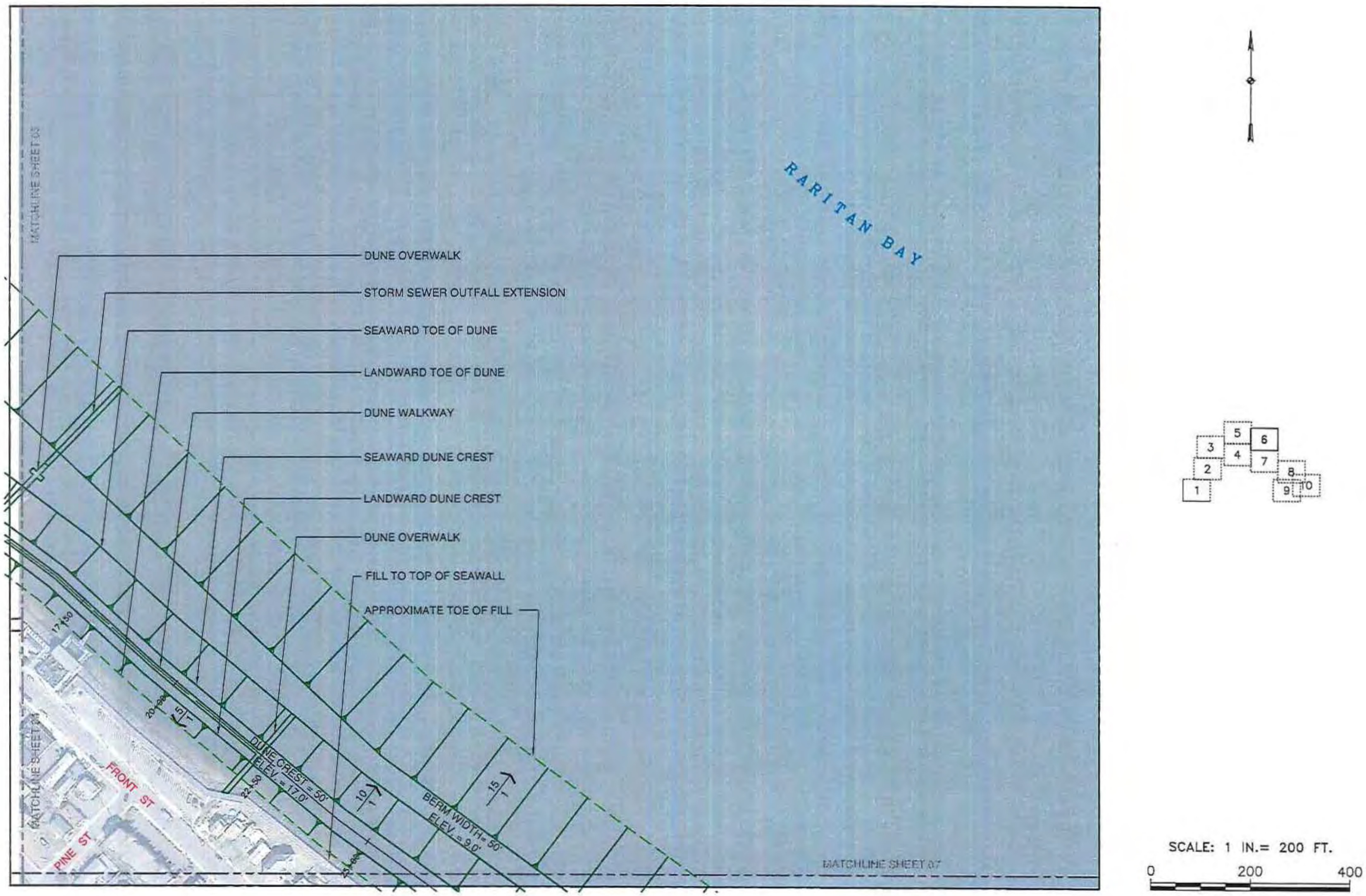
0 200 400

U.S. Army Corps of Engineers New York District

RARITAN BAY AND SANDY HOOK BAY, NJ
HURRICANE AND STORM DAMAGE REDUCTION
HURRICANE SANDY
LIMITED REEVALUATION REPORT
UNION BEACH, NEW JERSEY

SELECTED PLAN

Figure:
05



U.S. Army
Corps of Engineers
New York District

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Figure:
06

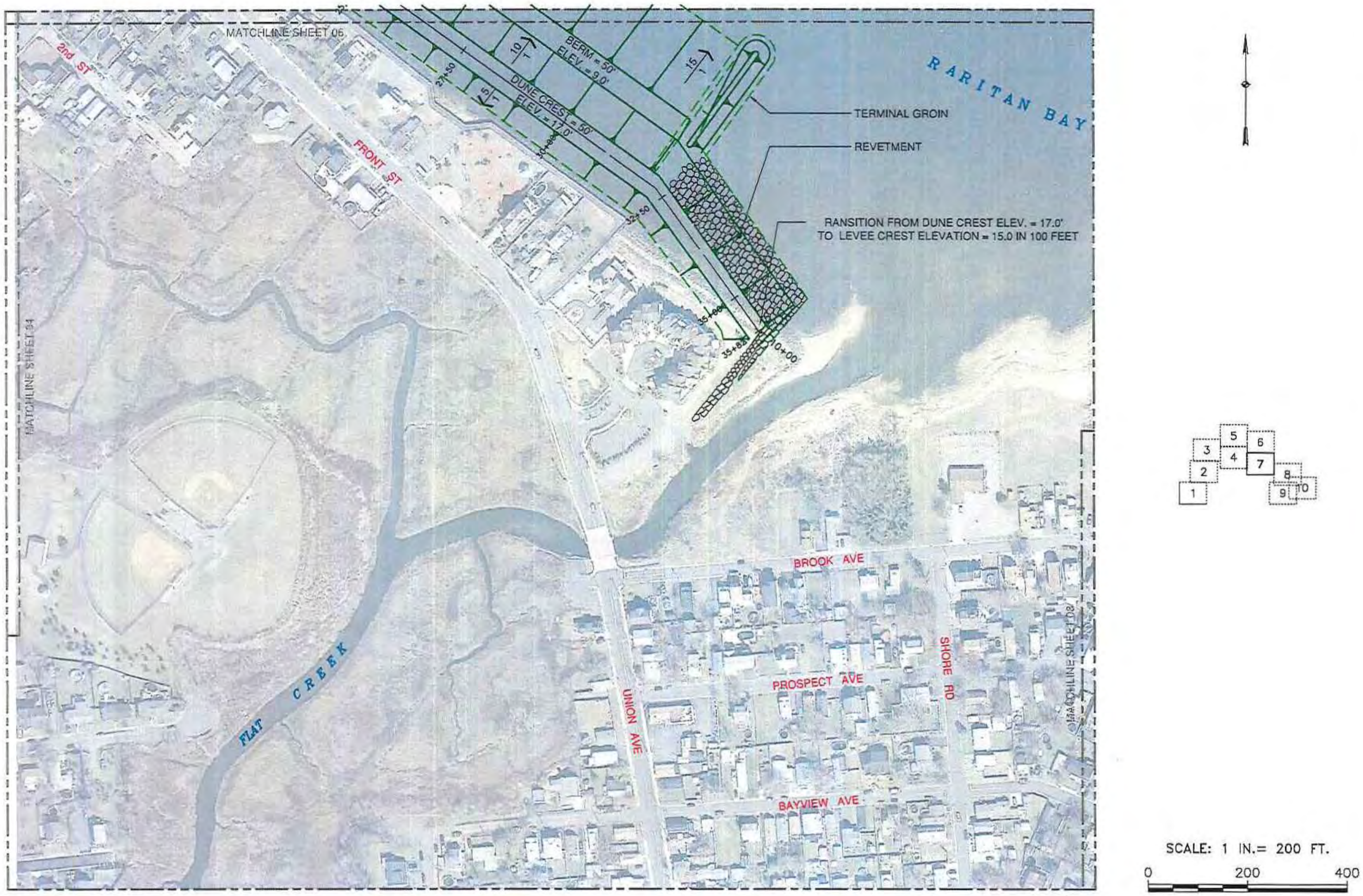

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Figure:
07

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

Division of Land Use Regulation
Mail Code 501-02A
P.O. Box 420
Trenton, New Jersey, 08625
www.nj.gov/dep/landuse

BOB MARTIN
Commissioner

Peter Weppler
Chief, Environmental Analysis Branch
Department of the Army
New York District, Corps of Engineers
Jacob K. Javis Federal Building
26 Federal Plaza
New York, NY 10278

June 21, 2017

RE: Raritan Bay and Sandy Hook Bay Coastal Storm Risk Management Project
Union Beach Borough, Monmouth County

Dear Mr. Weppler:

Based on the U.S. Army Corps of Engineers report entitled "Draft Limited Reevaluation Report and Draft Supplemental Environmental Assessment and General Conformity Determination", dated September 2016, the recommended plan appears to be consistent with the State's Coastal Zone Management policies and the State will withhold the final Federal Consistency determination until review of the final plan details.

If you have any question, please contact me at 609 984-3444.

Sincerely,

Diane Dow

Diane Dow, Director
Division of Land Use Regulation

C: Dave Rosenblatt, NJDEP Engineering and Construction

APPENDIX C

PERTINENT CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice

In Reply Refer To:
14-CPA-0026

NOV 13 2013

Matthew Voisine, Biologist
U.S. Army Corps of Engineers – New York District
26 Federal Plaza, Room 2151
New York, New York 10278

Re: Coastal Barrier Resources System determination pertaining to the Union Beach, New Jersey, Final Feasibility Report (2003) for the proposed combined hurricane and storm damage reduction project

Dear Mr. Voisine:

This response is in reference to your October 25, 2013 electronic correspondence, in which you request an applicability determination of the Coastal Barrier Resources Act (16 U.S.C. 3501 *et seq.*) (CBRA) relative to providing Federal funding assistance for the proposed construction of a beach berm and dune with revetments and two terminal groins, and of a system of levees and floodwalls with associated floodgates. The U.S. Fish and Wildlife Service (Service), New Jersey Field Office (NJFO) reviewed the referenced area for the presence of John H. Chafee Coastal Barrier Resources System (CBRS) units and for the applicability of Federal funds pursuant to the CBRA.

AUTHORITY

The CBRS was established by CBRA in 1982 and consists of geographic units along the Atlantic, Gulf of Mexico, Great Lakes, U.S. Virgin Islands, and Puerto Rico coasts that are delineated on a series of maps. Congress enacted CBRA to minimize the loss of human life, wasteful federal expenditures, and damage to natural resources on undeveloped coastal barriers. CBRA accomplishes these goals by prohibiting most Federal expenditures that promote development within the CBRS. CBRA does not prevent development; rather, it restricts Federal subsidies that encourage development within these hazard-prone and ecologically sensitive areas. CBRA imposes no restrictions on development conducted with non-Federal funds.

The Service is responsible for administering CBRA, which includes: maintaining the official maps of the CBRS; consulting with Federal agencies that propose spending funds within the CBRS; and making recommendations to Congress regarding whether certain areas were appropriately included in the CBRS. Aside from three minor exceptions, only new legislation can modify the CBRS boundaries to add or remove land. These exceptions include: (1) the CBRA five-year review requirement that solely considers changes that have occurred to the CBRS by natural forces such as erosion and accretion; (2) voluntary additions to the CBRS by property owners; and (3) additions of excess Federal property to the CBRS.

These comments are provided as technical assistance only; individual Federal agencies have the responsibility to independently ensure compliance with CBRA. Additionally, these comments do not constitute consultation for any project pursuant to Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) or comments afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*); nor do they preclude comment on any forthcoming environmental documents pursuant to the National Environmental Policy Act (83 Stat. 852; 42 U.S.C. 4321 *et seq.*).

CBRS DETERMINATION

The Study Area occupies approximately 1.8 square miles of land along the coast of Raritan Bay in the northern portion of Monmouth County. The Study Area encompasses the Borough of Union Beach and is enclosed by Raritan Bay to the north, the Borough of Keansburg to the west, the Township of Hazlet to the south, and Chingarora Creek to the west. The Study Area also includes Conaskonk Point Unit NJ-04 of the CBRS.

The Service has determined that one portion of the project within the CBRS is the proposed levee and associated floodgates crossing the wetlands from Ash Street to St. John and State Streets. The second portion of the project within the CBRS is the proposed levee skirting the northwestern portion of Bay Avenue and around most of the Bayshore Regional Sewerage Authority plant. All other proposed flood control measures appear to be in the immediate vicinity or at least farther than 500 feet from the CBRS boundary. The official CBRS map that was used to make this determination is available for viewing on the Service's website at: http://www.fws.gov/CBRA/Maps/CBRS/143.pdf.

Section 5 of the CBRA prohibits most new Federal expenditures or financial assistance within System units of the CBRS. If the proposed project or action is within or will affect a System unit, the Federal agency must, in consultation with the Service, determine whether or not any of the Section 6 exceptions under CBRA are applicable (16 U.S.C. 3505). If none of CBRA's exceptions are applicable, the proposed project should not proceed with Federal funding. The Service's response to a consultation request is in the form of an opinion only. The funding agency is responsible for complying with the provisions of CBRA.

A description of the limitations on federal expenditures and the exceptions to these limitations is available at: http://www.fws.gov/cbra/Consultations/Limitations-and-Exceptions.html. If you believe that the proposed project meets one of the exceptions to CBRA's limitations, please contact us for a CBRA consultation prior to committing Federal funds for the project. Additional information about the CBRA consultation process is available at: http://www.fws.gov/cbra/Consultations/Consultations.html

Please contact Carlo Popolizio at (609) 383-3938, extension 32, if you have any questions or require further assistance.

Sincerely,

Eric Schrading
Field Supervisor

cc: Ralph_Tiner@fws.gov
Katie_Niemi@fws.gov
Dana_Wright@fws.gov

NJFO:ES:cpopolizio:Ralph Tiner:Dana Wright:RP:ES:cap:11/06/13
P:/Shared/Carlo/14-CPA0026

RE: [EXTERNAL] CBRA Determination - Union Beach (UNCLASSIFIED)

Voisine, Matthew NAN02 <Matthew.Voisine@usace.army.mil> Wed, Oct 23, 2013 at 3:29 PM
To: "Popolizio, Carlo" <carlo_popolizio@fws.gov>
Cc: Ron Popowski <ron_popowski@fws.gov>, Wendy Walsh <wendy_walsh@fws.gov>, "Voisine, Matthew NAN02" <Matthew.Voisine@usace.army.mil>

Classification: UNCLASSIFIED
Caveats: NONE

Carlo

The project has been modified a little in certain areas. We are changing some of the designs of the floodwalls which will have a slightly larger impact. We will have T-walls instead of I-walls. The T-walls have a larger footprint.

Do you need the alignment of the structures near the CBRA area?

Thanks

Matthew Voisine
Biologist
USACE- NY District
26 Federal Plaza
Room 2151
NY, NY 10278
917.790.8718 voice
702.271.0496 mobile
212.264.0961 fax

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From: Popolizio, Carlo [mailto:carlo_popolizio@fws.gov]
Sent: Wednesday, October 23, 2013 3:15 PM
To: Voisine, Matthew NAN02
Cc: Ron Popowski; Wendy Walsh
Subject: [EXTERNAL] CBRA Determination - Union Beach

Hi Matthew,

I am the CBRA coordinator for New Jersey. In order for me to provide you with a determination, I need to know the specifics and localities of your project. Has the project been modified over time or can I use the Planning Aid Report issued form this office in 2003-04?

thanks, Carlo

--
Carlo Popolizio, Biologist
USFWS-NJFO
927 N. Main Street, Pleasantville NJ 08232

Phone: (609) 383-3938 x 32
Fax: (609) 646-0352
"Sell your cleverness and buy bewilderment." Rumi

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As a follow-up. Do you need some type of GIS file of our alignment or are you going to send us the CBRA alignment? I want to send you what you need and not unnecessary files.

Thanks

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Hi Matthew, i would like to get a good idea of the entire project and see if any portion of it falls within 500' or inside the CBRS. I presume you have the mapped CBRS area. Carlo
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Voisine, Matthew NAN02 <Matthew.Voisine@usace.army.mil> Fri, Oct 25, 2013 at 9:04 AM
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Cc: Ron Popowski <ron_popowski@fws.gov>, Wendy Walsh <wendy_walsh@fws.gov>, "Voisine, Matthew NAN02" <Matthew.Voisine@usace.army.mil>

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We have looked on the website to see the CBRS alignment. Our alignment (how it was originally) goes into the CBRS area in sections. The rest of the structural alignment skirts the CBRS alignment, definitely within 500'. I know the engineers have a .shp file of the CBRS alignment but there are some questions with it. There is a sewage treatment plant within the CBRS zone as the alignment goes through the plant. This has brought up discussions about how accurate the alignment downloaded from the CBRS website may be.

Attached is our structural alignment with the CBRS alignment that we received from the CBRS website.
I will sent you the rest of our files via an ftp site.

Thanks

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3091K

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Yes Matthew, the CBRS line goes through the BRSA sewage treatment plant, although a delineation mistake done in the past, it is the precise line of the CBRS boundary. It will eventually be corrected, but not for the time being. Carlo
[Quoted text hidden]

Voisine, Matthew NAN02 <Matthew.Voisine@usace.army.mil> Fri, Oct 25, 2013 at 9:43 AM
To: "Popolizio, Carlo" <carlo_popolizio@fws.gov>
Cc: Ron Popowski <ron_popowski@fws.gov>, Wendy Walsh <wendy_walsh@fws.gov>, "Voisine, Matthew NAN02" <Matthew.Voisine@usace.army.mil>

Classification: UNCLASSIFIED
Caveats: NONE

Carlo

I ask this only because you said it is a mistake that will not be corrected in the time being. Does that mean our alignment cannot protect the plant as it goes in the CBRS zone?

Thank you

Matthew Voisine
Biologist
USACE- NY District
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To: "Voisine, Matthew NAN02" <Matthew.Voisine@usace.army.mil>
Cc: Ron Popowski <ron_popowski@fws.gov>, Wendy Walsh <wendy_walsh@fws.gov>

Matthew,

I have to take a look at the project and what it entails. It takes an act of Congress to modify the CBRS line.

Carlo
[Quoted text hidden]

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278-0090

January 8 2014

Mr. Eric Schrading, Field Supervisor
Fish and Wildlife Service
New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, NJ 08232

Mr. Schrading:

The U.S. Army Corps of Engineers, New York District (District), has been undertaking emergency actions following Hurricane Sandy along the Atlantic Coast of New York and New Jersey, which includes the Raritan Bay shoreline. This assistance consists of the rehabilitation of federally-authorized hurricane and shore protection projects under the Disaster Relief Appropriation Act of 2013 (Public Law 113-2 also known as the Sandy Relief Bill). Under this authorization, the District is re-evaluating the Raritan and Sandy Hook Bay Hurricane and Storm Damage Reduction Project for Union Beach, Monmouth County, New Jersey (Project), which was authorized for construction by the Water Resources Development Act (WRDA) of 2007 (Public Law 110-114).

In October 2013, the District requested an applicability determination of the Coastal Barrier Resources Act (16 U.S.C 3501 *et seq.*; [CBRA]) for the proposed Project consisting of a beach berm, a dune with revetments and two terminal groins, and a system of levees, floodwalls and associated flood gates (Enclosures 1 and 2). The U.S. Fish and Wildlife Service, New Jersey Field Office (Service) has determined that two portions of the Project are located within the Coastal Barrier Resource System (CBRS), Conaskonk Point Unit (NJ-04; Enclosure 3). These areas are: 1) the proposed levee and associated floodgates crossing the wetlands from Ash Street to St John and State Streets; and 2) the proposed levee skirting the northwestern portion of Bay Avenue and around the Bayshore Regional Sewerage Authority plant (Enclosure 2).

Section 6 of CBRA (16 U.S.C. 3505) permits certain federal expenditures and financial assistance within the CBRS after consultation with the Service and if that expenditures meets one of the exceptions provided in 16 U.S.C. 3505 (a)(6) and is also consistent with the three purposes of the CBRA, which are the minimization of: 1) the loss of human life; 2) wasteful expenditure of federal revenues; and 3) damage to fish, wildlife and other natural resources associated with coastal barriers.

A report issued by the New Jersey Department of Environmental Protection Community Affairs after Hurricane Sandy stated that, as a result of the storm, approximately 1,096 houses suffered minor damage, 136 houses suffered major damage and 194 houses suffered severe damage. The current Project, as designed, could have prevented a significant portion of those damages. As reported in 2003, the Project study estimated that if implemented approximately $15,921.092.00 (October 2013 Price Level adjusted) annually may be saved, much of it federal funds. In addition, the Project will restore approximately 18 acres of invasive phragmites (*Phragmites australis*) wetland and upland habitat to native salt marsh, wetland scrub-shrub communities and wetland herbaceous/scrub-shrub habitat. The project will also benefit vegetation and wildlife through the restoration of this acreage.

For the construction of the levee and floodgates at Ash, St. John and State Streets, the District is asking for an exception pursuant to Section 6 of CBRA as an emergency action essential to the saving of lives, the protection of property, public health and safety. The area was severely damaged during Hurricane Sandy and remains at risk for additional damages resulting from future storm events. The proposed Project would provide protection that would reduce storm damage within Union Beach.

Through discussions with the Service in November 2013, the District understands that a major portion of the Conaskonk Point Unit (NJ-04) delineation will most likely be modified due to an inaccurate mapping datum. The existing delineation would be revised to include removing the Bayshore Regional Sewerage Authority plant and portions of the existing delineation near Bay Avenue, effectively removing this area from the construction restrictions required pursuant to the CBRA. The District plans to proceed under the assumption that this area will be removed from the CBRS and therefore no exception will be needed for this area pursuant to the CBRA.

Thank you for your cooperation with the District in this emergency situation. Should you have any questions or need additional information, please contact Matthew Voisine, Project Biologist, at 917-790-8718 or Matthew.Voisine@usace.army.mil.

Sincerely,

Frank Santomauro

Frank Santomauro
Chief, Planning Division

Enclosures

BISON CONNECT

Popolizio, Carlo <carlo_popolizio@fws.gov>

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Cc: Ron Popowski <ron_popowski@fws.gov>, Wendy Walsh <wendy_walsh@fws.gov>

Yes Matthew, the CBRS line goes through the BRSA sewage treatment plant, although a delineation mistake done in the past, it is the precise line of the CBRS boundary. It will eventually be corrected, but not for the time being. Carlo
[Quoted text hidden]

Voisine, Matthew NAN02 <Matthew.Voisine@usace.army.mil> Fri, Oct 25, 2013 at 9:43 AM
To: "Popolizio, Carlo" <carlo_popolizio@fws.gov>
Cc: Ron Popowski <ron_popowski@fws.gov>, Wendy Walsh <wendy_walsh@fws.gov>, "Voisine, Matthew NAN02" <Matthew.Voisine@usace.army.mil>

Classification: UNCLASSIFIED
Caveats: NONE

Carlo

I ask this only because you said it is a mistake that will not be corrected in the time being. Does that mean our alignment cannot protect the plant as it goes in the CBRS zone?

Thank you

Matthew Voisine
Biologist
USACE- NY District
26 Federal Plaza

Room 2151
NY, NY 10278
917.790.8718 voice
702.271.0496 mobile
212.264.0961 fax

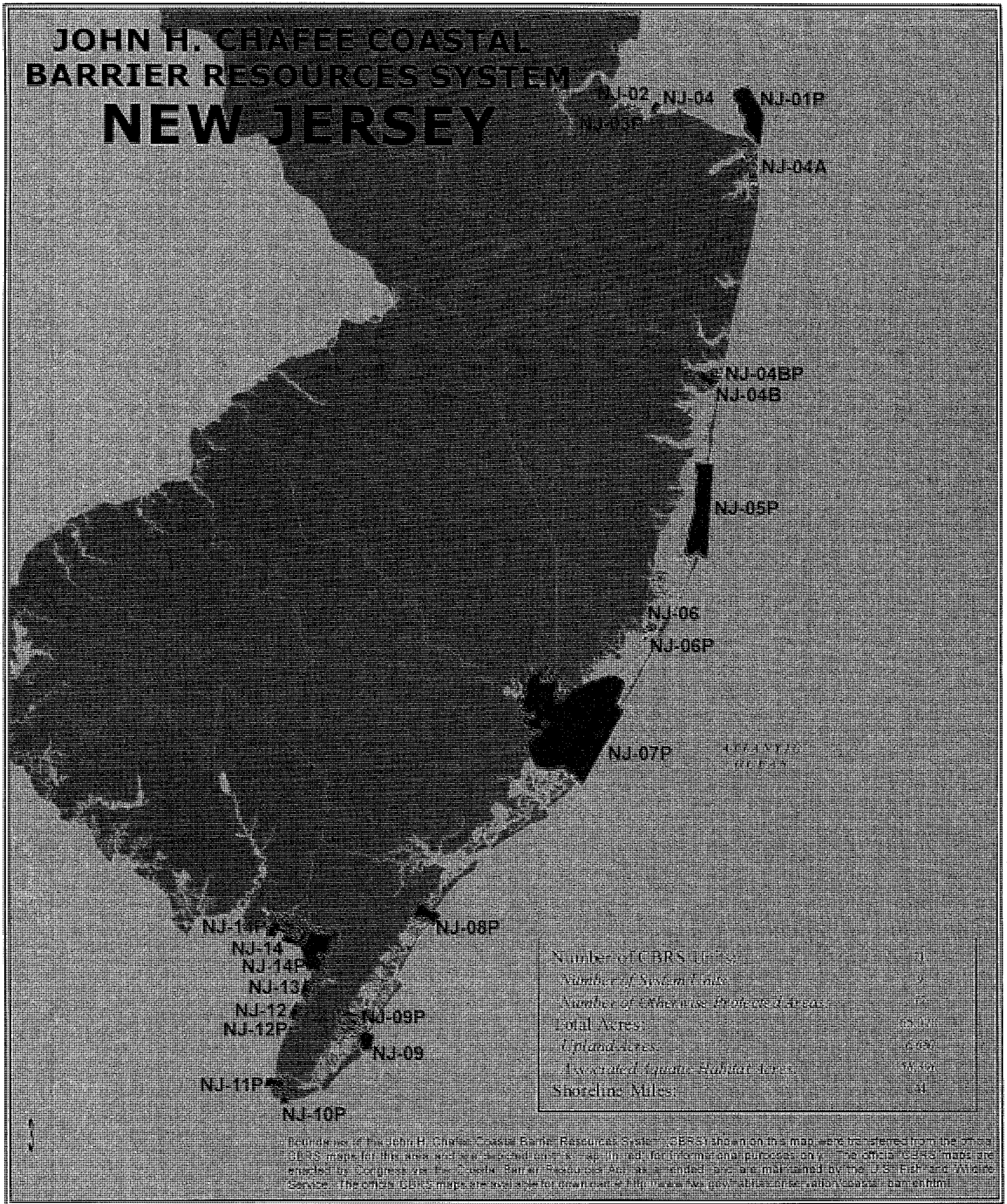
-----Original Message-----
From: Popolizio, Carlo [mailto:carlo_popolizio@fws.gov]
[Quoted text hidden]
Classification: UNCLASSIFIED
Caveats: NONE

Popolizio, Carlo <carlo_popolizio@fws.gov> Fri, Oct 25, 2013 at 10:38 AM
To: "Voisine, Matthew NAN02" <Matthew.Voisine@usace.army.mil>
Cc: Ron Popowski <ron_popowski@fws.gov>, Wendy Walsh <wendy_walsh@fws.gov>

Matthew,

I have to take a look at the project and what it entails. It takes an act of Congress to modify the CBRS line.

Carlo
[Quoted text hidden]


JOHN H. CHAFEE COASTAL
BARRIER RESOURCES SYSTEM
NEW JERSEY
NJ-02
NJ-04
NJ-01P
NJ-03P
NJ-04A
NJ-04BP
NJ-04B
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NJ-12P
NJ-09P
NJ-09
NJ-11P
NJ-10P
Number of CBRS Units:
Number of System Units
Number of Otherwise Protected Areas
Total Acres:
Upland Acres
Associated Aquatic Habitat Acres
Shoreline Miles:

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice

In Reply Refer To:
14-CPA-0026

Matthew Voisine, Biologist
U.S. Army Corps of Engineers – New York District
26 Federal Plaza, Room 2151
New York, New York 10278

NOV 13 2013

Re: Coastal Barrier Resources System determination pertaining to the Union Beach, New Jersey, Final Feasibility Report (2003) for the proposed combined hurricane and storm damage reduction project

Dear Mr. Voisine:

This response is in reference to your October 25, 2013 electronic correspondence, in which you request an applicability determination of the Coastal Barrier Resources Act (16 U.S.C. 3501 *et seq.*) (CBRA) relative to providing Federal funding assistance for the proposed construction of a beach berm and dune with revetments and two terminal groins, and of a system of levees and floodwalls with associated floodgates. The U.S. Fish and Wildlife Service (Service), New Jersey Field Office (NJFO) reviewed the referenced area for the presence of John H. Chafee Coastal Barrier Resources System (CBRS) units and for the applicability of Federal funds pursuant to the CBRA.

AUTHORITY

The CBRS was established by CBRA in 1982 and consists of geographic units along the Atlantic, Gulf of Mexico, Great Lakes, U.S. Virgin Islands, and Puerto Rico coasts that are delineated on a series of maps. Congress enacted CBRA to minimize the loss of human life, wasteful federal expenditures, and damage to natural resources on undeveloped coastal barriers. CBRA accomplishes these goals by prohibiting most Federal expenditures that promote development within the CBRS. CBRA does not prevent development; rather, it restricts Federal subsidies that encourage development within these hazard-prone and ecologically sensitive areas. CBRA imposes no restrictions on development conducted with non-Federal funds.

The Service is responsible for administering CBRA, which includes: maintaining the official maps of the CBRS; consulting with Federal agencies that propose spending funds within the CBRS; and making recommendations to Congress regarding whether certain areas were appropriately included in the CBRS. Aside from three minor exceptions, only new legislation can modify the CBRS boundaries to add or remove land. These exceptions include: (1) the CBRA five-year review requirement that solely considers changes that have occurred to the CBRS by natural forces such as erosion and accretion; (2) voluntary additions to the CBRS by property owners; and (3) additions of excess Federal property to the CBRS.

These comments are provided as technical assistance only; individual Federal agencies have the responsibility to independently ensure compliance with CBRA. Additionally, these comments do not constitute consultation for any project pursuant to Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) or comments afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*); nor do they preclude comment on any forthcoming environmental documents pursuant to the National Environmental Policy Act (83 Stat. 852; 42 U.S.C. 4321 *et seq.*).

CBRS DETERMINATION

The Study Area occupies approximately 1.8 square miles of land along the coast of Raritan Bay in the northern portion of Monmouth County. The Study Area encompasses the Borough of Union Beach and is enclosed by Raritan Bay to the north, the Borough of Keansburg to the west, the Township of Hazlet to the south, and Chingarora Creek to the west. The Study Area also includes Conaskonk Point Unit NJ-04 of the CBRS.

The Service has determined that one portion of the project within the CBRS is the proposed levee and associated floodgates crossing the wetlands from Ash Street to St. John and State Streets. The second portion of the project within the CBRS is the proposed levee skirting the northwestern portion of Bay Avenue and around most of the Bayshore Regional Sewerage Authority plant. All other proposed flood control measures appear to be in the immediate vicinity or at least farther than 500 feet from the CBRS boundary. The official CBRS map that was used to make this determination is available for viewing on the Service's website at: http://www.fws.gov/CBRA/Maps/CBRS/143.pdf.

Section 5 of the CBRA prohibits most new Federal expenditures or financial assistance within System units of the CBRS. If the proposed project or action is within or will affect a System unit, the Federal agency must, in consultation with the Service, determine whether or not any of the Section 6 exceptions under CBRA are applicable (16 U.S.C. 3505). If none of CBRA's exceptions are applicable, the proposed project should not proceed with Federal funding. The Service's response to a consultation request is in the form of an opinion only. The funding agency is responsible for complying with the provisions of CBRA.

A description of the limitations on federal expenditures and the exceptions to these limitations is available at: http://www.fws.gov/cbra/Consultations/Limitations-and-Exceptions.html. If you believe that the proposed project meets one of the exceptions to CBRA's limitations, please contact us for a CBRA consultation prior to committing Federal funds for the project. Additional information about the CBRA consultation process is available at: http://www.fws.gov/cbra/Consultations/Consultations.html

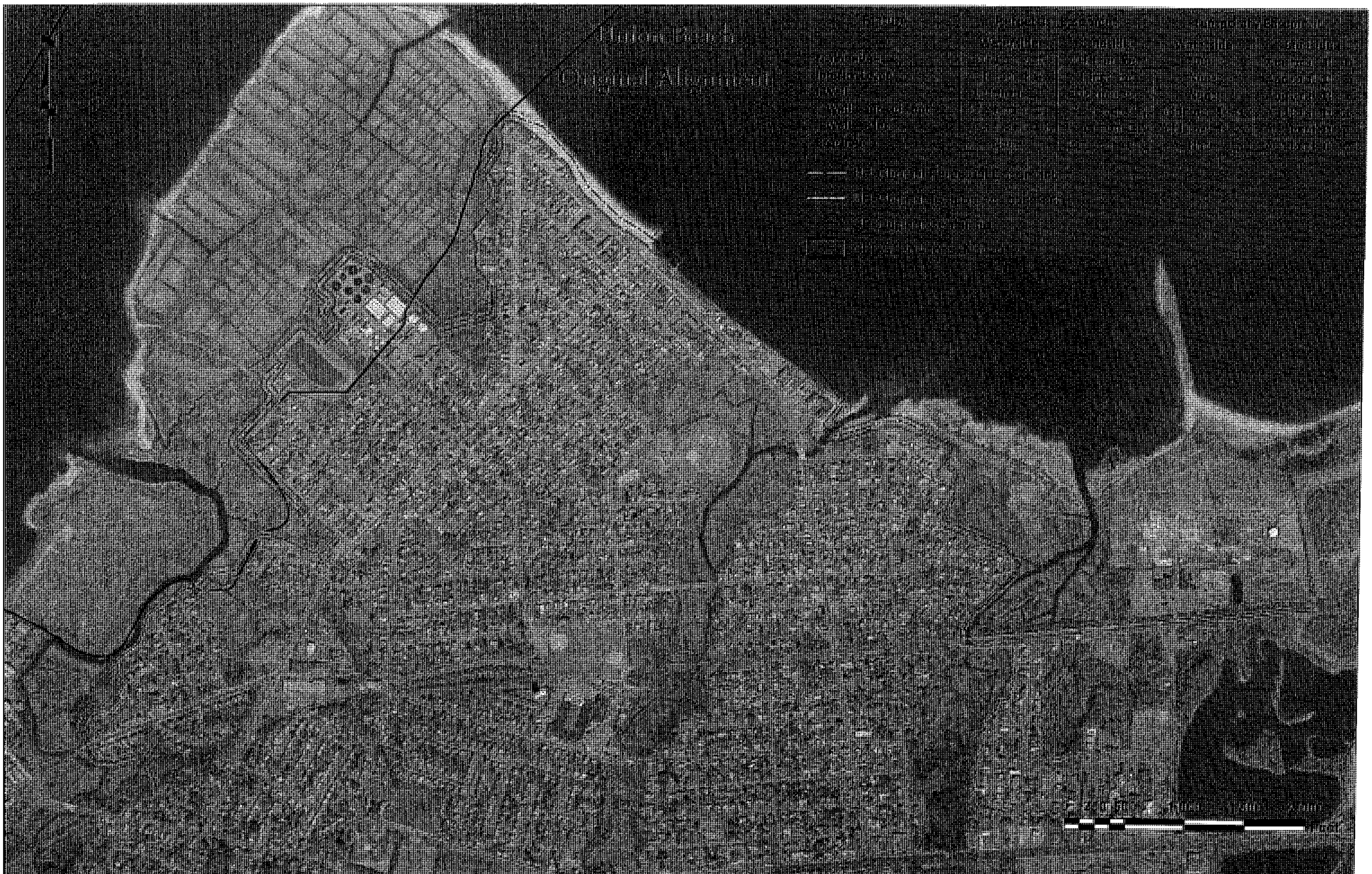
Please contact Carlo Popolizio at (609) 383-3938, extension 32, if you have any questions or require further assistance.

Sincerely,

Eric Schrading
Field Supervisor

cc: Ralph_Tiner@fws.gov
Katie_Niemi@fws.gov
Dana_Wright@fws.gov

NJFO:ES:cpopolizio:Ralph Tiner:Dana Wright:RP:ES:cap:11/06/13
P:/Shared/Carlo/14-CPA0026



Updated: 24 October 2013

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice

In Reply Refer To:
14-CPA-0026a

FEB 0 4 2014

Frank Santomauro, Chief
Planning Division
U.S. Army Corps of Engineers – New York District
26 Federal Plaza, Room 2151
New York, New York 10278

Re: Coastal Barrier Resources Act consultation pertaining to the Union Beach, Monmouth County, New Jersey, Final Feasibility Report (2003) for the proposed combined hurricane and storm damage reduction project

Dear Mr. Santomauro:

This response is in reference to your January 8, 2014 letter, in which you request a consultation pursuant to the Coastal Barrier Resources Act (16 U.S.C. 3501 *et seq.*) (CBRA) relative to providing Federal funding assistance for the proposed construction of a beach berm and dune with revetments and two terminal groins, and of a system of levees and floodwalls with associated floodgates. The U.S. Fish and Wildlife Service (Service), New Jersey Field Office (NJFO) reviewed the referenced area for the presence of John H. Chafee Coastal Barrier Resources System (CBRS) units and for the applicability of Federal funds pursuant to the CBRA. It is the Service opinion that the proposed project within the CBRS does not meet the criteria for a CBRA exception under 16 U.S.C. § 3505(a)(6)(E) for emergency actions. Our justification for this finding is provided below.

The Study Area occupies approximately 1.8 square miles of land along the coast of Raritan Bay in the northern portion of Monmouth County. The Study Area encompasses the Borough of Union Beach and is enclosed by Raritan Bay to the north, the Borough of Keansburg to the west, the Township of Hazlet to the south, and Chingarora Creek to the west. The Study Area also includes Conaskonk Point Unit NJ-04 of the CBRS.

The Service determined that one portion of the project within the CBRS Unit NJ-04 is the proposed levee and associated floodgates crossing the wetlands from Ash Street to St. John and State Streets. The second portion of the project within the CBRS is the proposed levee skirting the northwestern portion of Bay Avenue and around most of the Bayshore Regional Sewerage Authority (BRSA) plant. All other proposed flood control measures appeared to be in the immediate vicinity or at least farther than 500 feet from the CBRS boundary. The official CBRS map that was used to make this determination is available for viewing on the Service's website at: http://www.fws.gov/CBRA/Maps/CBRS/143.pdf.

The U.S. Army Corps of Engineers (Corps) is asking for an exception pursuant to Section 6 of the CBRA (16 U.S.C. § 3505(a)(6)(E) as an emergency action essential to the saving of lives, the protection of property, public health and safety for construction of a levee and floodgates at Ash, St. John, and State Streets. The Corps also states that the BRSA plant was included in the CBRS Unit NJ-04 due to inaccurate mapping datum and should not preclude the Corps from proceeding with construction within this portion of the project area. Finally the Corps states that the project will also restore approximately 18 acres of invasive common reed (*Phragmites australis*) for the benefit of native vegetation and wildlife.

AUTHORITY

These comments are provided as technical assistance only; individual Federal agencies have the responsibility to independently ensure compliance with CBRA. Additionally, these comments do not constitute consultation for any project pursuant to Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) or comments afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*); nor do they preclude comment on any forthcoming environmental documents pursuant to the National Environmental Policy Act (83 Stat. 852; 42 U.S.C. 4321 *et seq.*).

CBRA DETERMINATION

The CBRA (16 U.S.C. § 3594(a)) specifically prohibits new Federal expenditures and financial assistance for the following activities within System units of the CBRS: "the construction or purchase of any structure, appurtenance, facility, or related infrastructure", "the construction or purchase of any road, airport, boat-landing facility, or other facility on, or bridge or causeway to, any System unit", and "the carrying out of any project to prevent the erosion of, or to otherwise stabilize, any inlet, shoreline, or inshore area with limited exceptions."

The Service notes that the requested exception found at 16 U.S.C. § 3505(a)(6)(E) limits allowable Federal expenditures to "actions performed pursuant to Sections 5170a, 5170b, and 5192 of Title 42 and Section 1362 of the National Flood Insurance Act of 1968 (42 U.S.C. 4103) and are limited to actions that are necessary to alleviate the emergency." Section 5170b specifies that Department of Defense funds may be allocated to emergency work, which may be "carried out for a period not to exceed 10 days." Emergency work is defined as clearing and removing debris and wreckage, as well as temporary restoration of essential public facilities and services. It is our understanding that the proposed project would be completed under the Water Resources Development Act of 2007, not Sections 5170a, 5170b, or 5192 of Title 42 of the U.S. Code; therefore, the project cannot meet the exception to CBRA under 16 U.S.C. § 3505(a)(6)(E), regardless of whether the proposed project is otherwise consistent with the purposes of CBRA to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers.

On October 24, 2013, the Secretary of the Interior provided $5 million to the Service to comprehensively modernize the CBRS maps for eight states most affected by Hurricane Sandy: Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia. The Service plans to prepare comprehensively revised draft maps for these eight states by the end of 2017. The Service may propose to revise the boundaries of CBRS Unit NJ-04 through this process; however, any recommended changes to the CBRS (including proposed removals and proposed additions) will only become effective once the revised maps are enacted into law by Congress. We have no authority to apply the requirements of the CBRA as if the boundaries of Unit NJ-04 are different than as shown on the current official CBRS map of that Unit. Additionally, at this time, the Service anticipates that only a limited portion of Unit NJ-04 that overlaps with the Corps-planned levees and floodgates within the CBRS would be proposed for removal.

SUMMARY AND CONCLUSIONS

It is the Service's opinion that the proposed levee and associated floodgates crossing the wetlands from Ash Street to St. John and State Streets, including the northwest portion of Bay Avenue and the BRSA plant, within CBRS Unit NJ-04 are not allowable Federal expenditures under the exception to CBRA found at 16 U.S.C. § 3505(a)(6)(E). Actions necessary to alleviate an emergency and allowable pursuant to the CBRA under this exception may include such things as the removal of debris; temporary restoration of community services (*e.g.*, electricity, water, sewage); provisions for emergency shelter; and evacuations. Emergency actions are only allowable within CBRS units if they are necessary to alleviate the emergency *and* performed pursuant to Sections 5170a, 5170b, or 5192 of Title 42 of the U.S. Code.

The Service has not yet proposed any specific revisions to the boundaries of Unit NJ-04, and we do not anticipate proposed revisions to the New Jersey CBRS maps will be submitted to Congress for at least two years. At that point, the revised maps would have to be enacted by Congress through legislation to become effective. Additionally, we have no authority to apply the requirements of the CBRA as if the boundaries of Unit NJ-04 are different than as shown on the current official map of that Unit.

We hope this information is helpful. Please contact Carlo Popolizio at (609) 383-3938, extension 32, if you have any questions or require further assistance.

Sincerely,

Eric Schrading
Field Supervisor

cc: Ralph_Tiner@fws.gov
Katie_Niemi@fws.gov
Dana_Wright@fws.gov
Matthew.Voisine@usace.army.mil

NJFO:ES:cpopolizio:Tiner:Wright:Niemi:cap:RP:ES:cap: 1/30/14
P:/Shared/Carlo/14-CPA0026a

From:	Wright, Dana
To:	Voisine, Matthew NAN02
Cc:	Popolizio, Carlo; Ron Popowski; Eric Schrading; Katie Niemi
Subject:	Re: [EXTERNAL] Re: CBRS Union Beach (UNCLASSIFIED)
Date:	Wednesday, 18 June, 2014 11:37:51 AM

Matthew,

I want to provide some clarifying information about two different CBRS mapping projects that affect NJ in case there is any confusion. The new map for Unit NJ-04 that was recently released for review was produced through our digital conversion and 5-year review project <http://www.fws.gov/cbra/Maps/Digital-Conversion-Batch-2.html> , which limits changes to only those minor and technical changes necessary to reflect natural changes (e.g. erosion and accretion) in the units. Those types of minor changes can by made by the Service through our administrative authority, which is extremely limited.

There is another separate mapping project which will allow the Service to more comprehensively review the CBRS units 8 northeastern states affected by Hurricane Sandy (including NJ) and make recommendations to Congress for additions to and removals from the CBRS, including the correction of alleged mapping errors. That project, which you can read more about here: http://www.fws.gov/cbra/Maps/Hurricane-Sandy-Project.html, will not be complete until 2017, and at that point the draft maps that we produce will only be the Service's recommendations for changes. The draft maps would still need to enacted by Congress before they become effective. I'd also like to point out that while the Service could potentially recommend the removal of the sewerage treatment plant from the unit (that decision has yet to be made), we would likely propose to leave the surrounding wetlands within the Unit.

I can explain this further on the call if necessary.

Thanks,

Dana Wright
Program Specialist
Ecological Services
U.S. Fish & Wildlife Service
4401 N. Fairfax Drive, Room 860C
Arlington, VA 22203
703-358-2443 (office)
703-358-1869 (fax)

Learn more about the Coastal Barrier Resources Act <http://www.fws.gov/cbra>

On Wed, Jun 18, 2014 at 10:05 AM, Voisine, Matthew NAN02 <Matthew.Voisine@usace.army.mil> wrote:

> Classification: UNCLASSIFIED
> Caveats: NONE
>
> Carlo
>
> Now the new CBRS alignment has come out, can we set up a call to discuss the alignment for NJ-04 and the Districts Union Beach project. The new alignment did not remove the sewage treatment plant as we anticipated. We would like to discuss the Districts path forward in order to construct the flood mitigation plan and be in compliance with CBRA.

From:	Wright, Dana
To:	Voisine, Matthew NAN02; Ashton, Karen NAN02; Brighton, Nancy J NAN02
Cc:	Cynthia Bohn; Katie Niemi; Eric Schrading; Carlo Popolizio
Subject:	[EXTERNAL] CBRA Compliance and Union Beach Flood Control Project
Date:	Thursday, 29 September, 2016 1:01:44 PM

Hello Matthew,

We have reviewed the proposed levee and floodwall alignment for the Union Beach storm damage reduction project in the shapefile that you provided on September 23, 2016 with the file name "UB_PropAlign_092116.zip" against our final recommended boundary for Coastal Barrier Resources System (CBRS) Unit NJ-04.

If the proposed project is constructed as depicted in these data, and the Service's final recommended boundary for Unit NJ-04 is adopted by Congress, then the project would be located outside of the CBRS and therefore would not require a consultation under the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). Portions of the temporary and permanent easements around the flood control structures will remain within the CBRS, however because no structures are being constructed within those spaces, they are not affected by the CBRA.

The Service plans to transmit a final recommended CBRS map for Union Beach to Congress before the end of 2016. We will notify you once our final recommended map has been transmitted. The final recommended map will not take effect until and unless it is enacted through legislation.

Please let me know if you have any questions.

Thanks,

Dana Wright
Program Specialist
Ecological Services
U.S. Fish & Wildlife Service
5275 Leesburg Pike, MS: ES
Falls Church, VA 22041
703-358-2443 (office)
703-358-1800 (fax)

Learn more about the Coastal Barrier Resources Act <Blockedhttp://www.fws.gov/ecological-services/habitat-conservation/Coastal.html>

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278-0090

REPLY TO
ATTENTION OF
Environmental Analysis Branch

June 24 2014

Mr. Eric Davis
U.S. Fish & Wildlife Service, New Jersey Field Office
927 North Main Street, Building D
Pleasantville, New Jersey 08232

Subject: Section 7 Consultation for Raritan and Sandy Hook Bay Hurricane and Storm Damage Reduction Project for Union Beach, Monmouth County, New Jersey.

Dear Mr. Davis,

The U.S. Army Corps of Engineers, New York District (District), has been undertaking actions following Hurricane Sandy along the Atlantic Coast of New York and New Jersey, which includes the Raritan Bay shoreline. This assistance consists of the rehabilitation of federally authorized hurricane and shore protection projects under the Disaster Relief Appropriation Act of 2013 (Public Law 113-2 also known as the Sandy Relief Bill). Under this authorization, the District is re-evaluating the Raritan and Sandy Hook Bay Hurricane and Storm Damage Reduction Project for Union Beach, Monmouth County, New Jersey (Project), which was authorized for construction by the Water Resources Development Act (WRDA) of 2007 (Public Law 110-114).

Pursuant to our above referenced subject, the District, would like to initiate informal section 7 coordination for the project. Through the Services iPac system, Piping Plover (*Charadrius melodus*), Seabeach amaranth (*Amaranthus pumilus*), and northern long-eared Bat (*Myotis septentrionalis*) were identified as potentially occurring in the project area. The project will not affect the northern long-eared bat as there will be no activities near mines or caves and there will be no removal of any trees >3" in diameter at breast height.

The District is requesting information regarding seabeach amaranth and Piping Plover in and near Union Beach, NJ. The District has been in contact with Ron Popowski regarding this project and we have exchanged multiple documents discussing the project extend and footprint. If you have any questions regarding this request, please do not hesitate to contact me at matthew.voisine@usace.army.mil or 917-790-8718.

Sincerely,

Matthew Voisine, Project Biologist

cc:
Ron Popowski, USFWS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice

In Reply Refer To:
14-TA-0424

Matthew Voisine, Biologist
U.S. Army Corps of Engineers - NewYork District
26 Federal Plaza, Room 2151
New York, New York 10278
matthew.voisine@usace.army.mil

JUL 14 2014

Dear Mr. Voisine:

The U.S. Fish and Wildlife Service (Service) has reviewed your June 24, 2014 request for updated information on the presence of federally listed threatened and endangered species for the Union Beach Hurricane and Storm Damage Reduction Project, Monmouth County, New Jersey.

AUTHORITY

The following comments are provided as technical assistance.

FEDERALLY LISTED SPECIES AND SPECIES PROPOSED FOR LISTING

Piping Plover

The federally listed (threatened) piping plover (*Charadrius melodus*) nests approximately eight miles east in Gateway National Recreation Area, Sandy Hook Unit during the breeding season between March 15 and August 31. The Union Beach project area has no history of nesting piping plovers. However, if the beach nourishment proposed in 2011 has been completed (Public Notice NAN-2011-00334-EYA), it may have created suitable habitat that could attract nesting piping plovers in the future. We do not have any records indicating that piping plovers are nesting within the project area in 2014.

Seabeach Amaranth

The federally listed (threatened) plant seabeach amaranth (*Amaranthus pumilus*) is an annual plant endemic to Atlantic Coast beaches and barrier islands that was documented occurring in nearby Keansburg in 2013 approximately 2.5 linear miles from the proposed project area. The Union Beach project area has no history of seabeach amaranth plants. However, if the beach nourishment proposed in 2011 has been completed, it may have created suitable habitat for seabeach amaranth. The Service has yet to receive information regarding the presence of seabeach amaranth along the New Jersey coast in 2014.

Northern Long-Eared Bat

On October 3, 2013, the Service announced a proposed rule to list the northern long-eared bat (*Myotis septentrionalis*) as an endangered species throughout its range. The northern long-eared bat is a medium-sized bat found across much of the eastern and north-central United States. The northern long-eared bat predominantly overwinters in hibernacula that include caves and abandoned mines. During the summer, this species typically roosts singly or in colonies underneath bark or in cavities or crevices of both live trees and snags. Northern long-eared bats are also known to roost in human-made structures such as buildings, barns, sheds, and under eaves of windows. Threats to the northern long-eared bat include disease due to the emergence of white-nose syndrome, improper closure at hibernacula, degradation and destruction of summer habitat, and use of pesticides. Tree removal could impact this species by killing, injuring, or disturbing breeding or roosting bats if conducted between April 1 and September 30.

OTHER COMMENTS

Please be advised that Section 7 consultation pursuant to the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) requires the lead Federal agency in charge of the proposed project (*i.e.*, the U.S. Army Corps of Engineers, New York District) to provide a determination to the Service on whether the project as proposed may affect federally listed species. Also please be advised that Mr. Eric Davis is no longer employed at the New Jersey Field Office. Our Field Supervisor is Mr. Eric Schrading.

Thank you for the opportunity to provide this review. Should you have any questions, please contact Carlo Popolizio at (609) 383-3938 extension 32.

Sincerely,

for Eric Schrading
Field Supervisor

ES:NJFO:cpopoliz:RP:cap: 711/14
P:\Shared\Carlo\14-TA0424 [CORPS letter]

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

REPLY TO
ATTENTION OF
Environmental Branch

May 11, 2017

Mr. Eric Schrading
USFWS, NJ Field Office
Atlantic Professional Park
4 East Jimmie Leeds Road
Galloway, New Jersey 08205

Subject: 14-TA-0424, Raritan and Sandy Hook Bay, Union Beach, New Jersey, Coastal Storm Risk Management Project

Dear Mr. Schrading:

The U.S. Army Corps of Engineers, New York District (District) has been coordinating with the U. S. Fish and Wildlife Service (Service) on the Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey, Coastal Storm Risk Management Project and its Environmental Assessment. This letter is transmitting the District's request for informal consultation under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*) on the above referenced project. The District prepared the attached ESA determination and assessment for the following species: federally threatened northern long-eared bat (*Myotis septentrionalis*), federally threatened piping plover (*Charadrius melodus*), federally threatened red knot (*Calidris canutus rufa*), and the federally threatened seabeach amaranth (*Amaranthus pumilus*)

The Service responded to the District's initial request for threatened and endangered species information within the project area on July 14, 2014. The Service provided information on the northern long-eared bat, piping plover, and seabeach amaranth as they relate to the Union Beach project. Since that date, the red knot has been listed as threatened and potentially occurs in the project area.

Please find attached the project description which consists of a beach fill shoreline component, a levee and floodwall line of protection, interior drainage elements, and a wetland mitigation plan.

The District has determined there is "No effect" on the federally threatened northern long-eared bat, a "No effect" on the federally threatened piping plover, a "May affect, but is not likely to adversely affect" on the federally threatened red knot, and a "No effect" on the federally threatened seabeach amaranth. It is requested that your office concur with the above determinations. We thank you for your coordination and cooperation on this action. Additional information about the project is located at http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-Jersey/Raritan-Bay-and-Sandy-Hook-Union-Beach/.

If you have any questions or require additional information please contact Matthew Voisine, Project Biologist at 917.790.8718 or matthew.voisine@usace,army.mil.

Sincerely,

Peter Weppler
Chief, Environmental Analysis Branch

Attachment

Endangered Species Act (ESA) determination and assessment for northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*),), and seabeach amaranth (*Amaranthus pumilus*)

Northern Long-Eared Bat (*Myotis septentrionalis*)

Species Information

The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches but a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. This bat is distinguished by its long ears, particularly as compared to other bats in its genus (USFWS 2015).

Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, they are found hibernating most often in small crevices or cracks, often with only the nose and ears visible. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees) if trees are greater than 3 inches in diameter (USFWS 2015).

Northern long-eared bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation.

The northern long-eared bat's range includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. The species' range includes 37 States (including New Jersey) and the District of Columbia, (USFWS 2015).

Species Observations within Union Beach Project Area

The Service did not report of any northern long-eared bats within the project area. A literature yielded no reports of northern long-eared bats within the project area.

Union Beach, New Jersey Project

There are no known caves or mines within the project area. The District does not expect to remove trees greater than 3 inches in diameter.

After a full evaluation of the northern long-eared bat life history, habitats in the project area, and proposed project activities, a "no affect" determination was made by the

District on populations of northern long-eared bat as a result of implementation these proposed activities.

Piping plover (Charadrius melodus)

Species Information

The piping plover is a small shorebird approximately 7 inches long with a wingspan of about 15 inches. Piping plovers have white underparts with a light beige back and crown. Breeding adults have a single black breast band, which is often incomplete, and a black bar across the forehead. The legs and bill are orange in summer, with a black tip on the bill. In winter, the birds lose the breast bands, the legs fade from orange to pale yellow, and the bill becomes mostly black. Piping plover adults and chicks feed on marine macroinvertebrates such as worms, fly larvae, beetles, and crustaceans (USFWS 1996).

Piping plovers are present on the New Jersey shore during the breeding season, generally between March 15 and August 31. These territorial birds nest above the high tide line, usually on sandy ocean beaches and barrier islands, but also on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, the ends of sandspits, and deposits of suitable dredged or pumped sand. Piping plover nests consist of a shallow scrape in the sand, frequently lined with shell fragments and often located near small clumps of vegetation. Females lay four eggs that hatch in about 25 days, and surviving chicks learn to fly (fledge) after about 25 to 35 days. The flightless chicks follow their parents to feeding areas, which include the intertidal zone of ocean beaches, ocean washover areas, mudflats, sandflats, wrack lines (organic ocean material left by high tide), and the shorelines of coastal ponds, lagoons, and salt marshes (USFWS 1996).

Species Observations within Union Beach Project Area

The Service stated in the July 14, 2014 letter to the District that the Union Beach project area has no history of nesting piping plovers. eBird a real-time, online checklist program, managed by the Cornell Lab of Ornithology and National Audubon Society. eBird provides rich data sources for basic information on bird abundance and distribution at a variety of spatial and temporal scales. There are no reports of piping plovers within the project area through eBird.

Union Beach, New Jersey Project

Placement of beach fill and dune restoration may increase overall habitat value along the affected beachfront by expanding the area of suitable foraging habitat for piping plovers. Placement of beach fill for other District projects has provided suitable habitat for piping plovers however these project have been along the Atlantic coast and not in the bays.

After a full evaluation of the piping plover life history, habitats in the project area, and proposed project activities, a “no affect” determination was made by the District on populations of piping plover as a result of implementation these proposed activities.

Red Knot (*Calidris canutus rufa*)

Species Information

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

On the breeding grounds, the red knot’s diet consists mostly of terrestrial invertebrates such as insects and other arthropods.

Geolocator and resightings data show definitively that the *rufa* nonbreeding range includes the entire Atlantic and Caribbean coasts of South America and the Caribbean islands.

Coastal habitats used by red knots in migration and wintering areas are similar in character, generally coastal marine and estuarine (partially enclosed tidal area where fresh and salt water mixes) habitats with large areas of exposed intertidal sediments. Migration and wintering habitats include both high-energy ocean- or bay-front areas, as well as tidal flats in more sheltered bays and lagoons. Preferred wintering and migration microhabitats are muddy or sandy coastal areas, specifically, the mouths of bays and estuaries, tidal flats, and unimproved tidal inlets. Along the U.S. Atlantic coast, dynamic and ephemeral (lasting only briefly) features are important red knot habitats, including sand spits, islets, shoals, and sandbars, features often associated with inlets. In many wintering and stopover areas, quality high-tide roosting habitat (i.e., close to feeding areas, protected from predators, with sufficient space during the highest tides, free from excessive human disturbance) is limited (USFWS 2014).

The red knot breeds in the Canadian arctic and winters mainly in Tierra del Fuego, northern Brazil, or Florida, and migrates through New Jersey, to and from its breeding sites in the spring and fall (USFWS 2014). Red knots utilize coastal marine and estuarine habitats during the spring and fall migrations. Red knots show moderate fidelity to particular migration staging areas between years (USFWS 2014). These habitats include high energy ocean or bay front shores, tidal flats in sheltered bays, and lagoons (USFWS 2014). In North America, red knots are found along sandy, gravel, or cobble beaches; tidal mudflats; saltmarshes; shallow coastal impoundments and lagoons; and peat banks. Red knots use sandy beaches during both the spring and fall migration (USFWS 2014).

The red knot is a specialized molluscivore, primarily eating hard-shelled mollusks and supplementing with softer invertebrate prey (USFWS 2014). Red knots are restricted to foraging in the top 0.8 to 1.2 inches of sediment due to bill morphology (USFWS 2014). Red knots forage on a number of prey, exhibiting preference for specific prey within specific stop-overs, during the spring and fall migrations and based on wintering location (USFWS 2014). In New Jersey, red knots exhibited preference of horseshoe crab eggs during the spring migration (USFWS 2014). Red knots also forage on small periwinkles *(Littorina* spp.), tiny blue mussels and blue mussel spat *(Mytilus edulis),* gem clams *(Gemma gemma)* (not preferred), amphipods, naticid snails, polycheata worms, insect larvae, crustaceans, sand fleas *(Haustoriids* spp.), mole crabs *(Emerita talpoida),* dwarf surf clams *(Mulinia lateralis),* small bilvalves *(Tellina, Macoma, Donax, Gemmula, Iphigenia, Tivella, and Arca* spp.), and mud snails *(Peringia* ulvae; USFWS 2014).

Species Observations within Union Beach Project Area

eBird reports (Latuchie 2009) of red knots in Union Beach were last noted in May 2009 on Conaskonk Point. Recent eBird reports (Ostrand 2016) of red knots are in 2016 on the Morgan Avenue Mudflats in South Amboy, NJ approximately 7 miles west of Union Beach. The Bayshore Regional Sewerage Authority in Union Beach within the project area, contracted avian surveys in 2010 for a proposed wind power project (Kerlinger *et al*. 2011). Two red knots were observed flying along the shoreline on September 11.

Union Beach, New Jersey Project

Red knot may migrate through the Union Beach project area in the spring and the fall. The project area contains suitable habitat for foraging. Red knot may forage along the shoreline in Union Beach, but do not breed in the area. As noted above, red knots have not been observed within the project area since 2010 and 2009.

Construction of the Union Beach project line of protection for the floodwalls and levees is not at the shoreline, but is set back from the mean high water line, generally parallel with local roads, and the back yards of residential houses. Construction of the interior drainage areas are landward of the line of protection and therefore further set back from the shoreline. Construction of the shoreline component includes the placement of beach fill, two terminal groins, and two associated revetments. Construction of the wetlands intersects with the mean high water line and could temporarily restrict potential foraging habitat for red knots.

Permanent hard structures such as groins would eliminate any suitable foraging habitat directly within the footprint of these structures. However, the area of overall impact from these structures is expected to be minimal and most of the habitat that will be impacted is not of high habitat value to red knot. Specifically, red knot forage primarily in the intertidal zone along the coastline and bay shoreline. The areas in which hard structures are proposed include mostly subtidal areas that would be affected from groin placement. Overall impacts directly within the footprint of these structures would be permanent, but are not expected to significantly affect red knot foraging activities.

The primary direct impacts resulting from implementation of the project will be disturbance and direct impact of benthic, immobile invertebrate and plant communities currently living in these areas due to burial from beach fill material. As a result, red knots may experience some short-term loss of food resources within the beach fill placement. However, the direct placement of beach fill is not expected to cause long-term significant impacts on the red knot. The area of actual permanent red knot habitat loss due to permanent structures is small and would result in a negligible loss of foraging substrate for the species. In addition, although the red knot would avoid foraging within areas of direct sand placement in the intertidal zone until benthic food sources recolonized the site, recolonization of benthic communities in the intertidal zones typically takes place within six months to two years following beach fill placement activities.

Other short-term impacts, such as a slight decrease in water quality and an increase in turbidity, also are likely to occur during beach fill and groin construction and rehabilitation activities. Changes in water quality and turbidity may cause some short-term avoidance of the intertidal zone by the red knot during periods of low water quality resulting from construction activities. These impacts to their foraging activities will be short term and will have a minimal effect on them because red knot are mobile and can utilize unaffected foraging areas nearby.

During construction of the wetlands reds knot habitat may be impacted however, suitable foraging habitat would be available on either side of the construction area. Red knot could move further to adjacent habitat and avoid the temporary disturbance from construction.

Some minor, short-term, impacts to the red knot food resources and habitat will result from proposed project modifications. Therefore, after a full evaluation of red knot life history, habitats in the project area, and proposed project activities, a “May Affect, but is not likely to adversely affect” determination was made by the District on populations of red knot as a result of implementation these proposed activities.

Seabeach Amaranth (Amaranthus pumilus)

Species Information

An annual member of the amaranth family, seabeach amaranth has reddish stems and small, rounded, notched, spinach-green leaves. In New Jersey, these low-growing plants are typically about 4 inches across by late summer, but can occasionally reach 2 or 3 feet in diameter. The small white flowers and dark seeds are located in inconspicuous clusters along the stems. Germination begins in May and continues through the summer. Flowering begins as soon as plants reach sufficient size (June or July) and continues until the plants die between September and December (USFWS 2013).

Seabeach amaranth is native (endemic) to Atlantic Coast beaches and barrier islands. The primary habitat of seabeach amaranth consists of overwash flats at accreting ends of islands, lower foredunes, and upper strands of non-eroding beaches (landward of the wrackline), although the species occasionally establishes small temporary populations in other habitats, including sound-side beaches, blowouts in foredunes, inter-dunal areas, and on sand and shell material deposited for beach replenishment or as dredge spoil. Seabeach amaranth usually grows on a nearly pure sand substrate, occasionally with shell fragments mixed in (USFWS 2013).

Seabeach amaranth occupies elevations from 8 inches to 5 feet above mean high tide. The plant grows in the upper beach zone above the high tide line, and is intolerant of even occasional flooding during its growing season. The habitat of seabeach amaranth is sparsely vegetated with annual herbs and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. Vegetative associates of seabeach amaranth include sea rocket (*Cakile edentula*), seabeach spurge (*Chamaesyce polygonifolia*), and other species that require open, sandy beach habitats. However, this species is intolerant of competition and does not occur on well-vegetated sites (USFWS 2013).

Species Observations within Union Beach Project Area

The Service stated in the July 14, 2014 letter to the District that the Union Beach project area has no history of seabeach amaranth. A literature yielded no reports of seabeach amaranth within the project area.

Union Beach, New Jersey Project

Placement of beach fill and dune restoration may increase overall habitat value along the affected beachfront for seabeach amaranth. Placement of beach fill for other District projects has provided suitable habitat for seabeach amaranth however these project have been along the Atlantic coast and not in the bays.

After a full evaluation of seabeach amaranth life history, habitats in the project area, and proposed project activities, a “no affect” determination was made by the District on populations of seabeach amaranth as a result of implementation these proposed activities.

References

Kerlinger, P., J. D. Dowell, and J. Guarnaccia. 2011. Preconstruction avian studies, Bayshore Regional Sewerage Authority Wind Power Project Borough of Union Beach Monmouth County, New Jersey.

Latuchie, R. 2009. eBird Checklist: http://ebird.org/ebird/view/checklist?subID=S21742280. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available: http://www.ebird.org. (Accessed: Date [May 5, 2016]).

Ostrand, T. 2016. eBird Checklist: http://ebird.org/ebird/view/checklist?subID=S21742280. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available: http://www.ebird.org. (Accessed: Date [May 5, 2016]).

U.S. Fish and Wildlife Service. 1996. Piping plover *(Charadrius melodus),* Atlantic Coast population, revised recovery plan. U.S. Department of the Interior, Fish and Wildlife Service, Hadley, Massachusetts. 245 pp.

U.S. Fish and Wildlife Service. 2013. Seabeach amaranth 2012 year-end report. U.S. Department of the Interior, Fish and Wildlife Service, Pleasantville, New Jersey. 12 pp.

U. S. Fish and Wildlife Service. 2014. RUFA RED KNOT BACKGROUND INFORMATION AND THREATS ASSESSMENT SUPPLEMENT TO Endangered and Threatened Wildlife and Plants; Final Threatened Status for the Rufa Red Knot (Calidris canutus rufa) [Docket No. FWS–R5–ES–2013–0097; RIN AY17].

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
4 East Jimmie Leeds Road, Unit 4
Galloway, New Jersey 08205
Tel: 609/646 9310
http://www.fws.gov/northeast/njfieldoffice

IN REPLY REFER TO:
15-CPA-0035a

MAY 18 2017

Matthew Voisine, Biologist
U.S. Army Corps of Engineers - NewYork District
26 Federal Plaza, Room 2151
New York, New York 10278
matthew.voisine@usace.army.mil

Reference: Section 7 consultation for the Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey, Coastal Storm Risk Management Project, Monmouth County, New Jersey

The U.S. Fish and Wildlife Service (Service) has reviewed the above-referenced proposed project pursuant to the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) ensuring the protection of federally listed endangered and threatened species, the Migratory Bird Treaty Act of 1918 (40 Stat. 755, as amended; 16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e; 48 Stat. 401).

A known occurrence or potential habitat for the following federally listed or candidate species is located on or near the project's impact area. However, the Service concurs that the proposed project is not likely to adversely affect federally listed or candidate species for the reasons listed below.

Species	**Basis for Determination**
Piping plover (*Charadrius melodus*) (threatened)	No effect
Red knot (*Calidris canutus rufa*) (threatened)	Discountable effects
Northern long-eared bat (*Myotis septentrionalis*) (threatened)	Adherence to the ESA 4(d) rule

For the federally listed (threatened) seabeach amaranth (*Amaranthus pumilus*), the Service requested a beach survey on December 12, 2014. Please provide survey results by the end of the growing season (November 2017). Please survey anytime between July and October 2017 when seabeach amaranth is readily identifiable.

No other federally listed or proposed threatened or endangered flora or fauna under Service jurisdiction are known to occur within the proposed project's impact area. Further consultation pursuant to the ESA is required for seabeach amaranth. If additional information becomes available, or if project plans change, this determination may be reconsidered.

Please refer to this office's web site at http://www.fws.gov/northeast/njfieldoffice/Endangered/ for further information including federally listed and candidate species lists, procedures for requesting ESA review, the National Bald Eagle Management Guidelines, and contacts for obtaining information from the New Jersey Natural Heritage and Endangered and Nongame Species Programs regarding State-listed and other species of concern.

Reviewing Biologist: ____________________

Authorizing Supervisor: ____________________

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

REPLY TO
ATTENTION OF
Environmental Branch

May 11, 2017

Mr. Eric Schrading
USFWS, NJ Field Office
Atlantic Professional Park
4 East Jimmie Leeds Road
Galloway, New Jersey 08205

Subject: 14-TA-0424, Raritan and Sandy Hook Bay, Union Beach, New Jersey, Coastal Storm Risk Management Project

Dear Mr. Schrading:

The U.S. Army Corps of Engineers, New York District (District) has been coordinating with the U. S. Fish and Wildlife Service (Service) on the Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey, Coastal Storm Risk Management Project and its Environmental Assessment. This letter is transmitting the District's request for informal consultation under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*) on the above referenced project. The District prepared the attached ESA determination and assessment for the following species: federally threatened northern long-eared bat (*Myotis septentrionalis*), federally threatened piping plover (*Charadrius melodus*), federally threatened red knot (*Calidris canutus rufa*), and the federally threatened seabeach amaranth (*Amaranthus pumilus*)

The Service responded to the District's initial request for threatened and endangered species information within the project area on July 14, 2014. The Service provided information on the northern long-eared bat, piping plover, and seabeach amaranth as they relate to the Union Beach project. Since that date, the red knot has been listed as threatened and potentially occurs in the project area.

Please find attached the project description which consists of a beach fill shoreline component, a levee and floodwall line of protection, interior drainage elements, and a wetland mitigation plan.

The District has determined there is "No effect" on the federally threatened northern long-eared bat, a "No effect" on the federally threatened piping plover, a "May affect, but is not likely to adversely affect" on the federally threatened red knot, and a "No effect" on the federally threatened seabeach amaranth. It is requested that your office concur with the above determinations. We thank you for your coordination and cooperation on this action. Additional information about the project is located at http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-Jersey/Raritan-Bay-and-Sandy-Hook-Union-Beach/.

If you have any questions or require additional information please contact Matthew Voisine, Project Biologist at 917.790.8718 or matthew.voisine@usace,army.mil.

Sincerely,

Peter Weppler
Chief, Environmental Analysis Branch

Attachment

PURELL/SKILCRAFT 1200mL Anitbacterial Hand Wash Sanitizer

NSN: 8520–00–NIB–0111.

PURELL/SKILCRAFT–GOJO Instant Hand Sanitizer

NSN: 8520–00–NIB–0117—gel.
NSN: 8520–00–NIB–0120—foam.
NSN: 8520–00–NIB–0121—gel.
NPA: Travis Association for the Blind, Austin, TX.
Contracting Activity: Department Of Veterans Affairs, NAC, Hines, IL.

Service:

Service Type/Location: Carpet Replacement, Smithsonian National Gallery of Art, 6th & Constitution Avenue NW., Washington, DC.
NPA: Unknown.
Contracting Activity: National Gallery of Arts, Washington, DC.

Patricia Briscoe,

Deputy Director, Business Operations (Pricing and Information Management).

[FR Doc. 2014–01420 Filed 1–23–14; 8:45 am]

BILLING CODE 6353–01–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Notice of Intent To Prepare a Supplemental Environmental Impact Statement for the Raritan Bay and Sandy Hook Bay, New Jersey Feasibility Report for Hurricane and Storm Damage Reduction Union Beach, New Jersey Final Feasibility Report

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: The U.S. Army Corps of Engineers, New York District (District), is preparing a Supplemental Environmental Impact Statement (SEIS) to ascertain compliance with applicable Federal and State environmental laws for the authorized Raritan Bay and Sandy Hook Bay, New Jersey Feasibility Report for Hurricane and Storm Damage Reduction Union Beach, New Jersey Final Feasibility Report. The study area occupies an approximate 1.8 square mile area of land along the coast of Raritan Bay in the Borough of Union Beach, Monmouth County, New Jersey. The project was authorized for construction in the Water Resources Development Act of 2007 (Pub. L. 110–114) on November 8, 2007 but has yet to be constructed. An EIS for the authorized project was finalized in September 2003. This SEIS will identify any changes in the potential social, economic, cultural, and environmental affects through the implementation of the authorized plan since the EIS was published.

ADDRESSES: U.S. Army Corps of Engineers, New York District, Planning Division, Environmental Analysis Branch, 26 Federal Plaza, Room 2151, New York, NY 10278–0090.

FOR FURTHER INFORMATION CONTACT: Matthew Voisine, Project Biologist, *matthew.voisine@usace.army.mil* or 917–790–8718.

SUPPLEMENTARY INFORMATION:

1. The area is located in low elevation regions with numerous small creeks providing drainage. Low-lying residential and commercial structures in the area experience flooding caused by coastal storm inundation. This problem has progressively worsened in recent years due to loss of protective beaches and increased urbanization in the area with structures susceptible to flooding from rainfall and coastal storm surges, erosion and wave attack, combined with restrictions to channel flow in the tidal creeks. This area was devastated by Hurricane Sandy in October 2012. A NJDEP Community Affairs Report described 1,096 houses and 84 rentals with minor damage, 136 houses and 107 rentals with major damage, and 194 houses and 88 rentals with severe damage in Union Beach as a result of Hurricane Sandy.

2. The authorized plan recommends the implementation of a storm damage reduction project consisting of a combination of levee, floodwalls, tide gates, pump stations, a dune, and a beach berm with terminal groins. The project would also construct wetland habitat to mitigate for the loss of wetlands due to the implementation of the recommended plan.

3. The SEIS is will evaluate any changes in the project that may be necessary due to changes in regulations or existing conditions, including natural resources and the affects of hurricane Sandy. In one such proposed change the original authorized plans included the use of I–walls, which will need to be replaced per USACE Engineering Technical Letter (ETL) 1110–2–575, Engineering Design Evaluation of I-walls. The replacement for I-walls may have a larger footprint, potentially impacting more resources.

4. It is anticipated that a Draft SEIS is will be made available for public review in May 2014. Anyone with comments as to the scope of the SEIS or information that should be included in such assessment should provide this in writing to Mr. Voisine (see **ADDRESSES**).

5. Individuals interested in obtaining a copy of the Draft SEIS for review should contact Matthew Voisine (see **ADDRESSES**).

6. All federal agencies interested in participating as a Cooperating Agency are requested to submit a letter of intent to COL Paul E. Owen, District Engineer, U.S. Army Corps of Engineers, 26 Federal Plaza, Room 2109, New York, NY 10278–0090.

Dated: November 21, 2013.

Frank Santomauro,

Chief, Planning Division.

[FR Doc. 2014–01443 Filed 1–23–14; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 13346–003]

PayneBridge, LLC; Notice of Availability of Environmental Assessment

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission or FERC's) regulations, 18 Code of Federal Regulations (CFR) Part 380 (Order No. 486, 52 **Federal Register** 47,897), the Office of Energy Projects has reviewed PayneBridge, LLC's application for an original license to construct and operate the Williams Dam Water Power Project. The proposed 4.0-megawatt project would be located on the East Fork White River in Lawrence County, Indiana, near the town of Williams, at an existing dam owned and operated by the Indiana Department of Natural Resources. The project does not occupy any federal land.

Staff prepared an environmental assessment (EA), which analyzes the potential environmental effects of licensing the project and concludes that licensing the project, with appropriate protective measures, would not constitute a major federal action significantly affecting the quality of the human environment.

A copy of the EA is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's Web site at *www.ferc.gov* using the ''eLibrary'' link. Enter the docket number, excluding the last three digits, in the docket number field to access the document. For assistance, contact FERC Online Support at *FERCOnlineSupport@*

DEPARTMENT OF DEFENSE

Department of the Army, U. S. Army Corps of Engineers

Withdrawal of Notice of Intent To Prepare a Supplemental Environmental Impact Statement for the Raritan Bay and Sandy Hook Bay, New Jersey Feasibility Report for Hurricane and Storm Damage Reduction Union Beach, New Jersey Final Feasibility Report

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Intent; Withdrawal.

SUMMARY: The U.S. Army Corps of Engineers, New York District (NY District), is withdrawing its intent to prepare a Draft Supplemental Environmental Impact Statement (SEIS) for the Study. The Notice of Intent to prepare the SEIS was published in the Friday, January 24, 2014, issue of the **Federal Register** (79 FR 4155).

ADDRESSES: U.S. Army Corps of Engineers, New York District, Planning Division, Environmental Analysis Branch, 26 Federal Plaza, Room 2151, New York, NY 10278–0090.

FOR FURTHER INFORMATION CONTACT: Matthew Voisine, Project Biologist, at *matthew.voisine@usace.army.mil* or 917.790.8718.

SUPPLEMENTARY INFORMATION: The U.S. Army Corps of Engineers, NY District published a notice of intent to prepare a Supplemental Environmental Impact Statement in the January 24, 2014 issue of the **Federal Register** (FR Doc. 2014–01443). Since that time, resource agency involvement through meetings, changes in plan formulation, and re-evaluation of the project have reduced the magnitude and extent of proposed flood risk management measures and associated environmental impacts to the point that an SEIS is no longer necessary. A Supplemental Environmental Assessment will be prepared and circulated for review by agencies and the public. The NY District invites participation and consultation of agencies and individuals that have special expertise, legal jurisdiction, or interest in the preparation of the draft environmental assessment. Comments received, including the names and addresses of those who comment, will be considered part of the public record for this proposal. As a result of the process, if it is determined that the project may have significant impacts, the EIS process will be reinitiated and a NOI published.

Peter Weppler,

Chief, Environmental Analysis Branch.

[FR Doc. 2016–22336 Filed 9–15–16; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Record of Decision for the Remaining Balanced Vision Plan and Interior Drainage Plan Features Feasibility Report and Environmental Impact Statement, Dallas County, TX

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice.

SUMMARY: The U.S. Army Corps of Engineers (USACE), Fort Worth District, is issuing this notice to advise Federal, state, and local governmental agencies and the public that USACE has signed a Record of Decision (ROD) for the Remaining Balanced Vision Plan (BVP) and Interior Drainage Plan (IDP) Features *Feasibility Report* and *Final Environmental Impact Statement,* in Dallas County, TX. This ROD was rendered to declare that a USACE action, a Section 408 Permission for the City of Dallas to alter the Dallas Floodway, is in the public interest.

DATES: The USACE Fort Worth District Commander, Colonel Calvin C. Hudson II, signed the ROD and Section 408 Permission on July 28, 2016.

ADDRESSES: U.S. Army Corps of Engineers, Regional Planning and Environmental Center, CESWF–PEC–CC (Attn: Mr. Jason Story), P.O. Box 17300, Room 3A12, Fort Worth, TX 76102–0300.

FOR FURTHER INFORMATION CONTACT: Jason Story, Environmental Resources Specialist, Regional Planning and Environmental Center. Email address: *jason.e.story@usace.army.mil.*

SUPPLEMENTARY INFORMATION: The City of Dallas has requested permission to construct the Dallas Floodway Project remaining BVP and IDP features in Dallas County, TX. These remaining BVP and IDP features will constitute an alteration of the existing Dallas Floodway, a USACE federally authorized civil works project that requires Title 33 United States Code, Section 408 (Section 408) compliance. The proposed alterations within the Dallas Floodway consist of ecosystem restoration, recreation, and interior drainage improvements. These alterations were analyzed in the *Final Feasibility Report* and disclosed in the *Final Environmental Impact Statement* dated December 2014, for the Dallas Floodway Project. This ROD addresses the USACE Section 408 Permission.

Douglas C. Sims,

Chief, Environmental Compliance Branch, Regional Planning and Environmental Center.

[FR Doc. 2016–22321 Filed 9–15–16; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF EDUCATION

[Catalog of Federal Domestic Assistance (CFDA) Number: 84.215N]

Reopening and Extension of the Application Deadline Date for the Fiscal Year 2016 Competition; Promise Neighborhoods Program

AGENCY: Office of Innovation and Improvement, Department of Education.

ACTION: Notice.

SUMMARY: The Assistant Deputy Secretary for Innovation and Improvement reopens the competition and extends the deadline date for transmittal of applications for new awards for fiscal year (FY) 2016 under the Promise Neighborhoods program. The Assistant Deputy Secretary takes this action to allow more time for the preparation and submission of applications by prospective eligible applicants. We are reopening the competition and extending the application deadline date, from September 6, 2016 to September 16, 2016, for all applicants, due to the impact of severe weather-related issues across the country.

DATES:

Deadline for Transmittal of Applications: September 16, 2016.

Deadline for Intergovernmental Review: November 15, 2016.

SUPPLEMENTARY INFORMATION: On July 8, 2016, we published in the **Federal Register** (81 FR 44741) a notice inviting applications (NIA) for new awards for FY 2016 for the Promise Neighborhoods competition. On August 31, 2016, we published in the **Federal Register** a notice extending the deadline for transmittal of applications to allow certain eligible applicants affected by the flooding in Louisiana additional time to prepare and transmit their applications. At this time, we are reopening the Promise Neighborhoods competition and extending the deadline for transmittal of applications to allow all eligible applicants more time to prepare and submit their applications

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

December 28, 2016

Peter Weppler, Chief
Environmental Analysis Branch
Planning Division
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0900

RE: Essential Fish Habitat Assessment, Raritan Bay and Sandy Hook Bay, New Jersey Hurricane Sandy Limited Reevaluation Report for Coastal Storm Risk Management, Union Beach

Dear Mr. Weppler:

We have reviewed the September 2016 Draft Environmental Assessment (DEA), 2016 Essential Fish Habitat assessment for inshore areas of the project (EFH1), and the undated Essential Fish Habitat For the Use of Sand Resources at the Sea Bright Borrow Area assessment (EFH2), for the construction of the Raritan Bay and Sandy Hook Bay Coastal Storm Risk Management Project located in the Borough of Union Beach, Monmouth County, New Jersey. The report addresses changes to existing conditions that have occurred since the 2003 Feasibility Report and 2007 Authorized Plan, including changes to existing conditions that resulted from Hurricane Sandy. The project area is located in the northwestern section of Monmouth County, along the coast of Raritan Bay. The 1.8 square mile area is defined by Raritan Bay to the north, the Borough of Keansburg to the east, the Borough of Hazlet to the south, and Chingagora Creek to the west. Flat Creek and East Creek flow through sections of the project area; all creeks flow north into Raritan Bay. The western portion of Union Beach, as well as the eastern shoreline, is characterized by low-lying unprotected marsh with some beach. The developed section is comprised mainly of bulkheads and seawalls.

The Recommended Plan (RP) described in the DEA/EFH1/EFH2 is an approximately 20,000 linear feet (lf) system of levees, flood walls, beach dunes, and beach renourishment, and includes revetments, groins, and storm gates. The levee/floodwall component of the project consists of 10,932 lf of levees, 6,925 lf of floodwalls, two 35 lf wide stream closure gates, six 6 lf wide tide gates, natural ponding areas, road raising, the regrading of some drainage features, and wetlands mitigation. The 3,160 lf beach and dune portion of the project will be filled with 528,000 cubic yards of sand from the Sea Bright Borrow Area. Subsequent renourishment will occur every nine years from an upland source.

Magnuson Stevens Fisheries Management and Conservation Act (MSA)

The project area has been designated as EFH for a number of federally managed species including Atlantic butterfish (*Peprilus triacanthus*), Atlantic mackerel (*Scomber scombrus*), Atlantic sea herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), cobia (*Rachycentron canadum*), king mackerel (*Scomberomorus cavalla*), red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*), Spanish mackerel (*Scomberomorus maculates*), summer flounder (*Paralichthys dentatus*), winter flounder (*Pseudopleuronectes americanus*), windowpane flounder (*Scophthalmus aquosus*), clearnose skate (*Raja eglanteria*), little skate (*Leucoraja erinacea*), winter skate (*Leucoraja ocellata*), dusky shark (*Characharinus obscurus*), and sandbar shark (*Charcharinus plumbeus*).

The MSA requires federal agencies to consult us on project such as this that may affect EFH adversely. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments, lists the required contents of EFH assessments, and generally outlines each agency's obligations in this consultation procedure.

The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as "any impact which reduces the quality and/or quantity of EFH" and further states that:

> An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The EFH assessment does not include a complete assessment of how the project components, both individually and cumulatively, will impact the hydrology and ecology of Raritan Bay and its tributaries within the project area as a result of the installation of the storm gates. Impacts to EFH from specific components are also not evaluated fully. The DEA and EFH1 assessment do not clearly describe the amount and type of wetlands and open water that will be impacted by the proposed project. The areal extent of the impact from the footprint of the storm gates is also not clearly described. In addition, the total area of permanent and temporary impacts to estuarine wetlands is not identified clearly. The assessment also does not describe the areal extent of sand placement below the high tide line. The absence of these details prevents a full evaluation of the direct, indirect, individual, and cumulative effects of all of the proposed actions.

As a result, we must consider the assessment to be incomplete. In addition, based upon the scope of the project, including the storm surge barrier and the significant impacts to EFH and other aquatic resources that will result from its construction, an expanded EFH consultation as described in 50 CFR 600.920 (f) is warranted. An expanded consultation process allows the maximum opportunity for us to work together to review the action's impacts on EFH, and to develop EFH consultation recommendations. Under the expanded consultation procedures, we are allowed 60 calendar days to review, comment, and respond to the information that has been provided to us.

To initiate the expanded EFH consultation, a full and complete evaluation of the direct, indirect, individual and cumulative effects of the construction and operation of all of the project components on EFH should be provided. The required components of the EFH assessment include a description of the action; an analysis of the potential adverse effects of the action on EFH and the managed species; the federal agency's conclusions regarding the effects of the action on EFH; and proposed mitigation, if applicable. As part of the expanded consultation, the assessment should also include additional information such as results of on-site inspections, views of recognized experts, a review of pertinent literature, an analysis of alternatives and any other relevant information should be included.

Potential Project Impacts

Storm Surge Barriers

Hydrology

Tidal flushing regulates local salinity regimes, facilitates nutrient and sediment transport, and ameliorates hypoxic and anoxic conditions. Due to heavy urbanization of the Raritan Bay watershed, industrial effluent, sewage discharges, chemical and oil spills, and storm water runoff impact water quality in estuaries within the bay. A decrease in frequency or volume of tidal flushing would likely adversely impact an already fragile ecosystem.

The storm surge barriers proposed in the RP will consist of two 35 lf sluice gates and six 6 lf tide gates. Construction of the gates will have both short- and long-term impacts on the tidal creeks and wetlands within the project area. Short-term adverse effects will result from construction, while long-term impacts will include habitat loss within the footprint of the barrier, as well as changes in flow velocities, tidal amplitude and flow, sediment transport, and deposition. According to the DEIS, preliminary modeling has been conducted on the impact of the storm surge barrier on hydrology within the project area. However, more detailed hydrologic modeling should be conducted to provide additional information on impacts to the system in terms of changes in tidal regime, flow velocity, scour, sedimentation rates, and current patterns, as well as the effects of the storm barriers on the ecology and water quality of the tidal creeks and wetlands within the project area.

Wetlands

The estuarine wetlands and shallow water habitats within the project area provide nursery and forage habitat for a variety of species of concern to us including alewife *(Alosa pseudoharengus),* Atlantic croaker *(Micropogonias undulatus),* Atlantic menhaden *(Brevoortia tyrannus),* spot *(Leiostomus xanthurus),* striped bass *(Morone saxatilis)* as well as federally managed bluefish, winter flounder, and summer flounder. Important forage species such as mummichog *(Fundulus heteroclitus),* Atlantic silverside *(Menidia menidia),* inland silverside *(Menidia beryllina),* striped killifish *(Fundulus majalis)* and bay anchovy *(Anchoa mitchilli)* also utilize these areas. Mummichog, killifish, anchovies and other small fish and benthic organisms found in estuarine wetlands provide a valuable food source for many of the commercially and recreationally valuable species mentioned above including striped bass, summer flounder, weakfish, red hake, scup, and windowpane.

Wetlands also provide many other important ecological functions including water storage, nutrient cycling and primary production, sediment retention, water filtration or purification, and groundwater recharge. The loss of wetlands as a result of this project will adversely affect EFH for a number of federally managed species through the loss of nursery, forage, and refuge habitat; the reduction in prey species; and primary production and water quality degradation from the reduction in sediment retention and pollution filtration.

Mitigation
Mitigation of 22 acres is proposed in the RP for impacts to wetlands resulting from the construction of the project. Proposed mitigation includes the conversion of *Phragmites australis* dominated wetlands to *Spartina alterniflora* wetlands with areas of herbaceous/scrub-shrub habitat. However, without more information on the acres of wetlands to be filled or impacted temporarily, it is not possible to determine if the proposed mitigation will offset the adverse effects to EFH or the loss of wetlands functions.

As this project moves forward, additional information is needed on the acres of wetlands to be lost permanently, those impacted temporarily, and the compensatory mitigation proposed to offset impacts to wetlands and open waters in the project area. A mitigation plan should be developed in accordance with the federal final mitigation rules published in the Federal Register on April 10, 2008 (33 CFR Chapter 2 Part 332.4 (b)) and provided to us for review. The plan should explain how the proposed compensatory mitigation will offset the impacts to estuarine wetlands and EFH. It should also include performance measures, success criteria, and a long-term monitoring and maintenance plan.

In general, typical compensatory mitigation ratios used in New Jersey for creation and reestablishment of emergent and scrub-shrub wetlands is 2:1. The ratio is higher if forested wetlands are being impacted. When rehabilitation or enhancement of emergent wetlands is proposed as compensatory mitigation, a ratio of 3:1 or higher is generally required depending upon the existing conditions of the mitigation site. If the 22 acres of permanent vegetation removal mentioned in the DEA is all wetland fill, and the compensatory mitigation proposed is conversion of *P. australis* to *S. alterniflora* and/or *Spartina patens,* the mitigation would be considered rehabilitation of a degraded marsh. This would likely warrant a 3:1 mitigation ratio necessitating 66 acres of compensatory mitigation. This ratio also assumes that the area of *P. australis* to be removed is the non-native, invasive haplotype. Based upon our observations of a nearby project site (Port Monmouth) it is possible that some areas of *P. australis* at the Union Beach project site could be the native, non-invasive haplotype. Because the native haplotype is generally not invasive and can provide some habitat benefits for birds, its removal would not result in improved wetlands functions and would not be considered appropriate compensatory mitigation.

As stated above, the EFH1 assessment included in the report does not evaluate adequately all of the potential impacts to EFH that could result from implementation of the RP. As the adverse effects of this project on EFH may be substantial, an expanded EFH consultation will be necessary so that site specific EFH conservation recommendations may be developed.

We look forward to our continued coordination with your office on this project as it moves forward. If you have any questions or need additional information, please do not hesitate to contact Ursula Howson at ursula.howson@noaa.gov or (732) 872-3116.

Sincerely,

Karen Greene
Mid-Atlantic Field Office Supervisor

cc: NYD ACOE – M. Voisine
PRD – D. Marrone
NEFMC – T. Nies
MAFMC – C. Moore
ASMFC – L. Havel

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW
P.O. Box 420 Mail Code 401-07J Trenton, New Jersey 08625-0420
Phone Number (609) 292-3600
FAX NUMBER (609) 292-1921

January 03, 2017

Mr. Matthew Voisine
US Army Corp of Engineers
26 Federal Plaza, Room 2151
New York City, New York 10278

RE: Raritan Bay and Sandy Hook Bay
Supplemental Environmental Assessment and Hurricane Sandy Limited Reevaluation Report for Coastal Storm Risk Management.
Union Beach, Monmouth County, New Jersey.

Dear Mr. Voisine:

The New Jersey Department of Environmental Protection's (Department) Office of Permit Coordination and Environmental Review (PCER) distributed, for review and comment, the Supplemental Environmental Assessment (EA) and Hurricane Sandy Limited Reevaluation Report (HSLRR) for Coastal Storm Risk Management in Union Beach, New Jersey. The US Army Corp of Engineers (USACE) New York District proposed the Supplemental EA and HSLRR as a decision document to support the construction of a previously authorized Raritan Bay and Sandy Hook Bay, New Jersey Coastal Storm Risk Management project that was never constructed after it was approved prior to Hurricane Sandy in 2012. The HSLRR addresses relevant changes to the plan conditions that have occurred since a Feasibility Report/Final Environmental Impact Statement (FS/FEIS) was completed in September 2003 including changes to as a result of Hurricane Sandy. The Supplemental EA addresses changes to environmental site conditions and minor changes recommended by the HSLRR. It also supplements the 2003 FEIS and a 2008 Record of Decision (ROD) as well as updates the NEPA compliance for this project.

The Supplemental EA and the HSLRR provide for a storm protection beach , berm and dunes, interior drain structures including levees, floodwall gates, pumps, road raising, and wetland mitigation at Union Beach, Monmouth County. Based on the information provided for review, the Department offers the following comments for your consideration:

<u>Natural and Historic Resources</u>

General Comment

NHR will need more information such as Geographic Information Systems (GIS) shapefiles of all project elements including all structures and the vegetation-free zone as well as a list of parcels by Block and Lot that may be impacted by the project. The list of parcels include a summary of all proposed temporary and permanent easements. This information is necessary for our office to conduct a Land Management Review of the project on state lands.

If you have any additional questions, please contact Robin Madden at (609) 292-5990.

Endangered and Nongame Species

The Endangered and Nongame Species Program (ENSP) has reviewed the Supplemental Environmental Assessment and Hurricane Sandy Limited Reevaluation Report. Please see the attached memo for their comments. For seal haul outs discussed in section 5.5.6 Mammals in the area, the Endangered and Non-game Species Program would defer to any conditions and/or recommendations supplied by NOAA Protected Resources. It should be noted that Horseshoe Crabs spawn along the Raritan Bay shore, so work on the beach should be avoided should be avoided between April 15 and June 30.

If you have any additional questions, please contact Christina Davis at (609) 628-1919 or Mr. Kelly Davis at (908) 236-2118 or kelly.davis@dep.nj.gov.

Marine Fisheries Administration (MFA)

The Bureau of Marine Fisheries (BMF) has several comments regarding the planned developments Coastal Storm Risk Management Project in Union Beach. The primary concern is significant disturbance to the seafloor due to activities associated with hydraulic dredging in the borrow area and any in water work involved with levee, interior drainage, beach replenishment, floodwall, and groin construction. The Southern New England/Mid-Atlantic winter flounder stock is near historic lows and the proposed shoreline and tidal creek development locations occur within a region which has been determined to be Essential Fish Habitat for all life history stages of winter flounder. As such, the timing restrictions on dredging and development which have been established to protect the spawning and vulnerable life history stages of winter flounder should be imposed. Additionally, dredging and development timing restrictions which protect anadromous fish migrations (e.g. endangered populations of Atlantic) should also be observed. The BMF suggests minimizing any disturbances to the seafloor during the in-water construction and shoreline development phases of the project.

The Bureau of Shellfisheries does not anticipate any shellfish related issues in this section of Union Beach. The area has a history of low densities of clams only. No other commercial species has been documented in the area of question. However, the subject area is flanked by soft clam beds. Any work in the subject area should include best management practices to reduce turbidity during and after construction and to assure that vessels are not permitted to rest on the bay bottom and cause scouring. The area also appears near but not within a designated depuration harvest zone.

The MFA believes the potential loss of access to fishing grounds will be temporary and limited. The MFA urges that recreational activities and access continue to be permitted or expanded upon if applicable (public access to the groin structures) after the completion of the project, with an emphasis on recreational fishing access.

If you have any additional questions, please contact Brian Neilan at (609) 748-2037.

Historic and Cultural Resources

Thank you for providing the Historic Preservation Office (HPO) with the opportunity to review and comment on the potential for the above-referenced project to affect historic and archaeological resources.

As noted in the documentation provided, it appears that the proposed undertaking will require consultation under Section 106 of the National Historic Preservation Act for the identification, evaluation and treatment of historic properties within the project's area of potential effects. As a result, the HPO looks forward to further consultation with the United States Department of the Army, Corps of Engineers, pursuant to their obligations under Section 106 of the National Historic Preservation Act of 1966, as amended, and it's implementing regulations, 36 CFR §800. The HPO will notify the Office of Permit Coordination of any developments as consultation moves forward. If additional consultation with the HPO is needed for this undertaking, please reference the HPO project number 14-3633 in any future calls, emails, submissions or written correspondence to help expedite your review and response.

If you have any additional questions, please contact Jesse West-Rosenthal at (609) 984-6019.

Green Acres

It is our understanding that this flood control project, consisting of a series of levees/floodwalls, pump stations, outfall structures, flood gates, beach replenishment and wetland mitigation was previously approved by the Department and is now seeking reevaluation since it was never constructed. It does not appear from our records that the Green Acres Program commented on the original project, however, there are various municipal and County Green Acres encumbered parcels as well as State owned Cheesequake State Park within the project area. Therefore, in order to conduct a thorough jurisdictional determination and to determine the proposal's impact on any restricted areas, please provide GIS shapefiles of all project elements (including all structures and the vegetation-free zone) and a list of parcels by Block and Lot to be impacted by the project (including a list of all proposed temporary and permanent easements).

If you have any additional questions, please contact Jessica Patterson at (609) 984-0558.

Land Use Regulation Program

Land Use Permitting

The proposed project will require the submission of a Federal Consistency Determination. A determination request was submitted to the Department (DLUR File # 1350-16-0001.1 CDT 160001) but was withdrawn on December 13, 2016. Because the project has not been fully designed yet, the Division of Land Use Regulation was unable to review the project for compliance with the Coastal Zone Management Rules (NJAC 7:7-1.1 et. seq.).

Once a project has been designed, a Federal Consistency should be submitted to the Department. In addition, if the project is going to impact any Freshwater Wetlands and/or Transition Areas then a Freshwater Wetlands Individual permit will need to be applied for as well, demonstrating compliance with the Freshwater Wetlands Protection Act Rules (NJAC 7:7A -1.1 et. seq.).

It was not clear in the reports attached exactly what the proposed project entails and what the impacts will be. The submitted compliance statement and plans should show the proposed project and the limits of specials areas, as defined in Subchapter 9 of NJAC 7:7. All impacts to special areas, permanent or temporary, should be quantified in the submissions.

Under the application for the Coastal Permit(s), the US Army Corp of Engineers (USACE) would need to address the Flood Hazard Rules and the Stormwater Management Rules. If there are construction activities within the tidal flood hazard area not covered by the Coastal Permit, then the USACE would need an application for a Flood Hazard Individual Permit. USACE would not need a Flood Hazard

Verification under the Coastal Permit and the Flood Hazard Individual Permit as long as the USACE meets the exempted cases under NJAC 7:13-5.5 of the Flood Hazard Area Control Act Rules.

The flood hazard section of the submitted report did not address all Department required questions regarding this project. The Flood Hazard Rules have very specific requirements on how to demonstrate the need and justification for a flood control project. It is recommended that the USACE revise their justification to specifically gear it towards regulations found in NJAC 7:13-12.12. Please note that any floodway fill within the fluvial floodway of any unnamed regulated watercourses onsite as part of the flood control project is allowable under NJAC 7:13-11.3. So the applicant does not need a hardship exception for any floodway fill associated with the flood control project.

The project is required to demonstrate compliance with the Stormwater Management Rules under NJAC 7:8, because based on a preliminary review of the submitted information, the project will exceed the 0.25 of an acre net impervious and the 1 acre of disturbance thresholds and is a Major Development. The submitted report was not sufficient and does not comply with NJAC 7:8. The project must be designed to include stormwater best management practices (BMPs) in order to show compliance with NJAC 7:8.

The submitted report was not clear on whether or not there would be any new stream crossings associated with the flood control project. Any new culvert/bridge crossings or replacements could be a need for hydrologic and hydraulic calculations for.

The Division of Land Use Regulation could not identify all of the construction activities onsite. Therefore, the Division would suggest that once the USACE develops a set of plans that clearly depict the specific construction activity and the location, upon request, the Department can schedule a pre-application meeting with the USACE to review the project details and provide additional guidance prior to submittal of any permit applications.

If you have any additional questions, please contact Kara Turner at (609) 633-7205 or Chingwah Liang at (609) 292-1274.

Wetlands Mitigation

Land Use Mitigation may be required for this project depending on the total number of temporary and permanent acres of regulated wetlands impacts. If required, a mitigation plan must be developed prior to the Department issuance of a land use permit. If you have any questions, please contact Susan Lockwood at (609)-984-0580.

Office of Dredging and Sediment Technology

Based on the Supplemental Environmental Assessment (EA) and the Hurricane Sandy Limited Reevaluation Report (HSLRR), the project proposes a very ambitious amount of coastal engineering. Also, it appears that the USACE is proposing a large amount of wetlands impacts without any specific mitigation. All wetlands impacts should be avoided to the maximum extent practicable and would require mitigation. Mitigation could substantially alter the cost: benefit ratio.

If you have any additional questions, please contact Mark Davis at (609) 633-1357.

Air Permitting and Planning

Bureau of Evaluation and Planning

The Bureau of Evaluation and Planning (BEP) has reviewed the USACE Union Beach Supplemental Environmental Assessment (EA) and has the following comments:

1) 1. Introduction – 1.1 Purpose and Need
The EA states, "The 2003 Feasibility Study/Final Environmental Impact Statement (EIS) recommended a comprehensive plan consisting of levees, floodwalls, road raising, tide gates, interior drainage, pump stations terminal groins, sand placement and the creation of a dune utilizing an offshore borrow area. The recommended plan of the September 2003 Feasibility Report was authorized for construction in the Water Resources Development Act of 2007." Section 3.6 - HSLRR Alignment and Design Changes to 2007 Authorize Plan states, "The majority of the HSLRR Recommended Plan actions include substantially unchanged portions of the original 2007 Authorized Plan. The entire shorefront element, interior floodwall, interior drainage, road raising, stream closure gates and pumping stations and the use of the Sea Bright borrow area remains unchanged from the 2007 Authorize Plan. The primary differences between the 2007 Authorized Plan and the HSLRR Recommended Plan involve floodwall and levee alignment changes for the Chingarora Creek element."

Comment #1
The air emissions in Appendix E – Clean Air Act Conformity Record of Non-Applicability (Appendix E), appear to include air emissions associated with dredging, dredging support and groin construction. The air emissions associated with construction of other activities (e.g. floodwalls, levees, road raising etc.) for this project do not appear to be included in Appendix E. Please clarify if the air emissions associated with the construction of the floodwalls, levees, road raising etc. are included in Appendix E. If the air emissions are not included, please revise the General Conformity Applicability Analysis to include these activities within the nonattainment area and provide a Conformity Determination if required (93.157 (d) Reevaluation of Conformity). Please provide backup material (including assumptions, sample calculation, load factors, and emission factors) for the construction equipment used for the floodwalls, levees, road raising etc. for this project.

2) 2. 2007 Authorized Plan - 2.2.2 Shorefront Element
The SEA states, "Material will be utilized from the Sea Bright borrow area by hydraulic dredging for initial construction and an upland source by trucking for subsequent re-nourishment."

Comment #2
The Sea Bright borrow area does not appear to be in close enough proximity to the construction site to only use a hydraulic dredge as the means for depositing dredged material at the construction site. Section 5.14 - Beachfill Borrow of the Engineering Appendix (September 2016) states, "The area is located east of Sandy Hook, in the southwest corner of the Seabright '88 footprint. This borrow site is approximately 18 miles from Union Beach (15.5 miles haul distance and 2.1 miles pumping distance.) Given the distance from the Seabright borrow area, please clarify if the dredged materials will be transported by truck to the construction site for the initial construction. The air emissions in Appendix E do not appear to include air emissions from truck transport. If dredged materials will be transported by truck within the nonattainment area to the constructions site for the initial construction, please revise the General Conformity Applicability Analysis to include these activities and provide a Conformity Determination if required (93.157 (d) Reevaluation of Conformity). Please provide backup material (including assumptions, sample calculation, load factors, and emission factors) for transporting any dredged material to the construction site by truck.

3) 3. 3.1.2 Compliance with Floodwall Design Policy
The SEA states, "After consideration of new criteria and limited foundation information, the decision was made to replace all floodwall (both I-Wall and T-wall) on spread footings) with T-wall on piles for the HSLRR Recommended Plan."

Comment #3
The air emissions associated with the construction and the transport of the floodwall/aggregate within the nonattainment area to the staging areas/construction sites, do not appear to be included in Appendix E. The air emissions in Appendix E appear to be for dredging, shore crew support and groin construction. Please clarify if the air emissions associated with the construction and the transport of the floodwall/aggregate within the nonattainment area to the staging areas/construction sites are included in Appendix E. If the air emissions are not included, please revise the General Conformity Applicability Analysis to include these activities and provide a Conformity Determination if required (93.157 (d) Reevaluation of Conformity). Please provide backup material (including assumptions, sample calculation, load factors, and emission factors) for the construction and the transport of the floodwall/aggregate required for this project.

4) 5. Environmental Consequence- 5.1 Topography, Geology and Soils
The SEA states, "Dune and beach berm construction would involve the placement of approximately 688,000 cubic yards of sand increasing the existing topography to 17 feet NGVD29. ... Approximately 4,532,000 cubic yards will be dredged from SBBA for the HSLRR Recommended Plan and will not make a cut deeper than 20 feet in the ocean floor." Section 2.2.2 - Shore Element of the SEA states, "The total initial fill volume will be approximately 688,000 cubic yards, including advance fill, overfill, and tolerance. Twelve feet of advance fill would be placed with initial construction, with 21,000 cubic yards of periodic re-nourishment to follow approximately 9 years after construction, continuing at a 9-year cycle."
Section 5.14- Beachfill Borrow of the Engineering Appendix states, "The total volume within the area designated for Union Beach is 1.3 mcy. ...The assumption was made that 33% is of the material found will be deemed unsuitable by the dredger, i.e., a total of 1.3 mcy was delineated, of which 0.9 mcy is considered usable." Section 7.8 - Beachfill Borrow of the Engineering Appendix states, "The information on the beachfill borrow area is 28 years old and will need to be reevaluated During the PED phase."

Comment #4
The air emissions in Appendix E are based on 700,000 cubic yards of dredged material. Please clarify the amount of material that will be dredged for this project. The General Conformity Applicability Analysis and the Conformity Determination should be based on the amount of material dredged for this project and not the amount deemed usable. Please revise the General Conformity Applicability Analysis and provide a Conformity Determination if required (93.157 (d) Reevaluation of Conformity) to include the amount of material dredged for this project.

5) 5. Environmental Consequence- 5.1 Topography, Geology and Soils
The SEA states, "There will be transportation of sand from the seabed at SBBA to the placement area on the beach and into the intertidal zone of the placement area."

Comment #5
Comment #2 also applies to this portion of the project.

6) 5. Environmental Consequences - 5.14 Air Quality

The EA states, "The estimated total NOx emissions for the project are 91.4 tons for each year of construction. ... The project is presumed to conform to the General conformity requirements and is exempted from Subpart B under 40 CFR§93.153(c)(1)."

Comment #6
Comments #1 - #4 also apply to this portion of the project.

7) Appendix E – Clean Air Act Conformity Record of Non-Applicability
The Supporting Information and Data Table in Appendix E indicates that the load factor for the dredge is .66.

Comment #7
The SEA indicated that a hydraulic dredge was going to be used on this project. Please explain the use of .66 as the load factor for the dredge. For the Barnegat Inlet to Little Egg Harbor (LBI) project, .80 was used as the load factor for a hydraulic dredge.

8) The air emissions in the General Conformity - Applicable Emissions per Calendar Year Based on Project Duration and Schedule Table in Appendix E are 91.4 tons per year for 2018 and for 2019.

Comment #8
Comments #1 -#4 also apply to this portion of the project.

9) Coastal Zone Management Act Consistency Statement
Section 7:7E – 8.10 Air Quality of the Coastal Zone Management Act Consistency Statement states, "The estimated total NOx emissions for the project are 91.4 tons for 2015 and 2016."

Comment #9
Comments #1 - #4 also apply to this portion of the project. Appendix E indicates that the project emissions occur in years 2018 and 2019.

If you have any additional questions, please contact Angela Skowronek at (609) 984-0337.

Air Mobile Sources

Diesel exhaust contributes the highest cancer risk of all air toxics in New Jersey and is a major source of NOx within the state. Therefore, NJ DEP recommends that construction projects involving non-road diesel construction equipment operating in a small geographic area over an extended period of time implement the following measures to minimize the impact of diesel exhaust:

1. All on-road vehicles and non-road construction equipment operating at, or visiting, the construction site shall comply with the three-minute idling limit, pursuant to N.J.A.C. 7:27-14 and N.J.A.C. 7:27-15. Consider purchasing "No Idling" signs to post at the site to remind contractors to comply with the idling limits. Signs are available for purchase from the Bureau of Mobile Sources at 609/292-7953 or http://www.stopthesoot.org/sts-no-idle-sign.htm.

2. All non-road diesel construction equipment greater than 100 horsepower used on the project for more than ten days should have engines that meet the USEPA Tier 4 non-road emission standards, or the best available emission control technology that is technologically feasible for that application and is verified by the USEPA or the CARB as a diesel emission control strategy for reducing particulate matter and/or NOx emissions.

3. All on-road diesel vehicles used to haul materials or traveling to and from the construction site should use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities. If you have any additional questions, please contact Jeff Cantor at (609)

Treatment Works Approval

Based on the Supplemental Environmental Assessment (EA) and Hurricane Sandy Limited Reevaluation Report (HSLRR) for Coastal Storm Risk Management in Union Beach, New Jersey, it doesn't appear that a TWA would be required for this project. If you have any additional questions, please contact Jim Pontoriero at (609) 984-4429.

NJPDES Discharge to Surface Water

Based on a review of the Environmental Assessment document for the proposed project, a permit will be needed for any construction dewatering that may be discharged to surface water. Provided that the discharge is not contaminated, the appropriate discharge permit will be the B7- Short term De Minimis permit (see http://www.state.nj.us/dep/dwq/pdf/b7-rfa-checklist.pdf). This is determined by running a pollutant scan as described in the application checklist where the data can be collected up to a year in advance of the discharge. If, however, the analytical results demonstrate levels greater than the Appendix A standards as specified in the De Minimis permit (see http://www.state.nj.us/dep/dwq/pdf/b7-deminimis-final-permit-5-20-15.pdf), the appropriate NJPDES discharge to surface water permit will be the BGR – General Remediation Cleanup permit (see http://www.state.nj.us/dep/dwq/pdf/sw-gp-chklst.pdf) . The BGR permit can generally be processed in less than 30 days although a treatment works approval may be needed for any treatment. Contact information is listed on the checklists.

If you have any additional questions, please contact Kelly Perez at (609) 984-4507.

Stormwater Management

If more than one acre will be disturbed, a general permit for Construction Activities, (5G3) may be required. If you have any additional questions, please contact Ron Bannister at (609) 633-7021.

Thank you for giving the New Jersey Department of Environmental Protection the opportunity to comment on the Natural Resources Review for the proposed project. Please contact Katherine Nolan at (609) 292-3600 if you have any additional questions or concerns.

Sincerely,

Ruth W. Foster, PhD., P.G., Acting Director
Permit Coordination and Environmental Review

Enclosures

c. John Gray, Deputy Chief of Staff

Kelly Davis, New Jersey Division of Fish and Wildlife
Christina Davis, NJDEP Endangered and Nongame Species Program
Brian Neilan, NJDEP Bureau of Marine Fisheries
Jesse West-Rosenthal, NJDEP Historic Preservation Office
Jim Pontoriero, NJDEP, Treatment Works Approval
Kara Turner, NJDEP Division of Land Use Regulation
Chingwah Liang, NJDEP Division of Land Use Regulation
Mark Davis, NJDEP Office of Dredge & Sediment Technology
Angela Skowronek, NJDEP Air Planning
Jeff Cantor, NJDEP Bureau of Mobile Sources
Jessica Patterson, NJDEP Green Acres Program
Robin Madden, NJDEP Natural Historic Resources
Kelly Perez, NJDEP Surface Water Permitting
Ron Bannister, NJDEP Stormwater
Susan Lockwood, NJDEP Wetlands Mitigation
Kim Springer, NJ Coastal Management Program
Kevin Hassell, NJ Coastal Management Program
Bill Dixon, NJDEP Coastal Engineering
Deborah Voelbel, NJDEP Coastal Engineering
Karen Ashton, United States Army Corp of Engineers

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF FISH AND WILDLIFE
ENDANGERED AND NONGAME SPECIES PROGRAM
ENVIRONMENTAL REVIEW

Comments and/or recommendations regarding nongame resources relative to:

PROJECT NAME: Raritan Bay and Sandy Hook Bay, NJ Supplemental Environmental Assessment

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COUNTY: Monmouth

MUNICIPALITY: Union Beach

APPLICANT: USACE

PROJECT DESCRIPTION: Shoreline stabilization

AGENCY REQUESTING REVIEW: Office of Permit Coordination and Environmental Review

PROJECT REVIEW OFFICER: Katherine Nolan

REVIEW DATE: 12/13/2016

REVIWED BY: Christina Davis

Species Addressed: Piping Plover, Least Tern, Black Skimmer, American Oystercatcher, Pied-billed Grebe, Black-crowned Night-heron (note, this is not a comprehensive review of all potentially impacted T&E, other comments should be coming from appropriate biologists).

<u>General Comments</u>

The project area is not within a currently active breeding site for beach nesting birds. These include the federally and state listed Piping Plover, state listed Least Tern and Black Skimmer and species of special concern American Oystercatcher. The project is not expected to have an impact on these species during initial construction. However, the applicant should be aware that any of these species may take advantage of the new habitat that will be created with the nourishment of the beach, as happens with the Atlantic coast beach fills. If the work stretches out over multiple breeding seasons, the applicant should be prepared to make accommodations in work schedule should any of these species nest, including temporarily ceasing work or avoiding some areas during the breeding season. If suitable habitat is created, the municipality should be prepared to create a beach management plan (a document signed by the USFWS, the DFW and the municipality) outlining the management of beach nesting birds and listed plant species that may occur at the site.

State listed Black-crowned Night-heron and Pied-billed Grebe may occur at the site. Using the best available data, no impacts are expected for these species. If new information is collected prior to construction for these species, accommodations may need to be made for breeding birds. If the timing restrictions for tree or shrub removal noted on page 60 of the EA are followed (March 15-July 31), there should be no impact to potential breeding Black-crowned Night-heron.

Specific Comments

Supplemental EA

- Pg. 76, 6.5.6 – If Piping Plovers are detected within the project area, the applicant should coordinate with both the USFWS (as noted) *as well as* DFW- ENSP.
- The EA and CZM documents both note that there is no long-term impact expected to any of the state or federally listed species whose habitat is found within the project area. This supposes the only type of impacts are as a reduction in habitat – as noted in the general comment above, the placement of sand to create a berm can create habitat and attract beach nesting birds to a site. While this can lead to positive results in terms of increased areas available for nesting, it can also draw birds to sites that are difficult for them to successfully reproduce, given the high degree of human disturbance and stabilization that decrease opportunities for natural processes. All parties should be made aware of this potential outcome and the management that will come with it (for example, string and post fencing around nests, restrictions on human activity to reduce disturbance and prevent take, etc.).

Conflicting information in EA vs CZM Act Consistency Statement

- In Section 7:7E-3.16 Dunes (pg. 5) of the CZM document, it notes that no dunes will be created so the policy is not applicable. However, it is stated in the EA that a 3,160' length dune is part of the project (pg. 6 of EA).

SLR rate

- Unrelated to endangered species but as a general comment, the SLR rate cited in the EA (pg 30-31) of 0.7' by 2072 seems low. This is lower than some conservative SLR predictions and significantly lower than the moderate or high predictions (which are being increased as researchers begin to more fully understand various feedback loops). Although it is understood that it is extremely difficult to make predictions regarding SLR beyond 2050, as much of that will depend on whether emissions are lowered, stay the same or increase to inform models, 0.7' SLR by 2069/2072 (two different dates reported in the EA [pg 30-31] versus the Union Beach Description [pg 27-28]) seems a risky prediction , given that it is lower/ half of what researchers expect as "likely range" in NJ by 2050 of 1.0'-1.8' (Kopp, et al 2016).

  When I requested and received the 2003 FEIS, it appears that this number was the low end of what was predicted at the time. What was the reasoning for using the lowest predicted rate and not either the high (to be conservative) or mean? Was there any thought to updating this rate given the additional information that has been made available in the state since 2003?

Kopp, R.E., A. Broccoli, B. Horton, D. Kreeger, R. Leichenko, J.A. Miller, J.K. Miller, P. Orton, A. Parris, D. Robinson, C.P.Weaver, M. Campo, M. Kaplan, M. Buchanan, J. Herb, L.

Auermuller and C. Andrews. 2016. Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel. Prepared for the New Jersey Climate Adaptation Alliance. New Brunswick, New Jersey. Accessed 12/15/2016 at: http://njadapt.rutgers.edu/docman-lister/conference-materials/167-njcaa-stap-final-october-2016/file

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

February 13, 2017

REPLY TO
ATTENTION OF
Environmental Analysis Branch

Ruth W. Foster, PhD, P.G, Acting Director
Permit Coordination and Environmental Review
State of New Jersey, Department of Environmental Protection
P.O. Box 420 Mail Code 401-07J
Trenton, NJ 08625-0420

ATTN: Katherine Nolan

RE: Raritan Bay and Sandy Hook Bay Supplemental Environmental Assessment and Hurricane Sandy Limited Reevaluation Report for Coastal Storm Risk Management, Union Beach, Monmouth County, New Jersey.

Dear Ms. Foster:

Reference is made to the letter dated January 3, 2017 regarding the above subject (Enclosure 1). The District has reviewed the State's comments and is proving a response to those comments below.

Natural and Historic Resources
General Comment

NJDEP Comment:
NHR will need more information such as Geographic Information Systems (GIS) shapefiles of all project elements including all structures and the vegetation-free zone as well as a list of parcels by Block and Lot that may be impacted by the project. The list of parcels include a summary of all proposed temporary and permanent easements.

District Response:
The GIS shapefiles were provided, however the vegetation free zones are not yet identified. During the design phase project elements will become solidified, vegetation free zones will be identified and exact placement of structures will be determined. The Block and Lot parcels proposed to be impacted are available in the Real Estate Appendix of the HSLRR. The District will maintain coordination with the Green Acres Program as the project is further designed.

Endangered and Nongame Species

NJDEP Comment:
It should be noted that Horseshoe Crabs spawn along the Raritan Bay shore, so work on the beach should be avoided between April 15 and June 30.

District Response:
The District will work with the Division of Fish and Wildlife and avoid Horseshoe Crabs spawning along the Raritan Bay.

Division of Fish and Wildlife (DFW; attachment to January 3, 2017 letter), NJDEP Comment:
...If the work stretches out over multiple breeding seasons, the applicant should be prepared to make accommodations in work schedule should any of these species nest, including temporarily ceasing work or avoiding some areas during the breeding season. If suitable habitat is created, the municipality should be prepared to create a beach management plan (a document signed by the USFWS, the DFW and the municipality) outlining the management of beach nesting birds and listed plant species that may occur at the site.

District Response:
The District is aware of the possibility of that the beach nourishment may attract Piping Plovers or other state or federally listed species. If Piping Plovers or other listed species are detected in the project area, the District will coordinate with the DFW as well as USFWS to determine how to proceed.

DFW, NJDEP Comment: *In Section 7:7E-3.16 Dunes (pg. 5) of the CZM document, it notes that no dunes will be created so the policy is not applicable. However, it is stated in the EA that a 3,160' length dune is part of the project (pg. 6 of EA).*

District Response:
The mention in the CZM document that no dunes will be created is an error. There will be a dune in the project.

DFW, NJDEP Comment: *SLR*
What was the reasoning for using the lowest predicted rate and not either the high (to be conservative) or mean? Was there any thought to updating this rate given the additional information that has been made available in the state since 2003?

District Response:
Because the project is already authorized at a set elevation, the SLR analysis was conducted only to communicate the probability of exceedance or level of performance (level of protection). The District utilized professional judgement and additional data in choosing the 0.7 feet of SLR.

Marine Fisheries Administration (MFA)
NJDEP Comment:
The primary concern is significant disturbance to the seafloor due to activities associated with hydraulic dredging in the borrow area and any in water work involved with levee, interior drainage, beach replenishment, floodwall, and groin construction.

District Response:
The USFWS and the District have developed a Biological Opinion/Biological Assessment for the NJDEP permitted borrow (Appendix H of the Supplemental EA) area which the District will follow.

NJDEP Comment:
The Southern New England/Mid-Atlantic winter flounder stock is near historic lows and the proposed shoreline and tidal creek development locations occur within a region which has been determined to be Essential Fish Habitat for all life history stages of winter flounder. As such, the timing restrictions on dredging and development which have been established to protect the spawning and vulnerable life history stages of winter flounder should be imposed. Additionally, dredging and development timing restrictions which protect anadromous fish migrations (e.g. endangered populations of Atlantic) should also be observed. The BMF suggests minimizing any disturbances to the seafloor during the in-water construction and shoreline development phases of the project.

District Response:
The District is coordinating with NOAA for EFH habitat and species and will continue to coordinate with the Bureau of Marine Fisheries (BMF) as the project progresses into the design phase. The District will utilize best management practices to minimize impacts during construction of the project.

Historic and Cultural Resources
NJDEP Comment:
As noted in the documentation provided, it appears that the proposed undertaking will require consultation under Section 106 of the National Historic Preservation Act for the identification, evaluation and treatment of historic properties within the project's area of potential effects.

District Response:
The District has been coordinating with the New Jersey Historic Preservation Office (NJHPO) as the project updates have been made. On January 10, 2017 the District and NJSHPO signed a Programmatic Agreement for the Union Beach project. This agreement serves as the District's compliance with Section 106 of the National Historic Preservation Act.

Green Acres

NJDEP Comment:

Therefore, in order to conduct a thorough jurisdictional determination and to determine the proposal's impact on any restricted areas, please provide GIS shapefiles of all project elements (including all structures and the vegetation-free zone) and a list of parcels by Block and Lot to be impacted by the project (including a list of all proposed temporary and permanent easements).

District Response:

The District has provided the shapefiles for the project; however, the current project design is for feasibility purposes and is subject to change. During the design phase project elements will become solidified in order to develop wetland mitigation and vegetation free zone. The District will maintain coordination with the Green Acres Program as the project is further designed.

<u>Land Use Regulation Program</u>

Land Use Permitting

NJDEP Comment:

The proposed project will require the submission of a Federal Consistency Determination. A determination request was submitted to the Department (DLUR File# 1350-16-0001.1 CDT 160001) but was withdrawn on December 13, 2016. Because the project has not been fully designed yet, the Division of Land Use Regulation was unable to review the project for compliance with the Coastal Zone Management Rules (NJAC 7:7-1.1 et. seq.).

District Response:

The District will resubmit a Federal Consistency Determination during the design phase. The District will coordinate with the DLUR to provide guidance and review the project details.

Wetland Mitigation

NJDEP Comment:

Land Use Mitigation may be required for this project depending on the total number of temporary and permanent acres of regulated wetlands impacts. If required, a mitigation plan must be developed prior to the Department issuance of a land use permit.

District Response:

During the design phase of the project the District will delineate the wetlands and develop a mitigation plan addressing the impacts to the wetlands. The District will coordinate this plan with the NJDEP.

Office of Dredging and Sediment Technology

NJDEP Comment:

Based on the Supplemental Environmental Assessment (EA) and the Hurricane Sandy Limited Reevaluation Report (HSLRR), the project proposes a very ambitious amount of coastal *engineering. Also, it appears that the USACE is proposing a large amount of wetlands impacts without any specific mitigation. All wetlands impacts should be avoided to the maximum extent practicable and would require mitigation. Mitigation could substantially alter the cost: benefit ratio.*

District Response:
During the design phase of the project the District will delineate the wetlands and develop a mitigation plan addressing the impacts to the wetlands. The District developed a mitigation cost estimate based on the prior mitigation developed for the project and other District projects, which was included in the cost benefit ratio for the HSLRR.

Air Permitting and Planning

Bureau of Evaluation and Planning

NJDEP Comment *1:*
The air emissions in Appendix E - Clean Air Act Conformity Record of Non-Applicability (Appendix E), appear to include air emissions associated with dredging, dredging support and groin construction. The air emissions associated with construction of other activities (e.g. floodwalls, levees, road raising etc.) for this project do not appear to be included in Appendix E. Please clarify if the air emissions associated with the construction of the floodwalls, levees, road raising etc. are included in Appendix E.

District Response:
The Clean Air Act RONA represents all project elements including but not limited to dredging, dredging support, groin construction, beach work, floodwalls, levees, road raising, etc.

Comment 2:
The Sea Bright borrow area does not appear to be in close enough proximity to the construction site to only use a hydraulic dredge as the means for depositing dredged material at the construction site. Given the distance from the Sea bright borrow area, please clarify if the dredged materials will be transported by truck to the construction site for the initial construction. The air emissions in Appendix E do not appear to include air emissions from truck transport. If dredged materials will be transported by truck within the nonattainment area to the constructions site for the initial construction, please revise the General Conformity Applicability Analysis to include these activities and provide a Conformity Determination if required (93.157 (d) Reevaluation of Conformity).

District Response:
The District will utilize a hydraulic dredge at the Sea Bright Borrow area. The dredged material will be transported on the water near the placement area where the material will be pumped onto the shore. The RONA does not include truck transportation of the dredge material as the material will be transported on the ocean and pumped to the placement site.

Comment 3:
The air emissions associated with the construction and the transport of the floodwall/aggregate within the nonattainment area to the staging areas/construction sites, do not appear to be included in Appendix E.

District Response:
The RONA includes the transport of all material within the nonattainment area to the construction sites.

Comment 4:
The air emissions in Appendix E are based on 700,000 cubic yards of dredged material. Please clarify the amount of material that will be dredged for this project.

District Response:
The District will dredge 700,000 cubic yards of material all of which will be used in the beach component of the project.

Comment 5:
The SEA states, "There will be transportation of sand from the seabed at SBBA to the placement area on the beach and into the intertidal zone of the placement area."
Comment #2 also applies to this portion of the project.

District Response:
The District will utilize a hydraulic dredge at the Sea Bright Borrow area. The dredged material will be transported on the water near the placement area where the material will be pumped onto the shore. The RONA does not include truck transportation of the dredge material as the material will be transported on the ocean and pumped to the placement site.

Comment 6:
The EA states, "The estimated total NOx emissions for the project are 91.4 tons for each year of construction .... The project is presumed to conform to the General conformity requirements and is exempted from Subpart B under 40 CFR§93.153(c)(l)." Comments # 1 - #4 also apply to this portion of the project.

District Response:
Please see District Responses 1-4.

Comment 7:
Appendix E- Clean Air Act Conformity Record of Non-Applicability. The Supporting Information and Data Table in Appendix E indicates that the load factor for the dredge is .66.
The SEA indicated that a hydraulic dredge was going to be used on this project. Please explain the use of .66 as the load factor for the dredge. For the Barnegat Inlet to Little Egg Harbor (LBI) project, .80 was used as the load factor for a hydraulic dredge.

District Response:
The District used 66% for hopper dredge propulsion engines and 80% for their pump engines. It does appear that 80% was used for LBI's hopper dredge propulsion engine(s). This would have slightly over-estimated the expected emissions from LBI but the monthly calculator used to calculate and track actual emissions uses 66% for the propulsion engine, as do all of our other calculators. The Union Beach estimate is correct, with propulsion engines estimated with a 66% load factor and pump engines estimated with an 80% load factor.

Comment 8:
The air emissions in the General Conformity - Applicable Emissions per Calendar Year Based on Project Duration and Schedule Table in Appendix E are 91.4 tons per year for 2018 and for 2019. Comments #1 - #4 also apply to this portion of the project.

District Response:
Please see District Responses 1-4.

Comment 9:
Section 7:7E - 8.10 Air Quality of the Coastal Zone Management Act Consistency Statement states, "The estimated total NOx emissions for the project are 91.4 tons for 2015 and 2016." Comments #1 - #4 also apply to this portion of the project. Appendix E indicates that the project emissions occur in years 2018 and 2019.

District Response:
The years in the Consistency Statement are in error and should be 2018 and 2019 not 2015 and 2016. Additionally, please see District Responses 1-4.

Air Mobile Sources
NJDEP Comment:
All on-road vehicles and non-road construction equipment operating at, or visiting, the construction site shall comply with the three-minute idling limit, pursuant to N.J.A.C. 7:27-14 and N.J.A.C. 7:27-15.
All non-road diesel construction equipment greater than 100 horsepower used on the project for more than ten days should have engines that meet the USEPA Tier 4 non-road emission standards...
All on-road diesel vehicles used to haul materials or traveling to and from the construction site should use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities.

District Response:
The District and its construction contractor will comply with all vehicle and equipment regulations including idling limits, emission standards, and travel routes.

NJPDES Discharge to Surface Water
NJDEP Comment:
... a permit will be needed for any construction dewatering that may be discharged to surface water. Provided that the discharge is not contaminated, the appropriate discharge permit will be the B7 - Short term De Minim is permit.

District Response:
The District and its construction contractor will apply for the B7 – Short term De Minimis permit or appropriate discharge permit determined by the application process and the State of New Jersey.

Stormwater Management
NJDEP Comment:
If more than one acre will be disturbed, a general permit for Construction Activities, (5G3) may be required.

District Response:
The District will apply for a Construction Activities permit (5G3) as more than one acre will be disturbed.

Thank you for your review of the project. The District will continue to coordinate with the Department of Environmental Protection as the project enters the design phase and further reviews and permit coordination will be necessary. Please contact Matthew Voisine, at matthew.voisine@usace.army.mil or 917-790-8718 if you have additional comments or questions.

Sincerely,

Peter Weppler,
Chief, Environmental Analysis Branch

14-3633-1 GOR
RECEIVED

JUL 18 2014

HISTORIC PRESERVATION OFFICE
HPO - H2014-241

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

REPLY TO
ATTENTION OF

July 10, 2014

Environmental Assessment Section
Environmental Analysis Branch

Mr. Daniel Saunders
Deputy State Historic Preservation Officer
State of New Jersey Department of Environmental Protection
Historic Preservation Office
PO Box420
Trenton, NJ 08625-0420

Dear Mr. Saunders:

The US Army Corps of Engineers, New York District (District) is conducting a Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (EIS) in the Borough of Union Beach, Monmouth County, New Jersey (Enclosure 1). The community has had a history of flooding and was severely impacted by Hurricane Sandy on October 2012. The purpose of the HSLRR is to determine if conditions and plans developed and recommended at the feasibility phase remain viable at this time.

A cultural resource study conducted by the District as part of the reconnaissance phase noted the potential for cultural resources within the project area (Brighton 1995). The following Phase I cultural resource study identified no historic properties within the Area of Potential Effect (APE) as defined at the time of study (Panamerican Consultants, Inc. 2001). The Phase I included deep testing to identify buried paleo-surfaces however no such surfaces were encountered. A subsequent design change was also studied for the presence of cultural resources and no historic properties were identified. The Sea Bright Borrow Area (SBBA) was identified as the source for sand. In the project's 2003 EIS it is indicated that monitoring will be conducted in the SBBA and in the beach renourishment area during construction to identify resources that might be pumped on the beach from the borrow area. Coordination at all earlier phases was conducted with your office who concurred that there are no historic properties within the APE (Enclosure 2). The Historic Preservation Specialist with the Monmouth County Park System was also consulted.

HSLRR studies have lead to the following recommended changes to the feasibility plan: limited alignment change due to presence of Coastal Barrier Resources Act (CBRA) zone; levee embankment changes to assure correct drainage; floodwall change from I-wall to T-wall based on updated engineering regulations; changes to beach, dune and groins to adapt to climate change to be further assessed in Project Engineering and Design (PED) that may involve increasing the heights of features; Broadway Road Closure Gate to change from a miter gate to a roller gate; sluice gates in lieu of sector gates for Flat and East Creeks; alignment and easements to include vegetation-free zones of 15 feet from levee toes, drains or structural features and 15 feet from the faces of floodwalls and a minimum of 8 feet beyond the footing as per USACE's vegetation management policy; interior drainage studies need to determine size or need for pump stations that were originally proposed. Of the proposed changes to project design as a result of analysis conducted under the HSLRR only the proposed shift in the alignment to avoid the CBRA zone has the potential to impact cultural resources as all other potential design changes are within the previously studied APE.

The proposed alignment shift remains in the low-lying marsh area (Enclosure 3). Previous work, including deep testing, in such environments in the project area did not identify any significant resources or archeologically sensitive buried landforms. It is the opinion of the District that this shift will have no impact on historic resources. Pending concurrence by your office, no further work will be undertaken along the newly proposed alignment. The other recommended changes lie within the alignment previously surveyed where no historic properties were encountered.

In June 2014 a Programmatic Agreement (PA) for the New York District's Atlantic Coast of New Jersey (ACNJ) Sandy Hook to Barnegat Inlet Beach Erosion Control Project was signed by your office. The PA includes stipulations addressing potential cultural resources impacts with use of the SBBA (Enclosure 4). The stipulations were developed following surveys of the borrow area conducted in 2014 and include developing buffer zones around potential shipwrecks identified through remote sensing and coming up with protocols to follow should areas determined sensitive for buried paleo landforms be dredged (Panamerican Consultants, Inc. 2014). These stipulations will be followed when using the SBBA in connection with construction of the Union Beach Project in lieu of the monitoring previously stated in the EIS.

Wetland mitigation sites have yet to be identified. Cultural resources studies of the sites will be undertaken and all work coordinated with your office. Any refinements to design developed during the PED phase of the project will be subject to a cultural resources evaluation.

Public involvement will be conducted as part of the public review of the Supplemental EIS and will serve as the District's Section 106 public coordination. Please provide Section 106 comments, pursuant to 36 CFR 800.5. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

for

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

CC:
Delaware Nation
Delaware Tribe of Indians
Monmouth County Parks, Gail Hunton

CONCUR

8/18/14
DATE

Daniel D. Saunders
DEPUTY STATE HISTORIC
PRESERVATION OFFICER

Enclosure 1. Recommended Plan at Feasibility Phase

Enclosure 2

Correspondence

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

REPLY TO ATTENTION OF

January 19, 1996

Environmental Analysis Branch
Environmental Assessment Section

Dorothy P. Guzzo
Administrator
Historic Preservation Office
State of New Jersey
Department of Environmental Protection
Division of Parks and Forestry
501 East State Street
CN 404
Trenton, New Jersey 08625-0404

Dear Ms. Guzzo,

The U.S. Army Corps of Engineers, New York District (Corps) is currently evaluating Federal interest in storm damage reduction at Union Beach, Monmouth County, between Chingarora Creek to the west and Thorn's Creek to the east (Enclosure 1). The community of Union Beach has encountered extensive flooding as a result of storm driven tides and waves. Storm-induced shoreline erosion has eliminated most of the beach and has resulted in the deterioration of existing coastal protection and drainage structures. In many areas, the tidal surge results in the blockage of the existing storm drainage system compounding the extent and duration of flooding. The proposed protection project consists of a combined flood and shore protection project including the construction of levees and tide gates as well as beach fill along the Raritan Bay shoreline. The sand for this project will be trucked in from an existing upland borrow source.

The recommended project plan for Union Beach has two parts: a plan for coastal protection and a plan for flood protection. The proposed coastal protection plan includes the construction of a storm protection dune and beach fill section. The beach fill section would be located along approximately 3,500 feet of shoreline from an intersection with the eastern portion of the flood protection levee near the west bank of Flat Creek, then extending northwesterly to an intersection with the westerly portion of the levee, approximately 1,750 feet south east of Conaskonk Point (Enclosures 2 and 3). The dune will have a crest width of 45 feet at an elevation of +15 feet National Geodetic Vertical Datum (NGVD). The berm section will have a 50 foot wide berm at an elevation of +5 feet NGVD. The initial construction project will include advanced nourishment sufficient for a seven year period. Periodic nourishment according to the above design will be undertaken at seven year intervals. Sand for the fill will be available from an upland source located in Harvey Cedars, New Jersey.

The proposed flood protection design will provide flood protection for Union Beach from Chingarora, Flat and East Creeks with 18,800 feet of levee (see Enclosures 2 and 3). The proposed levees have a crest width of 10 feet with a design elevation of +13 feet NGVD. Three road raisings are required to accommodate the levee alignment. An impervious core is provided along the entire levee. The impervious core will extend approximately six feet below the existing ground to prevent seepage under and through the foundation of the levee. Twenty-four drainage structures will be incorporated along the levee alignment (see Enclosures 2 and 3). Additionally, 14 tide gate structures with sluice gates will be used where the levee crosses creeks and subcreeks.

In November 1995, a brief study was completed by the Corps to determine what studies would be required to identify cultural resources within the project area (Enclosure 4). A review of the site files located in your office and at the New Jersey State Museum indicate a number of prehistoric sites have been identified along the south shore of Raritan Bay. Most of the sites were located inland along a number of the creeks situated along the coast. More recent archaeological investigations have found much of the Raritan Bay area to have been disturbed by modern development.

The recommended coastal protection plan should not have an impact on cultural resources located along the shoreline. The shoreline area has been manipulated to permit the construction of bulkheads and beaches. The continued and continuous erosion of the beach portion of the study area had greatly disturbed the fill area and limited its potential to contain intact archaeological remains. The proposed plan will also have little impact to historic resources. Structures at Union Beach were located inland, south of the beach and behind the current bulkhead. The sand utilized for this portion of the proposed project will be taken from an upland borrow source. This source is an existing borrow pit operated by a private company that provides sand and gravel for a variety of agencies. The use of upland borrow source will have no effect on cultural resources. No additional work for this portion of the project will be undertaken.

The construction of the proposed flood protection plan has the potential to impact cultural resources that may be eligible for the National Register of Historic Places (NRHP) located within the areas where levees, tide gates and drainage structures as well as areas where roads may be raised. Areas along the creeks are particularly sensitive for the recover of prehistoric remains. The city of Union Beach was started in the mid-19th century and remains of the original town may exist underneath the current city. The excavation of the core for the levees had the potential to disturb and destroy cultural resources that may provide valuable information on the historical development of Union Beach and the Raritan Bay coastline.

In order to locate and identify cultural resources within the proposed flood protection project area, additional work will be required. This work will consist of in-depth documentary research, a pedestrian survey of the proposed levee areas, road raising, drainage structures and tidal gate areas, followed by systematic, sub-surface archaeological testing of these areas. In addition, the impact of the construction of these features on potential NRHP eligible architecturally significant structures within the project areas will also be assessed. The results of these surveys will be coordinated with your office.

On the basis of current project plans and pending review by your office, the Corps is of the opinion that the proposed Combined Flood Control and Shore Protection, Union Beach, Monmouth County, New Jersey will have no effect on historic properties located near the sand placement area, but has the potential to effect properties that may be located within the location of the levees, tidal gates and road raisings. Additional work will be conducted to locate and identify potentially significant cultural resources. Please provide this office with Section 106 comments as pursuant to 36 CFR Part 800.5.

If you or your staff have any questions or require additional information, please contact Ms. Nancy Brighton, (212)264-4663. Thank you for your assistance.

Sincerely,

Joseph Vas L

Stuart Piken, P.E.
Chief, Planning Division

Enclosures

Christine Todd Whitman
Governor

State of New Jersey

Department of Environmental Protection

DIVISION OF PARKS AND FORESTRY
HISTORIC PRESERVATION OFFICE
CN-404
TRENTON, N.J. 08625-0404
TEL: (609) 292-2023
FAX: (609) 984-0578

Robert C. Shinn, Jr.
Commissioner

HPO-B96-2
February 1, 1996

Mr. Stuart Piken, P.E.
Chief, Planning Division
Department of the Army New York District
Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Re: Monmouth County, Union Beach
Flood and Shore Protection Project
Chingarora Creek to Thorn's Creek

Attn: Nancy Brighton

Dear Mr. Piken:

Thank you for your letter and the cultural resource assessment for the flood and shore protection project for Union Beach. I am in agreement with both of your findings, that the coastal protection plan will not likely have an impact on cultural resources along the shoreline and that the proposed flood protection plan does have the potential to impact as yet unidentified cultural resources eligible for National Register inclusion. Therefore, unless there are project changes, new information comes to light, or resources are discovered during project implementation, no additional cultural resource assessment should be necessary for the coastal protection portion of the project. When the cultural resource survey for the flood protection project portion has been completed, I will be able to provide Section 106 comments for the entire project.

Because it appears that much of the levee construction and associated work will occur in marsh/poorly drained areas and the construction is slated to disturb soils c. six feet below surface, I strongly recommend the survey include deep core sampling by a soil scientist familiar with cultural issues/ strata to identify potentially culture bearing strata which now lie submerged beneath tidal marsh. This work could potentially delimit and define appropriate areas for more traditional archaeological testing.

One question which remains entails use of sand for this project from an existing upland borrow source. Has this source been previously evaluated under Section 106 for impacts to cultural resources? If you have a list of locations/quarries which have been evaluated over time which you use or may use as sources of sand, it would be useful if you could provide this to the Office. Given the time which has elapsed in some cases between evaluations and the change of project reviewers, this would be very helpful.

Thank you again for your request for comment and for your submission. If you have any questions please do not hesitate to contact Deborah Fimbel, staff reviewer for this project.

Sincerely,

Dorothy P. Guzzo

Dorothy P. Guzzo
Deputy State Historic
Preservation Officer

DG:DF
C:\PW\wd\106\96716

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

REPLY TO ATTENTION OF

May 23, 2001

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy State Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625-0404

Attention: Deborah Fimbel

Dear Ms. Guzzo:

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of the draft *Phase I Cultural Resource Investigation for the Union Beach Hurricane and Storm Damage Reduction Feasibility Study, Borough of Union Beach, Monmouth County, New Jersey* (Enclosure). The impact of levee and floodwall construction is not expected to impact any significant cultural resource. The impact to cultural resources by the coastal component of the project was considered in a previous Corps study entitled *Cultural Resources Assessment: Pre-Feasibility Study, Combined Flood Control and Shore Protection, Union Beach, Monmouth County, New Jersey* which was coordinated with your office (USACE/Brighton 1995). The coastal component of the project consisting of construction of a beach berm, dune, terminal groins and a reinforced sheet-pile wall will likewise not impact cultural resources since this portion of the project area has been subject to both construction (i.e., bulkheads and beach) and continuous erosion. No further cultural resource investigations are recommended for the project area unless future changes in design will result in additional impacts.

We would appreciate receiving any Section 106 comments that you may have regarding the enclosed report. Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact John Killeen, Project Archaeologist at (212) 264-0473.

Sincerely,

Jenine Gallo

Jenine Gallo
Chief, Environmental Review Section

Enclosure

State of New Jersey
Department of Environmental Protection

)ONALD T. DIFRANCESCO
Acting Governor

Robert C. Shinn, Jr.
Commissioner

Natural & Historic Resources
PO Box 404
Trenton, NJ 08625-0404
TEL: (609)292-3541
FAX: (609)984-0836

HPO-I2001-230
106/01-2222
September 27, 2001

Jenine Gallo
Chief, Environmental Review Section
Department of the Army
Corps of Engineers New York District
Jacob K. Javits Federal Building
New York, NY 10278-0090

ATTN: John Killeen

Dear Ms. Gallo:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR 800: Protection of Historic Properties, as published in the *Federal Register* 12 December 2000 (65 FR 77725-77739) I am providing **Consultation Comments** for the following undertaking:

Monmouth County/Union Beach Borough
Union Beach Hurricane and Storm Damage
Reduction Feasibility Study
Levee and Flood Wall System Installation Study
U.S. Army Corps of Engineers

800.4 Identification of Historic Properties

Based on available information, it is my opinion that there are no historic properties within the project's Area of Potential Effect. Consequently, pursuant to 36 CFR 800.4(d), no further Section 106 Consultation is required unless resources are discovered during project implementation, pursuant to 36 CRF 800.11.

Additional Comments

These comments are based on review of the May 2001 draft report for the project, *Phase I Cultural Resource Investigation for the Union Beach Hurricane and Storm Damage Reduction Feasibility Study, Borough of Union Beach, Monmouth County, New Jersey* prepared by Panamerican Consultants, Inc. for Northern Ecological Associates, Inc.

under contract to the U.S. Army Corps of Engineers, and subsequent discussion between John Killeen of your staff and Deborah Fimbel regarding the three sets of Central Railroad of New Jersey bridge abutments.

The Office has no other comments on the project except that which was provided verbally in July by Deborah Fimbel, to ensure that Gail Hunton of Monmouth County Park System is made aware of the project if she has not been already, to ensure an opportunity for input from the Monmouth County Park system.

The Office looks forward to receiving the final report for the project with original photographs. Thank you again for providing this opportunity for review and Consultation. If you have any questions, please do not hesitate to contact Deborah Fimbel, staff reviewer for this project, at 609-984-6019.

Sincerely,

Dorothy P. Guzzo

Dorothy P. Guzzo
Deputy State Historic
Preservation Officer

DPG:DRF

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

REPLY TO ATTENTION OF

December 4, 2001

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy State Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625-0404

Attention: Deborah Fimbel

Dear Ms. Guzzo:

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of the Final *Phase I Cultural Resource Investigation for theUnion Beach Hurricane and Storm Damage Reduction Feasibility Study, Borough of Union Beach, Monmouth County, New Jersey* (Enclosure). The proposed hurricane and storm damage reduction project is not expected to impact any significant cultural resource. We have also provided the draft of the enclosed report to Monmouth County Parks System for comment with no resulting comment. This final report will be provided to Monmouth County Parks System for their reference as well. No further cultural resource investigations are recommended for the project area unless future changes in project design will result in additional impacts.

We will coordinate with your office should changes in the project plans become necessary. Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact John Killeen, Project Archaeologist at (212) 264-0473.

Sincerely,

Jenine Gallo

Jenine Gallo
Team Leader, Environmental Analysis Branch

Enclosure

cf: G. Hunton, Monmouth County Parks System
R. Brattain, ACOE (without report)

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

REPLY TO ATTENTION OF

May 30, 2002

RECEIVED
JUN - 4 2002
HISTORIC PRESERVATION OFFICE

(01-2222)
02-2120 DF
HPO - F2002-123
(please see page 2)

Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy State Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625-0404

Attention: Deborah Fimbel

Dear Ms. Guzzo:

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with the results of the cultural resource reconnaissance of the proposed interior levee portion of the Union Beach hurricane and storm damage reduction project. This addition to the project design was developed after the final report entitled *Phase I Cultural Resource Investigation for the Union Beach Hurricane and Storm Damage Reduction Feasibility Study, Borough of Union Beach, Monmouth County, New Jersey* was coordinated with your office (Panamerican Consultants, Inc. 2001). On April 30, 2002 a reconnaissance crew from the Corps conducted a series of six auger tests in selected locations along the footprint of the proposed interior levee south of Jersey Avenue (Attachment 1). The auger tests were conducted for two reasons, as follows:

1) to determine if significant pollution exists in the levee footprint, and

2) to determine the extent and nature of cultural resources that may be present in the levee footprint and assess the possibility for encountering cultural resources in the Area of Potential Effect (APE)

The construction of the proposed levee will not adversely impact the homes that will be protected by the levee. These homes are post-World War II and later structures and most have been altered. There are no known National or State Register of Historic Places eligible sites in the APE. Based on the current reconnaissance and historic maps, there is virtually no possibility for the presence of significant historic cultural resources and very low probability for the presence of prehistoric cultural resources within this footprint (Attachments 2 through 6). The levee traverses property that is composed of creek side land that is only 10 to 12 inches above the water table (mainly phragmites detritus) that is laden with garbage and construction/demolition debris (Attachment 7 and 8). The entire levee footprint can be characterized as a disturbed environment. Excavation for the interior levee will only reach 12 inches below ground surface (Attachment 9). The footprint of the levee is 10 feet wide. Since the levee height is 4 feet, the viewshed will not be impacted. It is the Corps' opinion that the proposed interior levee will not impact any significant cultural resource. No further cultural resource investigations are recommended for the project area unless future changes in project design will result in additional impacts. Please provide Section 106 comments pursuant to 36 CFR 800.5. We will coordinate with your office should further changes in the project plans become necessary. Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact John Killeen, Project Archaeologist at (212) 264-0473.

Sincerely,

for Leonard Houston,
Chief, Environmental Analysis Branch

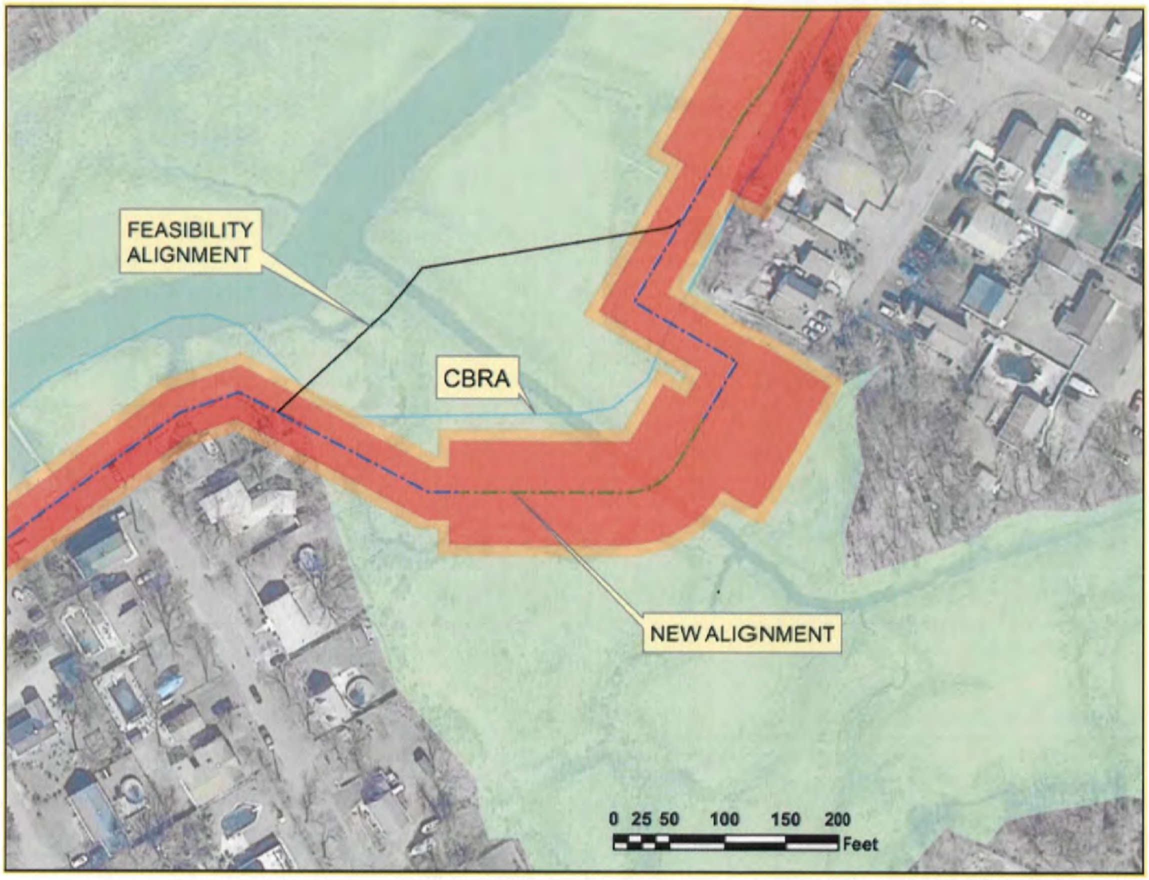
Attachments

cf: G. Hunton, Monmouth County Parks System

I concur with your finding that there are no historic properties affected within the project's area of potential effects. Consequently, pursuant to 36 CFR 800.4(d)(1), no further Section 106 consultation is required unless additional resources are discovered during project implementation pursuant to 36 CFR 800.13.

6/13/02

Dorothy P. Guzzo — **Date**
Deputy State Historic Preservation Officer



Enclosure 3: Proposed new alignment to avoid Coastal Barrier Resources Act (CBRA) zone.

Enclosure 4

Atlantic Coast of New Jersey Sandy Hook to Barnegat Inlet Beach Erosion Control Project - Programmatic Agreement – June 2014: Stipulations related to the Sea Bright Borrow Area.

SEA BRIGHT BORROW AREA (SBBA):

A. Geomorphology and Native American Site Potential

1. Areas determined sensitive for paleo landforms will be avoided as practicable. If avoidance is not feasible the New York District shall implement a program to monitor the material from these areas that is collected in the UXO screens.

2. Protocol for the monitoring program will be developed in coordination with NJHPO. A brief report will generated after each effort which shall be coordinated with NJHPO and other interested parties.

3. The protocol shall include measures the Corps will undertake should artifacts be encountered.

4. No further regular monitoring of dredged material will be carried out. However, the project archaeologist will educate the UXO specialists at the beginning of each renourishment cycle on the types of archaeological materials that could be encountered so that they will be more likely to identify these materials when or if they are pumped onto the beach. Early detection could allow the archaeologist time to halt the pumping operation, inspect the material, and consult with the NJHPO to make a determination for monitoring or for moving the dredge operation elsewhere.

B. Shipwrecks

1. The New York District shall designate a buffer zone of 250 feet around each potential shipwreck identified through remote sensing surveys conducted for the Undertaking. Buffer zone(s) shall be clearly delineated on construction plans. No construction activities that could potentially impact the wrecks will occur within the designated zones.

2. If it is determined that a buffer zone cannot be employed in an area as sand from that location is critical for the Undertaking, the District will conduct further study to determine if a target is a cultural resource and evaluate its NRHP eligibility. If determined eligible the District shall consult with the NJHPO to develop treatment plans.

3. Should new borrow areas outside the surveyed area of the SBBA be required the proposed locations shall be surveyed for historic resources employing the survey standards of the time and shall be coordinated with NJHPO and other interested parties.

References

Brighton, Nancy J.
1995 Cultural Resources Assessment, Pre-feasibility Study, Combined Flood Control and Shoreline Protection, Union Beach, Monmouth County, New Jersey.

Panamerican Consultants, Inc.
2001 Phase I Cultural Resource Investigation for the Union Beach Hurricane and Storm Damage Reduction Feasibility Study, Borough of Union Beach, Monmouth County, New Jersey.

2014 Cultural Resources Remote Sensing Survey of the Sea Bright Borrow Area and the Near Shore Area Sandy Hook to Barnegat Beach Erosion Control Project: Elberon to Loch Arbor Reach Monmouth County, New Jersey. Contract No. W912DS-09-0009, Task Order No. 0020

Delaware Tribe Historic Preservation Representatives
Department of Anthropology
Gladfelter Hall
Temple University
1115 W. Polett Walk
Philadelphia, PA 19122
temple@delawaretribe.org

August 18, 2014

Department of the Army
New York District, Corps of Engineers
Attn: Peter M. Weppler
Jacob K. Javits Federal Building
New York, NY 10278

Re: Hurricane Sandy Limited Reevaluation Report and Supplemental Environmental Impact Statement in Union Beach, Monmouth County, New Jersey

Dear Peter M. Weppler

Thank you for informing the Delaware Tribe on the proposed construction associated with the above referenced project. **Our review indicates that the project is located in the vicinity of significant archaeological resources that hold cultural and religious significance to the Delaware Tribe.** Given the location of the proposed project, we request that you conduct a Phase I archaeological survey that includes background research, surface survey and subsurface testing of the project area.

We wish to continue as a consulting party on this project and look forward to receiving a copy of the Phase I survey report so we may reevaluate the project and its' potential threat to culturally significant resources. If human remains are discovered during the survey, we request that you immediately halt all ground disturbing activities and contact the Delaware Tribe before moving forward with the survey or project construction. We respectfully request that all construction for the proposed project is not initiated until after we are able to review the Phase I survey report and provide our written comments.

If you have any questions, feel free to contact this office by phone at (609) 220-1047 or by e-mail at temple@delawaretribe.org.

Sincerely,

Blair Fink

Blair Fink
Delaware Tribe Historic Preservation Representatives
Department of Anthropology
Gladfelter Hall
Temple University
1115 W. Polett Walk
Philadelphia, PA 19122

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

REPLY TO
ATTENTION OF

October 15, 2014

Environmental Assessment Section
Environmental Analysis Branch

Mr. Reid Nelson, Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation
The Old Post Office Building
1100 Pennsylvania Avenue, N.W., Suite 809
Washington, D.C. 20004

Dear Mr. Nelson:

The US Army Corps of Engineers, New York District (District) is preparing a Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) in the Borough of Union Beach, Monmouth County, New Jersey (Enclosure 1). The community has had a history of flooding and was severely impacted by Hurricane Sandy on October 2012. The purpose of the HSLRR is to determine if conditions and plans developed and recommended at the feasibility phase remain viable at this time.

A Phase I cultural resource study identified no historic properties within the Area of Potential Effect (APE) as defined at the time of study. The Phase I work included deep testing to identify buried paleo-surfaces however no such surfaces were encountered. A subsequent design change was also studied for the presence of cultural resources and no historic properties were identified. The Sea Bright Borrow Area (SBBA) was identified as the source for sand. In the project's 2003 EIS it is indicated that monitoring will be conducted in the SBBA and in the beach renourishment area during construction to identify resources that might be pumped on the beach from the borrow area. Coordination of all cultural resources studies was conducted with the New Jersey Historic Preservation Office (NJHPO).

HSLRR studies have lead to several recommended changes to the feasibility plan. Of those changes only the proposed shift in the alignment to avoid a Coastal Barrier Resources Act zone has the potential to impact cultural resources as all other potential design changes are within the previously studied APE. The proposed alignment shift remains in the low-lying marsh area. Previous work, including deep testing, in such environments in the project area did not identify any significant resources or archeologically sensitive buried landforms. The NJHPO concurred with the District's assessment that this shift will have no impact on historic resources and no further work will be undertaken along the newly proposed alignment (Enclosure 2). The locations for wetland mitigation sites have yet to be identified. Cultural resources studies of the sites will be undertaken.

A Draft Programmatic Agreement (PA) was prepared and is enclosed for your review (Enclosure 3). The District is coordinating this document with the NJHPO, the Delaware Nation and Delaware Tribe of Indians. It will be available for public review through the release of the Draft SEIS and will serve as the District's public outreach.

The PA stipulates the work the District will undertake for areas that have not yet been investigated. In June 2014, a PA for the District's Atlantic Coast of New Jersey Sandy Hook to Barnegat Inlet Beach Erosion Control Project was signed by the District and NJHPO. The PA includes stipulations addressing potential cultural resources impacts with use of the SBBA. The stipulations were developed following surveys of the borrow area conducted in 2014 and include developing buffer zones around potential shipwrecks identified through remote sensing and developing protocols to follow should areas determined sensitive for buried paleo landforms be dredged. These stipulations were incorporated into the Union Beach PA and will be followed when using the SBBA in connection with construction of this project in lieu of the monitoring previously identified in the project's 2003 EIS. It is not anticipated that any historic resources will be impacted in the SBBA with the construction of this project.

We invite you to consult with us on the Union Beach Hurricane Sandy Limited Reevaluation Study and participate in the PA as per 36 CFR Part 800.6. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

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

REPLY TO
ATTENTION OF

October 15, 2014

Environmental Assessment Section
Environmental Analysis Branch

Ms. Tamara Francis-Fourkiller
Delaware Nation
Cultural Preservation Department
P.O. Box 825
Anadarko, OK 73005

Dear Ms. Francis-Fourkiller:

The US Army Corps of Engineers, New York District (District) is preparing a Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) in the Borough of Union Beach, Monmouth County, New Jersey (Enclosure 1). The community has had a history of flooding and was severely impacted by Hurricane Sandy on October 2012. The purpose of the HSLRR is to determine if conditions and plans developed and recommended at the feasibility phase remain viable at this time.

A Phase I cultural resource study identified no historic properties within the Area of Potential Effect (APE) as defined at the time of study. Please find enclosed a CD containing the final report entitled *Phase I Cultural Resource Investigation for the Union Beach Hurricane and Storm Damage Reduction Feasibility Study, Borough of Union Beach, Monmouth County, New Jersey* by Panamerican Consultants, Inc., dated 2001 (Enclosure 2). The Phase I work included deep testing to identify buried paleo-surfaces however no such surfaces were encountered. A subsequent design change was also studied for the presence of cultural resources and no historic properties were identified. The Sea Bright Borrow Area (SBBA) was identified as the source for sand. In the project's 2003 EIS it is indicated that monitoring will be conducted in the SBBA and in the beach renourishment area during construction to identify resources that might be pumped on the beach from the borrow area. Coordination of all cultural resources studies was conducted with the New Jersey Historic Preservation Office (NJHPO).

HSLRR studies have lead to several recommended changes to the feasibility plan. Of those changes only the proposed shift in the alignment to avoid a Coastal Barrier Resources Act zone has the potential to impact cultural resources as all other potential design changes are within the previously studied APE. The proposed alignment shift remains in the low-lying marsh area (Enclosure 3). Previous work, including deep testing, in such environments in the project area did not identify any significant resources or archeologically sensitive buried landforms. The

NJHPO concurred with the District's assessment that this shift will have no impact on historic resources and no further work will be undertaken along the newly proposed alignment (Enclosure 4). Wetland mitigation sites have yet to be identified. Cultural resources studies of the sites will be undertaken

A Draft Programmatic Agreement (PA) was prepared and is being coordinated with the NJHPO and is enclosed for your review (Enclosure 5). The PA stipulates the work the District will undertake for areas that have not yet been investigated. In June 2014, a PA for the New York District's Atlantic Coast of New Jersey Sandy Hook to Barnegat Inlet Beach Erosion Control Project was signed by the District and NJHPO. The PA includes stipulations addressing potential cultural resources impacts with use of the SBBA. The stipulations were developed following surveys of the borrow area conducted in 2014 and include developing buffer zones around potential shipwrecks identified through remote sensing and coming up with protocols to follow should areas determined sensitive for buried paleo landforms be dredged. These stipulations were incorporated into the Union Beach PA and will be followed when using the SBBA in connection with construction of this project in lieu of the monitoring previously identified in the project's 2003 EIS. It is not anticipated that any historic resources will be impacted in the SBBA with the construction of this project

Please review the enclosed documents and provide comments or concerns. If you find the PA acceptable as written and wish to be a signatory, please sign the appropriate page and return the original to my office. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

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

REPLY TO
ATTENTION OF

October 15, 2014

Environmental Assessment Section
Environmental Analysis Branch

Ms. Blair Fink
Delaware Tribe Historic Preservation Representatives
Department of Anthropology
Gladfelter Hall
Temple University
1115 W. Polett Walk
Philadelphia. PA 19122

Dear Ms. Fink:

Thank you for your letter of 18 August 2014 expressing your interest in being a consulting party to the US Army Corps of Engineers, New York District (District) Hurricane Sandy Limited Reevaluation (HSLRR) Study and Supplemental Environmental Impact Statement (SEIS) in the Borough of Union Beach, Monmouth County, New Jersey (Enclosure 1). As requested, please also find enclosed a CD containing the final report entitled *Phase I Cultural Resource Investigation for the Union Beach Hurricane and Storm Damage Reduction Feasibility Study, Borough of Union Beach, Monmouth County, New Jersey* by Panamerican Consultants, Inc., dated 2001 (Enclosure 2).

The Phase I cultural resource study identified no historic properties within the Area of Potential Effect (APE) as defined at the time of study. The work included deep testing to identify buried paleo-surfaces however no such surfaces were encountered. A subsequent design change was also studied for the presence of cultural resources and no historic properties were identified. The Sea Bright Borrow Area (SBBA) was identified as the source for sand. In the project's 2003 EIS it is indicated that monitoring will be conducted in the SBBA and in the beach renourishment area during construction to identify resources that might be pumped on the beach from the borrow area. Coordination of all cultural resources studies was conducted with the New Jersey Historic Preservation Office (NJHPO).

HSLRR studies have lead to several recommended changes to the feasibility plan. Of those changes only the proposed shift in the alignment to avoid a Coastal Barrier Resources Act zone has the potential to impact cultural resources as all other potential design changes are within the previously studied APE. The proposed alignment shift remains in the low-lying marsh area (Enclosure 3). Previous work, including deep testing, in such environments in the project area did not identify any significant resources or archeologically sensitive buried landforms. The

NJHPO concurred with the District's assessment that this shift will have no impact on historic resources and no further work will be undertaken along the newly proposed alignment (Enclosure 4). Wetland mitigation sites have yet to be identified. Cultural resources studies of the sites will be undertaken

A Draft Programmatic Agreement (PA) was prepared and is being coordinated with the NJHPO and is enclosed for your review (Enclosure 5). The PA stipulates the work the District will undertake for areas that have not previously been investigated. In June 2014, a PA for the District's Atlantic Coast of New Jersey Sandy Hook to Barnegat Inlet Beach Erosion Control Project was signed by the District and NJHPO. The PA includes stipulations addressing potential cultural resources impacts with use of the SBBA. The stipulations were developed following surveys of the borrow area conducted in 2014 and include developing buffer zones around potential shipwrecks identified through remote sensing and coming up with protocols to follow should areas determined sensitive for buried paleo landforms be dredged. These stipulations were incorporated into the Union Beach PA and will be followed when using the SBBA in connection with construction of this project in lieu of the monitoring previously identified in the project's 2003 EIS. It is not anticipated that any historic resources will be impacted in the SBBA with the construction of this project

Please review the enclosed documents and provide comments or concerns. If you find the PA acceptable as written and wish to be a signatory, please sign the appropriate page and return the original to my office. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

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

REPLY TO
ATTENTION OF

October 15 , 2014

Environmental Assessment Section
Environmental Analysis Branch

Mr. Daniel Saunders
Deputy State Historic Preservation Officer
State of New Jersey Department of Environmental Protection
Historic Preservation Office
PO Box420
Trenton, NJ 08625-0420

Dear Mr. Saunders:

The US Army Corps of Engineers, New York District (District) is preparing a Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) in the Borough of Union Beach, Monmouth County, New Jersey (Enclosure 1). The community has had a history of flooding and was severely impacted by Hurricane Sandy on October 2012. The purpose of the HSLRR is to determine if conditions and plans developed and recommended at the feasibility phase remain viable at this time.

As recently coordinated with your office the HSLRR studies have lead to several recommended changes to the feasibility plan. Of those changes only the proposed shift in the alignment to avoid a Coastal Barrier Resources Act zone has the potential to impact cultural resources as all other potential design changes are within the previously studied APE. Your office concurred with the District's assessment that this shift will have no impact on historic resources and no further work will be undertaken along the newly proposed alignment (Enclosure 2). The locations of wetland mitigation sites have yet to be identified. Cultural resources studies of the sites will be undertaken and all work coordinated with your office. Any refinements to design developed during the Project Engineering and Design phase of the project will be subject to a cultural resources evaluation. A Draft Programmatic Agreement (PA) was prepared and is enclosed for your review (Enclosure 3). The PA stipulates the work the New York District will undertake for areas that have not yet been investigated. The District is coordinating this document with the Advisory Council on Historic Preservation, the Delaware Nation and Delaware Tribe of Indians. It will be available for public review through the release of the Draft SEIS and will serve as the District's public outreach.

The source of sand for this project is the Sea Bright Borrow Area (SBBA). In June 2014, your office entered into a PA for the District's Atlantic Coast of New Jersey Sandy Hook to Barnegat Inlet Beach Erosion Control Project. The PA included stipulations addressing potential cultural resources impacts with use of the SBBA. The stipulations were developed following surveys of the borrow area conducted in 2014 and include developing buffer zones around potential shipwrecks identified through remote sensing and developing protocols to follow should areas determined sensitive for buried paleo landforms be dredged. These stipulations were incorporated into the Union Beach PA although it is not anticipated that any historic resources will be impacted in the SBBA with the construction of this project.

Please review the enclosed documents and provide Section 106 comments, pursuant to 36 CFR 800.5. If you find the PA acceptable as written, please sign the appropriate page and return the original to my office. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

Pete Weppler

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

CC:
Monmouth County Parks, Gail Hunton

Delaware Tribe Historic Preservation Representatives
Department of Anthropology
Gladfelter Hall
Temple University
1115 W. Polett Walk
Philadelphia, PA 19122
temple@delawaretribe.org

November 11, 2014

Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
Attn: Lynn Rakos
26 Federal Plaza,
New York, NY 10278

Re: Union Beach Hurricane Sandy Limited Reevaluation Study and Supplemental Environmental Impact Statement

Dear Lynn Rakos,

Thank you for notifying the Delaware Tribe of the plans for the above referenced project. Our review indicates that there are no religious or culturally significant sites within the selected project area, and we have no objection to the proposed project. We defer further comment to your office.

We ask that if any archaeological remains (artifacts, subsurface features, etc.) are discovered during the construction process that construction be halted until an archaeologist can view and assess the finds. Furthermore, we ask that if any human remains are accidentally unearthed during the course of the project that you cease development immediately and inform the Delaware Tribe of Indians of the inadvertent discovery. If you have any questions, feel free to contact this office by phone at (609) 220-1047 or by e-mail at temple@delawaretribe.org.

Sincerely,

Blair Fink

Blair Fink
Delaware Tribe Historic Preservation Representatives
Department of Anthropology
Gladfelter Hall
Temple University
1115 W. Polett Walk
Philadelphia, PA 19122

December 5, 2014

Mr. Peter Weppler
Chief, Environmental Analysis Branch
U.S. Army Corps of Engineers - Planning
26 Federal Plaza - Room 2151
New York, NY 10278-0090

Ref: Proposed Union Beach Coastal Storm Risk Management Project
Borough of Union Beach, Monmouth County, New Jersey

Dear Mr. Weppler:

On November 3, 2014, the Advisory Council on Historic Preservation (ACHP) received your notification and supporting documentation regarding the development of a programmatic agreement to address the potential adverse effects for the referenced project. Based upon the information you provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, of our regulations, "Protection of Historic Properties" (36 CFR Part 800), does not apply to this undertaking. Accordingly, we do not believe that our participation in the consultation to resolve adverse effects is needed. However, if we receive a request for participation from the State Historic Preservation Officer, Tribal Historic Preservation Officer, affected Indian tribe, a consulting party, or other party, we may reconsider this decision. Additionally, should circumstances change, and you determine that our participation is needed to conclude the consultation process, please notify us.

Pursuant to 36 CFR §800.6(b)(1)(iv), you will need to file the final programmatic agreement (PA), developed in consultation with the New Jersey State Historic Preservation Office (SHPO) and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the PA and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

If you have any questions or require further assistance, please contact Brian Lusher at 202-517-0221, or via email at blusher@achp.gov.

Sincerely,

Raymond V. Wallace

Raymond V. Wallace
Historic Preservation Technician
Office of Federal Agency Programs

The Delaware Nation
Cultural Preservation Office
P.O. Box 825 - 31064 State Highway 281- Anadarko, OK 73005
Phone: 405/247-2448 – Fax: 405/247-8905

NAGPRA ext. 1403
Section 106 ext. 1181
Museum ext. 1181
Library ext. 1196
Clerk ext. 1182

December 12, 2014

RE: US Army Corps of Engineers, New York District is preparing a Hurricane Sandy Limited Reevaluation Report and Supplemental Environmental Impact Statement in the Borough of Union Beach, Monmouth County, NJ

Ms. Rakos,

The Delaware Nation Cultural Preservation Department received correspondence regarding the above referenced project. Our office is committed to protecting sites important to tribal heritage, culture and religion. Furthermore, the tribe is particularly concerned with archaeological sites that may contain human burials or remains, and associated funerary objects.

As described in your correspondence and upon research of our database(s) and files, we find that the Lenape people occupied this area either prehistorically or historically. However, the location of the project does not endanger cultural or religious sites of interest to the Delaware Nation. Please continue with the project as planned. However, should this project inadvertently uncover an archaeological site or object(s), we request that you halt all construction and ground disturbance activities and immediately contact the appropriate state agencies, as well as our office (within 24 hours).

Please Note the Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge Munsee Band of Mohican Indians are the only Federally Recognized Delaware/Lenape entities in the United States and consultation must be made only with designated staff of these three tribes. We appreciate your cooperation in contacting the Delaware Nation Cultural Preservation Office to conduct proper Section 106 consultation. Should you have any questions regarding this email or future consultation feel free to contact our offices at 405-247-2448 or by email nalligood@delawarenation.com.

Sincerely,

Nekole Alligood

Nekole Alligood
Director

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

REPLY TO
ATTENTION OF

September 12, 2016

Environmental Assessment Section
Environmental Analysis Branch

Ms. Katherine J. Marcopul
Deputy State Historic Preservation Officer
State of New Jersey Department of Environmental Protection
Historic Preservation Office
PO Box420
Trenton, NJ 08625-0420

Dears. Ms. Marcopul:

The US Army Corps of Engineers, New York District (District) is preparing a Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) for Coastal Storm Risk Management in the Borough of Union Beach, Monmouth County, New Jersey (Figure 1; HPO 14-3633). The HSLRR study has led to several recommended changes to the feasibility plan. As previously coordinated with your office the original alignment and the proposed changes are not anticipated to impact historic resources. Wetland mitigation sites have yet to be identified so a Programmatic Agreement (PA) was drafted to address the need for study of such sites once proposed. The source of sand for this project is the Sea Bright Borrow Area (SBBA). The SBBA is covered under the signed PA for the District's Atlantic Coast of New Jersey Sandy Hook to Barnegat Inlet Beach Erosion Control Project and relevant stipulations were incorporated into the Union Beach Draft PA. The Draft Union Beach PA was reviewed by your staff and the enclosed Revised Draft PA addresses the one comment received from your office (Enclosure 1). The revised document also includes minor format changes and updates to signatories following leadership changes in both our offices. All modifications are highlighted in the enclosed document. The District coordinated the Draft PA with the Advisory Council on Historic Preservation, the Delaware Nation and Delaware Tribe of Indians and all have declined to be signatories to the agreement (Enclosure 2).

Recently, further refinements to the alignment have been proposed to avoid the Coastal Barrier Resource System (CBRS) as delineated in 2016. These proposed realignments are on higher ground that may prove sensitive for archaeological resources (Figure 2). The enclosed Revised Draft PA reflects the need for testing these areas.

As a result of CBRS alignment modifications a section of floodwall is now proposed to run adjacent to the west side of Florence Avenue between Broadway and St. John's Avenue (See Figure 2, Area 1). This location is across the street from two properties identified in the Monmouth County Historic Sites Inventory. These properties, car barns and a power house, are associated with the Jersey Central Traction Company which operated from the turn of the 20th-century until 1923. The power house was later used to supply electricity to the area and the car barn once housed the borough hall. Using "Google Earth" it appears that the car barns still stand but it not clear if the powerhouse is extant. The structures will not be directly impacted the project. The setting as it is today does not convey a sense of the buildings' purpose as all evidence of the former trolley line is gone. A floodwall across the street will not impact the setting of the structures (Figure 3). It is the District's opinion that a floodwall built across the street from Jersey Central Traction Company buildings will have no effect on the resources.

A potential historic resource not addressed in the project's cultural resources survey reports or previous correspondence between our offices is the former Belford to Keyport extension of the New York and Atlantic Highlands Railroad. The right-of-way is now the Henry Hudson Trail, a paved bikeway in the Monmouth County Park system. The rail line was constructed sometime after 1889 to provide access to the already developing communities along the Raritan Bay shore. It is the District's opinion that this late and relatively minor addition to the northern Monmouth County railroad network, now a paved bike path, is not eligible for the National Register of Historic Places.

The Revised Draft PA is enclosed for your review (see Enclosure 1). The PA stipulates the work the District will undertake for areas that have not yet been investigated. The document will be made available for public review through the release of the Draft SEIS and will serve as the District's public outreach. Please review the enclosed documents and provide Section 106 comments, pursuant to 36 CFR 800.5. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

CC:
Delaware Nation
Delaware Tribe of Indians
Monmouth County Parks, Gail Hunton

Figure 1. Project Area Location

Figure 2: Alignment modifications following 2016 delineation of the Coastal Barrier Resources System.

Figure 3: View looking north north-east, along Florence Avenue from its intersection with Broadway. The Jersey Central Traction Company car barn is visible at the center right of image. A flood wall is proposed to run along the west (left in this view) side of Florence Avenue. Source: Google Earth, accessed 6 Sept 2016.

REVISED DRAFT PROGRAMMATIC AGREEMENT
AMONG
THE U. S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
AND
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICE
REGARDING
THE UNION BEACH
COASTAL STORM RISK MANAGEMENT PROJECT
BOROUGH OF UNION BEACH
MONMOUTH COUNTY, NEW JERSEY

WHEREAS, the U.S. Army Corps of Engineers, New York District, (New York District) was authorized to conduct a feasibility study for the Raritan Bay and Sandy Hook Bay by a resolution of the Committee of Public Works and Transportation of the U.S. House of Representatives adopted 1 August 1990; and

WHEREAS, the feasibility study for the Union Beach section of the Raritan Bay and Sandy Hook Bay recommended a plan consisting of levees, floodwalls and road raising, tide gates, interior drainage, pump stations, terminal groins, sandy beach and dune construction, utilizing the offshore Sea Bright Borrow Area (SBBA) as the source for sand (Appendix A, Figures 1, 2 and 3); and

WHEREAS, the New York District was authorized to construct the Union Beach section by the Water Resources Development Act of 2007 (Public Law 110-114) on November 8, 2007, but received no appropriations for construction so the project was not constructed; and

WHEREAS, in response to extensive storm damages resulting from Hurricane Sandy (October 2012) and an increased vulnerability to future events, Congress passed the Disaster Relief Appropriations Act of 2013 (P.L. 113-2). The Union Beach section was identified to Congress as authorized but unconstructed and therefore the proposed work in this reach is being funded under P.L. 113-2; and

WHEREAS, the authorized project and existing conditions have been reviewed under the Hurricane Sandy Limited Re-evaluation Report (HSLRR) and draft Supplemental Environmental Impact Statement (SEIS) for the Union Beach Coastal Storm Risk Management Project to confirm that the authorized project is still the most suitable design (the Undertaking); and

~~WHEREAS, the HSLRR study lead to several modifications to project features, none of which were determined to potentially effect historic properties; and~~

WHEREAS, the New York District has defined the "Area of Potential Effect" (APE) for this Undertaking to consist of the footprints and associated work areas for proposed levees, floodwalls and road raising, tide gates, interior drainage, pump stations, terminal groins, sandy beach, wetland and other mitigation sites, and the SBBA; and

~~WHEREAS, wetland mitigation sites have yet to be identified; and~~

WHEREAS, the New York District conducted a Phase I cultural resources survey of the onshore APE as defined at the time of the feasibility study, included testing for deeply buried deposits, and no properties listed on or eligible for the National Register of Historic Places (NRHP) were identified (see Appendix A, Figure 2); and

WHEREAS, the HSLRR study lead to several modifications to project features; the proposed realignment of the Undertaking following the 2016 delineation of the Coastal Barrier Resource System may effect historic properties (Appendix A, Figure 4); and

WHEREAS, wetland mitigation sites have yet to be identified; and

WHEREAS, potential impacts to cultural resources associated with use of the SBBA are addressed through stipulations contained in the Programmatic Agreement (PA) for the New York District's Atlantic Coast of New Jersey (ACNJ) Sandy Hook to Barnegat Inlet Beach Erosion Control Project signed in June 2014 and relevant stipulations therein are incorporated into this document; and

~~WHEREAS, renourishment contracts will be awarded when Federal and non-Federal funding is available for the remaining duration of the authorization; and~~

~~WHEREAS, the New York District shall implement the provisions of this PA as funding for the Undertaking is appropriated in future years; and~~

WHEREAS, the New Jersey Historic Preservation Office (NJHPO) has been provided all survey reports for review; and

WHEREAS, the New York District shall implement the provisions of this PA as funding for the Undertaking is appropriated in future years; and

WHEREAS, the Advisory Council on Historic Preservation (Council), the Delaware Nation and the Delaware Tribe of Indians have been invited to participate in this PA and have declined to be signatories to this document; and

WHEREAS, The New York District provided public review of the PA as part of the SEIS for the Undertaking under the National Environmental Policy Act (NEPA) which will serve as partial fulfillment of the New York District's Section 106 public coordination and shall conduct additional public outreach through the local community; and

NOW, THEREFORE, the New York District and the NJHPO agree that the Undertaking shall be administered in accordance with the following stipulations to satisfy the New

York District's Section 106 responsibility for all individual undertakings of the Undertaking.

Stipulations

The New York District shall ensure that the following measures are carried out:

I. IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES OF WETLAND MITIGATION SITE(S) ~~APE~~AND ALIGNMENT CHANGES

A. The New York District shall ensure that alignment changes and ~~when a~~ wetland mitigation site(s) ~~is identified it~~ will be subject to a cultural resources assessment to identify historic properties and consider project effects on any identified properties.

1. The New York District shall ensure that archaeological surveys, if required, are conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and the New Jersey Historic Preservation Office's (HPO) Guidelines for Phase I Archaeological Investigations: Identification of Archaeological Resources (January 17, 1996).

2. The New York District, in consultation with the NJHPO, shall evaluate the eligibility of any resource encountered using the NRHP Criteria. The New York District will coordinate its determination(s) with the Council, Delaware Nation and the Delaware Tribe of Indians.

3. The New York District shall maintain records of all decisions it makes related to the NRHP eligibility of properties.

B. If historic properties are identified, the New York District shall apply the criteria of adverse effect to the historic properties within the APE and take into account the views of the NJHPO, the Council, Delaware Nation and the Delaware Tribe of Indians.

C. Any objections to a determination of eligibility or the application of adverse effect criteria will be resolved in accordance with Section VII.B, below.

II. SEA BRIGHT BORROW AREA (SBBA):

The New York District will implement the same stipulations addressing work in the SBBA that were developed for the New York District's ACNJ Sandy Hook to Barnegat Inlet Beach Erosion Control Project PA signed in June 2014. The stipulations are as follows:

A. Geomorphology and Native American Site Potential

1. Areas determined sensitive for paleo landforms will be avoided as practicable. If avoidance is not feasible the New York District shall implement a program to monitor the material from these areas that is collected in the UXO screens.

2. Protocol for the monitoring program will be developed in coordination with NJHPO. A brief report will generated after each effort which shall be coordinated with NJHPO and other interested parties.

3. The protocol shall include measures the Corps will undertake should artifacts be encountered.

4. No further regular monitoring of dredged material will be carried out. However, the project archaeologist will educate the UXO specialists at the beginning of each renourishment cycle on the types of archaeological materials that could be encountered so that they will be more likely to identify these materials when or if they are pumped onto the beach. Early detection could allow the archaeologist time to halt the pumping operation, inspect the material, and consult with the NJHPO to make a determination for monitoring or for moving the dredge operation elsewhere.

B. Shipwrecks

1. The New York District shall designate a buffer zone of 250 feet around each potential shipwreck identified through remote sensing surveys conducted for the ACNJ project. Buffer zone(s) shall be clearly delineated on construction plans. No construction activities that could potentially impact the wrecks will occur within the designated zones.

2. If it is determined that a buffer zone cannot be employed in an area as sand from that location is critical for the Undertaking, the District will conduct further study to determine if a target is a cultural resource and evaluate its NRHP eligibility. If determined eligible the District shall consult with the NJHPO to develop treatment plans.

3. Should new borrow areas outside the surveyed area of the SBBA be required the proposed locations shall be surveyed for historic resources employing the survey standards of the time and shall be coordinated with NJHPO and other interested parties.

III. PUBLIC INVOLVEMENT and OUTREACH

A. The New York District shall inform the interested public of the existence of this PA and the New York District plan for meeting the terms of this PA. Copies of this PA and relevant documentation prepared pursuant to the terms of this PA shall be made available for public inspection (information regarding the locations of archaeological sites will be withheld in accordance with the Freedom of Information Act and National Register Bulletin 29, if it appears that this information could jeopardize archaeological sites). Any comments received from the public under this PA shall be taken into account by the New York District.

B. Public Objections. The New York District shall review and resolve timely substantive public objections. Public objections shall be considered timely when they are provided within the review periods specified in Section VII (A) of this PA. The New York District shall consult with the NJHPO, and as appropriate with the Council, to resolve objections. Study actions which are not the subject of the objection may proceed while the consultation is conducted.

IV. UNANTICIPATED DISCOVERY

A. If previously unidentified and unanticipated properties are discovered during the Undertaking implementation, the New York District shall cease all work in the vicinity of the discovered historic property until it can be evaluated. If the property is determined to be eligible, the New York District shall consult with the NJHPO to develop a treatment plan.

B. The New York District shall implement the treatment plan once approved by NJHPO.

V. HUMAN REMAINS

If any human remains and/or grave-associated artifacts are encountered during data recovery, the New York District, the NJHPO, the Council, the Delaware Nation and the Delaware Tribe of Indians, shall consult to develop a treatment plan for human remains that is responsive to the Council's "Policy Statement on Human Remains" (September 27, 1988), the Native American Grave Protection and Repatriation Act (PL 101-601) and, U.S. Army Corps of Engineers, Policy Guidance Letter No. 57, (1998) Indian Sovereignty and Government-to-Government Relations With Indian Tribes.

VI. PROFESSIONAL QUALIFICATIONS

The New York District shall ensure that qualified professionals meeting the National Park Service professional qualifications for the appropriate discipline [National Park Service Professional Qualification Standards, Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44738-39)] are used to complete all identification and evaluation plans related to this undertaking, to include archaeological surveys and testing, historic structure inventories, and documentation.

VII. ADMINISTRATIVE TERMS

A. REVIEW PERIODS

The New York District shall ensure that all draft and final reports resulting from actions pursuant to this PA will be provided, to the NJHPO, Council, the Delaware Nation, the Delaware Tribe of Indians, and upon request, to other interested parties.

The NJHPO, Council, the Delaware Nation, the Delaware Tribe of Indians and any other interested party shall have 30 days to review and/or object to determinations, evaluations, plans, reports, and other documents submitted to them by the New York District.

B. DISPUTE RESOLUTION

1. The New York District and the signatories shall attempt to resolve any disagreement arising from implementation of this PA. If there is a determination that the disagreement cannot be resolved, the New York District shall request the Council`s recommendations or request the comments of the Council in accordance with 36 CFR Part 800.4(d)(1)(iv)(A) through 36 CFR Part 800.4(d)(1)(iv)(C) and/or 36 CFR Part 800.7(c), depending upon the nature of the disagreement or dispute.

2. Any Council recommendations or comments provided in response will be considered in accordance with 36 CFR Part 800.4(d)(1)(iv)(A) through 36 CFR Part 800.4(d)(1)(iv)(C) and/or 36 CFR Part 800.7(c), with reference only to the subject of the dispute. The New York District shall respond to Council recommendations or comments indicating how the New York District has taken the Council's recommendations or comments into account and complied with same prior to proceeding with Undertaking activities that are subject to dispute. Responsibility to carry out all other actions under this PA that are not the subject of the dispute will remain unchanged.

C. TERMINATION

Any signatory to this PA may terminate it by providing a thirty day notice to the signatories, provided that the signatories will consult during the period prior to termination by certified mail to seek agreement on amendments or other actions that would avoid termination. In the event of termination, the New York District will comply with 36 CFR Parts 800.4 through 800.6 with regard to individual undertakings covered by this PA.

D. SUNSET CLAUSE.

This PA will continue in full force and effect until the construction of the Undertaking is complete and all terms of this PA are met, unless the Undertaking is terminated or authorization is rescinded or a period of five (5) years from execution of the PA has passed at which time the agreement may be extended as written provided all signatories concur.

E. AMENDMENT

This PA may be amended upon agreement in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the Council.

F. ANTI-DEFICIENCY ACT

All requirements set forth in this PA requiring expenditure of funds by the New York District are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. 1341). No obligation undertaken by the New York District under the terms of this PA shall require or be interpreted to require a commitment to extend funds not appropriated for a particular purpose. If the New York District cannot perform any obligation set forth in this PA because of unavailability of funds, that obligation must be renegotiated among the New York District and the signatories as necessary.

Execution and implementation of this PA evidences that the New York District has satisfied its Section 106 responsibilities for all individual undertakings of the Undertaking, and that the New York District has afforded the NJHPO, Council, the Delaware Nation and the Delaware Tribe of Indians an opportunity to comment on the undertaking and its effects on historic properties.

U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT

By: ______________________________ Date: ________________
~~Col. Paul E. Owen, P.E.~~David A. Caldwell
Colonel, U.S. Army
Commander
~~District Engineer, New York District~~

NEW JERSEY STATE HISTORIC PRESERVATION OFFICE

By: ______________________________ Date: ________________
~~Daniel D. Saunders~~Katherine J. Marcopul, Deputy State Historic Preservation Officer

Appendix A

Maps and Plans

Figure 1. Project Area Location

Figure 2: Overview of Authorized Project Alignment;
White = Levees or Floodwalls
Light Blue = Beach and Dune

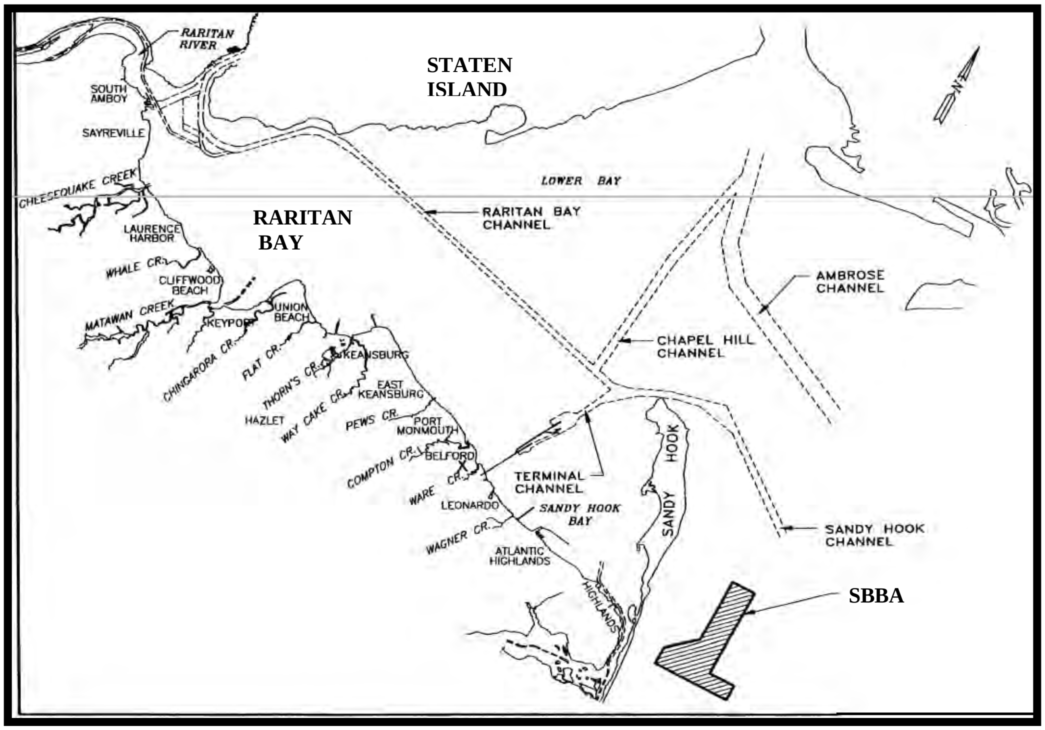


Figure 3: Location of the Sea Bright Borrow Area (SBBA).

Figure 4: Proposed Changes in Alignment to Avoid Coastal Barrier Resource System.

State of New Jersey
MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
P.O. Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

January 10, 2017

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

RE: Monmouth County, Union Beach Borough
Programmatic Agreement
Coastal Storm Risk Management Project
United States Department of the Army, Corps of Engineers

Dear Ms. Weppler:

I have signed the attached Programmatic Agreement and am returning it to you as requested. . Thank you for your efforts to complete the Section 106 review process.

If you have any questions, please do not hesitate to contact Jesse West-Rosenthal of my staff at (609) 984-6019 with any questions regarding archaeology. Please reference the HPO project number 14-3633, in any future calls, emails, or written correspondence to help expedite your review and response.

Sincerely,

Katherine J. Marcopul

Katherine J. Marcopul
Deputy State Historic
Preservation Officer

Cc: Lynn Rakos, USACE

[attachment]

KJM/MMB/JWR

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

REPLY TO
ATTENTION OF

26 May 2017

Environmental Assessment Section
Environmental Analysis Branch

Ms. Katherine J. Marcopul
Deputy State Historic Preservation Officer
State of New Jersey Department of Environmental Protection
Historic Preservation Office
PO Box420
Trenton, NJ 08625-0420

Dears. Ms. Marcopul:

The US Army Corps of Engineers, New York District (District) is finalizing the Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) for Coastal Storm Risk Management in the Borough of Union Beach, Monmouth County, New Jersey (HPO 14-3633). Enclosed is a copy of the executed Programmatic Agreement (PA) developed to address the need for further study and mitigation as the project proceeds.

Signed copies of the PA will be provided to the Advisory Council on Historic Preservation and federally recognized tribes. Thank you for your assistance in the Section 106 process. We look forward to working with you as we implement the stipulations of the PA. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629.

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

26 May 2017

Environmental Assessment Section
Environmental Analysis Branch

Mr. Reid Nelson, Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001-2637

Dear Mr. Nelson:

The US Army Corps of Engineers, New York District (District) is finalizing the Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) for Coastal Storm Risk Management in the Borough of Union Beach, Monmouth County, New Jersey. Your office reviewed the draft Programmatic Agreement for this project (Enclosure 1). The PA was subsequently revised based on modifications to project plans. The draft PA was coordinated with Federally Recognized Tribes who did not wish to participate in the agreement but requested being informed should any Native American resources be encountered as the project proceeds. The revised draft PA was made available for public review in the Draft Environmental Assessment which served as the USACE's Section 106 public coordination. No comments were received regarding the cultural resources component of the project or the PA.

A copy of the executed PA is enclosed for your files (Enclosure 2). Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629.

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

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

REPLY TO ATTENTION OF

26 May 2017

Environmental Assessment Section
Environmental Analysis Branch

Ms. Kim Penrod
Director
Delaware Nation
Cultural Resources
P.O. Box 825
Anadarko, OK 73005

Dear Ms. Penrod:

The US Army Corps of Engineers, New York District (District) is finalizing the Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) for Coastal Storm Risk Management in the Borough of Union Beach, Monmouth County, New Jersey. Your office reviewed the draft Programmatic Agreement for this project (Enclosure 1). The PA was subsequently revised based on modifications to project plans. The revised draft PA was made available for public review in the Draft Environmental Assessment which served as the USACE's Section 106 public coordination. No comments were received regarding the cultural resources component of the project or the PA.

A copy of the executed PA is enclosed for your files (Enclosure 2). We will inform you should we encounter any archaeological resources as the project proceeds. Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

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

REPLY TO
ATTENTION OF

26 May 2017

Environmental Assessment Section
Environmental Analysis Branch

Mr. Chester Brooks
Chief
Delaware Tribe
5100 Tuxedo Blvd.
Bartlesville, OK 74006

Dear Mr. Brooks:

The US Army Corps of Engineers, New York District (District) is finalizing the Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) for Coastal Storm Risk Management in the Borough of Union Beach, Monmouth County, New Jersey. Your office reviewed the draft Programmatic Agreement for this project (Enclosure 1). The PA was subsequently revised based on modifications to project plans. The revised draft PA was made available for public review in the Draft Environmental Assessment which served as the USACE's Section 106 public coordination. No comments were received regarding the cultural resources component of the project or the PA.

A copy of the executed PA is enclosed for your files (Enclosure 2). We will inform you should we encounter any archaeological resources as the project proceeds. Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

From:	Rakos, Lynn CIV USARMY CENAN (US)
To:	"Eastern Historic Preservation"
Subject:	Signed PA Union Beach, NJ
Date:	Friday, May 26, 2017 11:04:00 AM
Attachments:	Union Beach Signed PA.pdf Delaware Tribe signed PA.pdf

Hello Susan,

Attached please find attached the signed Programmatic Agreement for the New York District's Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) for Coastal Storm Risk Management in the Borough of Union Beach, Monmouth County, New Jersey. Also attached is a letter submitting a hard copy of the PA to your Chief, Chester Brooks.

If you have any questions or concerns please contact me.
Many thanks and happy weekend,
Lynn

Lynn Rakos
Project Archaeologist
(917) 790-8629

State of New Jersey
MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
P.O. Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

October 20, 2016

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

RE: Monmouth County, Union Beach Borough
Union Beach Coastal Storm Risk Management Project
United States Department of the Army, Corps of Engineers
Programmatic Agreement

Dear Mr. Weppler:

Thank you for providing the Historic Preservation Office (HPO) the opportunity to review and comment on the revised programmatic agreement for the Union Beach Coastal Storm Risk Management Project. The HPO has reviewed the agreement document and finds it acceptable and believes is it ready for signature. The HPO looks forward to receiving the document for execution of the agreement.

Thank you for providing the opportunity to review and comment on the potential for the above-referenced project to affect historic properties. If you have any questions, please do not hesitate to contact Jesse West-Rosenthal of my staff at (609) 984-6019 with any questions regarding archaeology. Please reference the HPO project number 14-3633, in any future calls, emails, or written correspondence to help expedite your review and response.

Sincerely,

Katherine J. Marcopul

Katherine J. Marcopul
Deputy State Historic
Preservation Officer

Cc: Lynn Rakos – USACE
KJM/MMB/JWR

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

REPLY TO
ATTENTION OF

6 December 2016

Environmental Assessment Section
Environmental Analysis Branch

Ms. Katherine J. Marcopul
Deputy State Historic Preservation Officer
State of New Jersey Department of Environmental Protection
Historic Preservation Office
PO Box420
Trenton, NJ 08625-0420

Dears. Ms. Marcopul:

The US Army Corps of Engineers, New York District (District) is finalizing the Hurricane Sandy Limited Reevaluation Report (HSLRR) and Supplemental Environmental Impact Statement (SEIS) for Coastal Storm Risk Management in the Borough of Union Beach, Monmouth County, New Jersey (HPO 14-3633). Your office reviewed both the draft and revised draft Programmatic Agreement for this project (Enclosure 1). Your comment has been incorporated into the enclosed final PA (Enclosure 2).

Please review the enclosed agreement. If you concur with its stipulations, please sign and date PA and return the original to the Corps. A copy of the signed document will be provided to your office and to the Advisory Council on Historic Preservation. If you have questions or would like to receive further information please contact Ms. Rakos at (917) 790-8629 or by email at lynn.rakos@usace.army.mil.

Sincerely,

Peter M. Weppler
Chief, Environmental Analysis Branch

Enclosures

CC (w/ Enclosures)
Delaware Nation
Delaware Tribe of Indians
Monmouth County Parks, Gail Hunton

APPENDIX D

CLEAN AIR ACT CONFORMITY
RECORD OF NON-APPLICABILITY

RECORD OF NON-APPLICABILITY (RONA)

Project Name: Raritan Bay and Sandy Hook Bay, New Jersey Hurricane Sandy Limited Reevaluation Report for Coastal Storm Risk Management

Union Beach, New Jersey

Project/Action Point of Contact: Matthew Voisine (matthew.voisine@usace.army.mil)

Activity Estimate: Equipment for ABU Sandy 9-16-13.xlsx, Steve Weinberg via email, 16 September 2013

Begin Date: November 2018

End Date: February 2019

1. The project described above has been evaluated for Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40CFR§93 Subpart B).

2. The project is located in Monmouth County, New Jersey, which has the following nonattainment-related designations with respect to the National Ambient Air Quality Standards (40CFR§81.133; as of September 30, 2016): 'Moderate' Nonattainment 2008 8-hour Ozone Standard (primary and secondary) and 'Maintenance' for 2006 $PM_{2.5}$ Standard.

3. The requirements of this rule do not apply because the total direct and indirect emissions from this project are significantly less than the 100 tons trigger levels for NO_x, $PM_{2.5}$, and SO_2 for each project year and significantly below the 50 tons trigger level for VOC (40CFR§93.153(b)(1) & (2)), as VOCs, SO_2, and $PM_{2.5}$ are typically a fraction of total NOx emissions. The estimated emissions for the project for each pollutant are provided below.

	Estimated Emissions, tons per year		
Pollutant	**2018**	**2019**	**2020**
NO_x	91.4	91.4	0.0
VOC	3.4	3.4	0.0
$PM_{2.5}$	4.7	4.7	0.0
SO_2	0.1	0.1	0.0
CO	11.9	11.9	0.0

4. The project conforms with the General Conformity requirements (40CFR§93.153(c)(1)) and is exempted from the requirements of 40 CFR §93 Subpart B.

Sincerely,

Peter Weppler
Chief, Environmental Analysis Branch

Emissions have been estimated using project planning information developed by the New York District, consisting of anticipated equipment types and estimates of the horsepower and operating hours of the diesel engines powering the equipment. In addition to this planning information, conservative factors have been used to represent the average level of engine load of operating engines (load factors) and the average emissions of typical engines used to power the equipment (emission factors). The basic emission estimating equation is the following:

$$E = hrs \times LF \times EF$$

Where:

E = Emissions per period of time such as a year or the entire project.
hrs = Number of operating hours in the period of time (e.g., hours per year, hours per project).
LF = Load factor, an estimate of the average percentage of full load an engine is run at in its usual operating mode.
EF = Emission factor, an estimate of the amount of a pollutant (such as NO_x) that an engine emits while performing a defined amount of work.

In these estimates, the emission factors are in units of grams of pollutant per horsepower hour (g/hphr). For each piece of equipment, the number of horsepower hours (hphr) is calculated by multiplying the engine's horsepower by the load factor assigned to the type of equipment and the number of hours that piece of equipment is anticipated to work during the year or during the project. For example, a crane with a 250-horsepower engine would have a load factor of 0.43 (meaning on average the crane's engine operates at 43% of its maximum rated power output). If the crane were anticipated to operate 1,000 hours during the course of the project, the horsepower hours would be calculated by:

$$250 \text{ horsepower} \times 0.43 \times 1{,}000 \text{ hours} = 107{,}500 \text{ hphr}$$

The emissions from diesel engines vary with the age of an engine and, most importantly, with when it was built. Newer engines of a given size and function typically emit lower levels of pollutants than older engines. The NO_x emission factors used in these calculations assume that the equipment pre-dates most emission control requirements (known as Tier 0 engines in most cases), to provide a reasonable "upper bound" to the emission estimates. If newer engines are actually used in the work, then emissions will be lower than estimated for the same amount of work. In the example of the crane engine, a NO_x emission factor of 9.5 g/hphr would be used to estimate emissions from this crane on the project by the following equation:

$$\frac{107{,}500 \text{ hphr} \times 9.5 \text{ g } NO_x/\text{hphr}}{453.59 \text{ g/lb} \times 2{,}000 \text{ lbs/ton}} = 1.1 \text{ tons of } NO_x$$

As noted above, information on the equipment types, horsepower, and hours of operation associated with the project have been obtained from the project's plans and represent current best estimates of the equipment and work that will be required. Load factors have been obtained from various sources depending on the type of equipment. Marine engine load factors are primarily from a document associated with the New York and New Jersey Harbor Deepening Project (HDP): "Marine and Land-Based Mobile Source Emission Estimates for the Consolidated Schedule of 50-Foot Deepening Project, January 2004," and from EPA's 1998 Regulatory Impact Analysis (RIA): "EPA Regulatory Impact Analysis: Control of Commercial Marine Vessels." Land-side nonroad equipment load factors are from the documentation for EPA's NONROAD emission estimating model, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA420-P-04-005, April 2004."

Emission factors have also been sourced from a variety of documents and other sources depending on engine type and pollutant. The NO_x emission factors for marine engines have been developed primarily from EPA documentation for the Category 1 and 2 standards (RIA, "Control of Emission from Marine Engines, November 1999) and are consistent with emission factors used in documenting emissions from the HDP, while the VOC emission factors for marine engines are from the Port Authority of New York and New Jersey's "2010 Multi-Facility Emissions Inventory" which represent the range of marine engines operating in the New Jersey harbor and coastal region in terms of age and regulatory tier level. Nonroad equipment NO_x emission factors have been derived from EPA emission standards and documentation, while the nonroad VOC emission factors have been based on EPA's Diesel Emissions Quantifier (DEQ, accessed at: *www.epa.gov/cleandiesel/quantifier/*), run for moderately old equipment (model year 1995). On-road vehicle emission factors have also been developed from the DEQ, assuming a mixture of Class 8, Class 6, and Class 5 (the smallest covered by the DEQ) on-road trucks.

As noted above, the emission factors have been chosen to be moderately conservative so as not to underestimate project emissions. Actual project emissions will be estimated and tracked during the course of the project and will be based on the characteristics and operating hours of the specific equipment chosen by the contractor to do the work.

The following pages summarize the estimated emissions of pollutants relevant to General Conformity, NO_x, VOC, $PM_{2.5}$, SO_2, and CO in sum for the project and by calendar year based on the schedule information also presented (in terms of operating months per year). Following this summary information are project details including the anticipated equipment and engine information developed by the New York District, the load factors and emission factors as discussed above, and the estimated emissions for the project by piece of equipment.

USACE - New York District

NAN - ABU Sandy-Related Projects

General Conformity Related Emission Estimates

Emission Estimates & Supporting Information - Union Beach 9/30/2016

DRAFT

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

Pollutant	Estimated Emissions, tons per year 2018	2019	2020
NO_x	91.4	91.4	0.0
VOC	3.4	3.4	0.0
$PM_{2.5}$	4.7	4.7	0.0
SO_2	0.1	0.1	0.0
CO	11.9	11.9	0.0

Maximum emissions per month given the project duration as listed in the "project duration" table

Pollutant	Water Side Dredge	Water Side Auxiliary	Water Side Pumps	Shore Crew Support* Dozer	Shore Crew Support* Front-end loader	Total Dredging	Groin Construction* Barge	Groin Construction* Excavator	Groin Construction* Front-end loader	Total Groin
	Estimated Emissions, tons per month									
NO_x	37.3	1.3	5.7	1.3	0.1	45.6	0.02	0.04	0.05	0.11
VOC	1.4	0.0	0.2	0.0	0.0	1.7	0.001	0.001	0.001	0.002
$PM_{2.5}$	2.0	0.1	0.3	0.0	0.0	2.4	0.001	0.001	0.001	0.002
SO_2	0.02	0.00	0.01	0.00	0.00	0.03	0.0000	0.0000	0.0000	0.0001
CO	4.1	0.2	1.5	0.2	0.0	5.9	0.00	0.01	0.01	0.015

Supporting information and data

	Dredge	Auxiliary	Pumps	Shore crew* Dozer	Shore crew* Front-end loader	Groin construction* Barge	Groin construction* Excav	Groin construction* Front-end loader
Horsepower	8,000	600	2,000	310	25	20	23	25
Load factors	0.66	0.40	0.80	0.59	0.59	0.40	0.59	0.59
Hrs/day	22	22	22	22	22	10	10	10
Days/month	30	30	30	30	30	30	30	30
Emission factors								
NO_x	9.7	7.3	4.9	9.5	9.5	7.3	9.5	9.5
VOC	0.37	0.20	0.20	0.19	0.19	0.20	0.19	0.19
$PM_{2.5}$	0.51	0.29	0.29	0.16	0.16	0.29	0.16	0.16
SO_2	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
CO	1.06	1.27	1.27	1.21	1.21	1.27	1.21	1.21

Project Duration and Working Months per Year

Cu yds	2013	2014	2015	2016	2017	2018	2019	2020
700,000						2	2	

APPENDIX E

ESSENTIAL FISH HABITAT FOR THE USE OF SAND RESOURCES AT THE SEA BRIGHT OFFSHORE BORROW AREA

ESSENTIAL FISH HABITAT ASSESSMENT

For The Use of Sand Resources at the Sea Bright Offshore Borrow Area

Prepared by: U.S. Army Corps of Engineers
New York District
Planning Division
26 Federal Plaza
New York, New York 10278-0090

I INTRODUCTION

The Raritan Bay and Sandy Hook Bay, New Jersey Feasibility Report for Hurricane and Storm Damage Reduction – Union Beach, New Jersey was completed in September 2003, and authorized for construction in November 2007. The primary purpose of the project is to provide National Economic Development benefits for coastal storm risk management.

As a consequence of Hurricane Sandy in October 2012, Congress passed Public Law (P.L.) 113-2, the "Disaster Relief Appropriations Act, 2013", which authorized supplemental appropriations to federal agencies for expenses related to the consequences of Hurricane Sandy. Chapter 4 of P.L. 113-2 identifies those actions directed by Congress specific to the U.S. Army Corps of Engineers (USACE), including preparation of two interim reports to Congress, a project performance evaluation report, and a comprehensive study to address the flood risks of vulnerable coastal populations in areas affected by Hurricane Sandy within the boundaries of the North Atlantic Division of USACE.

The Hurricane Sandy Limited Reevaluation Report (HSLRR) serves as a decision document to support the construction of the Raritan Bay and Sandy Hook Bay, New Jersey Coastal Storm Risk Management Project. It addresses relevant changes to the existing conditions that have occurred since the Feasibility Report was completed in September 2003, including changes due to Hurricane Sandy. The HSLRR was prepared to expedite implementation of the authorized but unconstructed project in response to Public Law (P.L.) 113-2 of January 29, 2013, "Disaster Relief Appropriations Act, 2013".

II CRITERIA FOR THIS EFH ASSESSMENT

For the purpose of this Essential Fish Habitat (EFH) assessment the following criteria are applied:

1. This EFH assessment is being done as a courtesy and to implement the USACE's Environmental Operating Principles because the removal of sand in the Sea Bright Offshore Borrow Area (SBOBA) began in 1994, which began prior to provisions in the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act of 1996, which required the preparation of an EFH assessment in locations that are designated as EFH for species with Fishery Management Plans, and their important prey species.

2. In 1994, the District initiated a 9 consecutive year, multi-component Biological Monitoring Program (BMP) to quantify the impacts and subsequent recovery to aquatic resources that occupy offshore borrow areas. Accordingly, the results of the BMP are applicable to this EFH assessment because the resources at the SBOBA and at the offshore borrow areas that were evaluated as components of the BMP are alike (Clarke *et al*. 1991 and USACE 2001).

3. The area to be assessed is named “The Sea Bright Offshore Borrow Area”, which encompasses both the Sea Bright 88 and 89 offshore borrow areas.

4. This EFH assessment is action/activity (hydraulic dredging) specific, not project specific. As a component of this EFH assessment, several existing projects will be identified along with their estimated initial nourishment and periodic renourishment volumes and a tentative construction schedule of each existing project will be identified.

5. As this EFH assessment covers dredging in the SBOBA, not a specific project, neither a new/revised EFH assessment nor reconsultation with the NMFS will need to be performed if either estimated volumes change or construction schedules change or a project that is not identified in this EFH assessment, but requires sand resources to prevent/reduce damages caused by hurricanes and severe storm events.

6. This EFH assessment is applicable for an action/activity that requires the use of sand to prevent/reduce damages caused by hurricane and severe storm events or has a goal to restore habitat.

7. The District conducted investigations that produced 2 separate Environmental Impact Statements (EIS). The Section I EIS (USACE, 1989) and the Section II EIS (USACE, 1995), and their supporting documents will serve as the foundation that previously addressed in detail the analysis of alternatives, economic justification, identification of existing resources, discussion of adverse impacts, to include cumulative impacts to these existing resources and identification of mitigation.

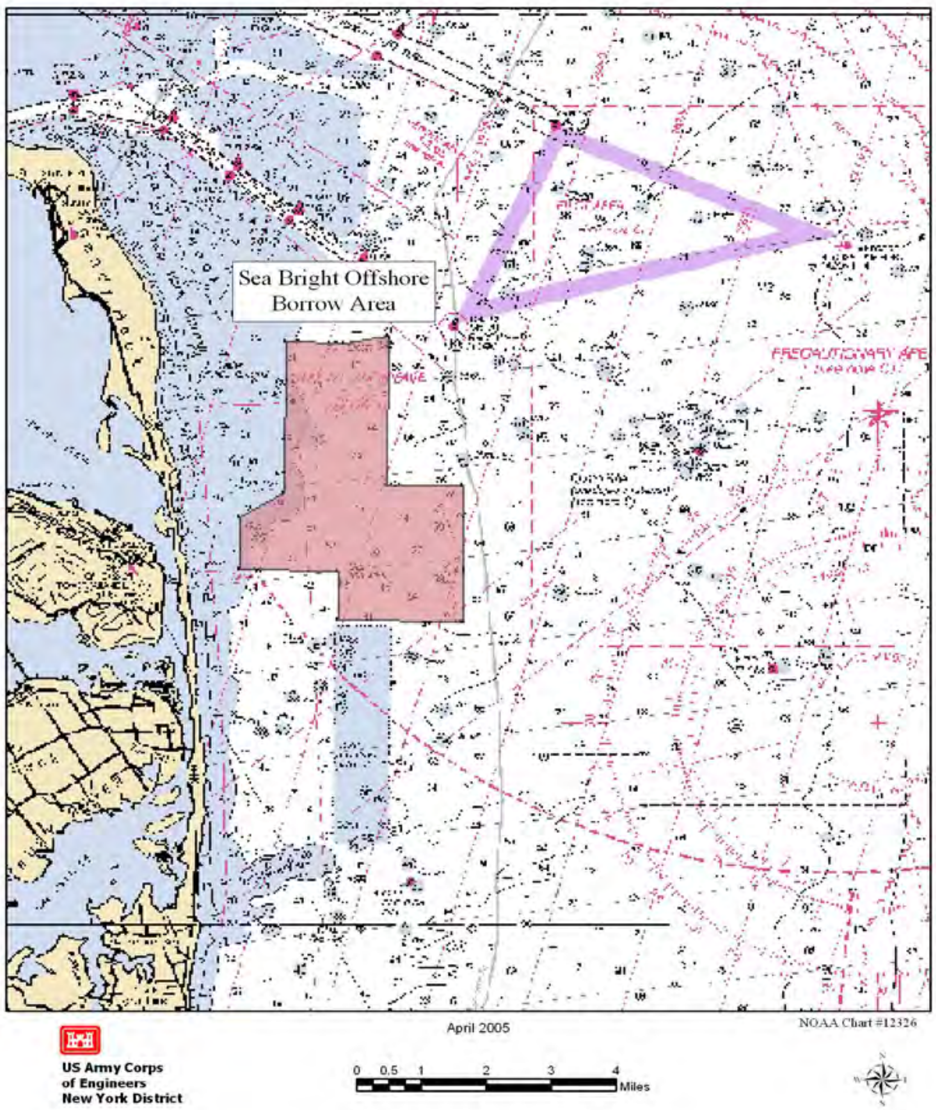
8. The material within the SBOBA is 99% sand and therefore contains no more than a minute level of fine grain sediments, which can be associated with contaminants (USACE 1989).

9. The alteration of the SBOBA’s bathymetry will not affect surface wave conditions (USACE 1989 and 1995). As a result, the resources that occupy the nearby intertidal zone and beach habitats will not be affected.

III STUDY AREA FOR THIS EFH ASSESSMENT

Beach nourishment with periodic renourichment cycles is the selected alternative for both Section I and II, as well as other hurricane and shore protection projects within the boundary of the District. This alternative is recognized as an acceptable engineering solution that is both economically justifiable and environmentally sustainable to protect local communities from damages caused by hurricanes and severe storm events. The District performed geotechnical analyzes to find suitable material in sufficient quantities that would be needed to restore sandy beaches. Each analysis investigated upland sources, as well as sources located in the Raritan Bay and Atlantic Ocean waters offshore of the coastline of northern New Jersey. The results identified 2 areas that meet grain size compatibility and economic validation. These areas are known as the Sea Bright 88 and the Sea Bright 89 offshore borrow areas. Although each offshore borrow area has been assigned its own title, they are located next to one another and form one continuous footprint, which is known as "The Sea Bright Offshore Borrow Area (SBOBA)." The SBOBA is the study area for this EFH Assessment. The SBOBA is located approximately 1 nautical mile east of Sandy Hook, New Jersey (see Figure 1 and Table 1).

Figure 1



The SBOBA has an estimated volume of 84,426,000 cubic yards of sand and is roughly 3,719 acres in size. Its bottom elevation ranges in depths from –24 to –63 feet National Geodetic Vertical Datum (NGVD), that slope from northwest to deeper water at its southeastern boundary. The SBOBA is not considered a shoal, because the adjacent bathymetry elevations are similar to the elevations within the SBOBA.

Table 1: Sea Bright Offshore Borrow Area (Geographic Coordinates NAD83) [1] [2]

SBOBA ID Point	Longitude	Latitude
1	73.963775066	40.398380249
2	73.963674696	40.408041780
3	73.953787792	40.412592720
4	73.953498319	40.440040082
5	73.940565978	40.439959588
6	73.930636868	40.441214360
7	73.930935048	40.413822032
8	73.913842355	40.413712011
9	73.914117148	40.389009498
10	73.941972413	40.389187404
11	73.941875427	40.398245062

(1) Coordinates approximate, as scaled from NOAA Chart #12326.
(2) Coordinates in decimal degrees.

The area formally known as the Mud Dump Site (MDS) is located about 4 nautical miles to the east. The area designated as the Historic Area Remediation Site (the HARS) is located about 1 nautical mile east of the SBOBA. In addition, the HARS is also situated down drift from the prevailing ocean current. This means that the prevailing ocean current first passes over the SBOBA and then it flows away from the SBOBA to pass over the HARS. As previously mentioned in Section II, 8 above, the material within the SBOBA is 99% sand and therefore contains no more than a minute level of fine grain sediments, which can be associated with contaminants (USACE 1989).

IV Previous Utilization of Sand at the SBOBA

The District began to use sand located within the SBOBA in 1994 and its use continues to present day. An estimated volume of 15,490,000 cubic yards has been placed along about 18 miles of shoreline from Sandy Hook south to Spring Lake, New Jersey. Furthermore, pursuant to its Support For Others program, the District partnered with the U.S. Department of Interior, National Park Service to place sand within the critical zone to widen their beach to protect the main access road into the Gateway National Park located at Sandy Hook, New Jersey. Table 2 below identifies the volumes of sand per location that were used to initially restore and maintain sandy beaches.

Table 2: Shows the location, starting date and volume of sand that was used from the SBOBA to restore sandy beach habitat.

Location	Completion Date	Volume of Sand [3]
Contract 1A – Monmouth Beach, NJ	November 1995	4,600,000
Contract 1B – Sea Bright, NJ	October 1996	3,800,000
Sandy Hook National Park [1]	February 1998	300,000
Contract 2 – Long Branch, NJ	December 1998	4,300,000
1st Renourishment Contract 1A and 1B[2]	October 2002	2,242,000
Sandy Hook National Park[1]	October 2002	300,000
Section II, Spring Lake, NJ	October 2002	225,000

[1] Support For Others Program.
[2] Includes the communities of Sea Bright, Monmouth Beach and Spring Lake, NJ.
[3] Measured in cubic yards.

V Proposed Utilization of Sand at the SBOBA

In addition to the initial placement of sand, the design of beaches involves periodic renourishment. Periodic renourishment provides long-term protection to the design beach by restoring the beach to its original design footprint. Placement of sand to renourishment a beach is accomplished the same manner as initial beach construction. Table 3 below shows the estimated volume of sand needed at a specific site and its proposed future date for initial placement and renourishments.

Table 3: Shows the estimated volume of sand, the location for sand placement, and proposed future date for initial placement and renourishment cycle.

Location	Date	Nourishment Cycle[6]	Estimated Volume of Sand
Section II – South Reach[1]	2006	1st	1,000,000
Long Branch, NJ	2006	1st	1,000,000
Port Monmouth, NJ[2]	2007	Initial	400,000
Keansburg, NJ[2]	2007	Initial	2,000,000
Laurence Harbor, NJ[2]	2007	Initial	600,000
Union Beach, NJ[2]	2008	Initial	700,000
Section I – Contract 3[3]	2008	Initial	4,460,000
Section II – North Reach[4]	2008	1st [6]	2,600,000
Section I – 1A, 1B, and 2[5]	2009	2nd[6]	3,500,000
Section II – Entire Reach	2010	2nd[6]	2,600,000
Section I – 1A, 1B and 2	2013	3rd[6]	3,500,000
Section II – Entire Reach	2018	3rd[6]	2,600,000
Section I – 1A, 1B and 2	2021	4th[6]	3,500,000
Section II – Entire Reach	2024	4th[6]	2,600,000
Section I – 1A, 1B and 2	2027	5th[6]	3,500,000

Section II – Entire Reach	2030	5th[6]	2,600,000
Section I – 1A, 1B and 2	2031	6th[6]	3,500,000
Section II – Entire Reach	2036	6th[6]	2,600,000
Section I – 1A, 1B and 2	2039	7th[6]	3,500,000
Section II – Entire Reach	2042	7th[6]	2,600,000

[1] Belmar to Manasquan, NJ
[2] Sand for periodic renourishment to come from upland sources.
[3] Includes the communities of Elberon, Deal, Allenhurst and Loch Arbour, NJ.
[4] Asbury Park to Avon-by-the-Sea, NJ
[5] 1A = Monmouth Beach, NJ; 1B = Sea Bright, NJ; 2 = Long Branch, NJ
[6] Renourishment planning estimates only. Actual placement dates, volumes, and locations are based on funding availability, storm occurrences and fill longevity.

VI Method to Dredge Sand at the SBOBA

The method that has been used almost exclusively to dredge sand from the SBOBA involves the use of a hopper dredge. The hopper dredge uses hydraulic arms that are lowered from the vessel to the ocean bottom. Using large pumps located on-board the vessel, sand is sucked from the ocean bottom and transported up through hydraulic arms and then deposited into the hopper of the vessel. Once the vessel has reached its maximum holding capacity of sand, each hydraulic arm is lifted out of the water. The hopper dredge then transports its load of sand to the beach where the sand will be transported from the vessel by a floating pipeline and placed on the beach as a slurry mixture. The sand is then spread and contoured to design specifications by earth-moving equipment. It is expected that a hopper dredge will be used almost exclusively in the future.

However, a cutter-head dredge was used to dredge and transport sand from the SBOBA to locations within the Sandy Hook National Park and in the northern section of Sea Bright, NJ. The selection of a cutter-head dredge was made to reduce the cost to restore the beach in these areas. A cutter-head dredge, like the hopper dredge, uses suction to remove sand from the ocean bottom and place the sand onto the beach. The difference is that a cutter-head dredge transports the sand from the ocean bottom to the placement site in one continuous operation by using a pipeline. The hopper dredge has to fill-up its hopper with sand, and then carrying the sand, travel to the placement site to discharge the sand by a floating pipeline.

VII EXISTING RESOURCES

Under provisions of the reauthorized Magnuson-Stevens Fishery Conservation and Management Act of 1996, the entire area of the SBOBA is designated as EFH for species with Fishery Management Plans (FMP's), and their important prey species. The National Marine Fisheries Service has identified EFH within 10-minute x 10-minute squares. The study area contains EFH for various life stages for 28 species of managed fish and shellfish. Table 4 presents the managed species and their life stage for which EFH is identified within the 10 x 10 minute squares (North Boundary 40^0 30.0' N; East Boundary 73^0 50'.0 W; South Boundary 40^0 20.0' N; West Boundary 74^0 00.0' W) that cover the study area. The habitat requirements for identified EFH species and their representative life stages are provided in Table 5. The square description include waters west of and east of the Sandy Hook peninsula, along with waters east of Sea Bright and north of Monmouth Beach, New Jersey

Table 4: EFH managed species and their representative life stage at the SBOBA.

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
Atlantic cod (*Gadus morhua*)				x
Whiting (*Merluccius bilinearis*)	x	x	x	x
Red hake (*Urophycis chuss*)	x	x	x	
Witch flounder (*Glyptocephalus cynoglossus*)		x		
Winter flounder (*Pleuronectes americanus*)	x	x	x	x
Yellowtail flounder (*Pleuronectes ferruginea*)	x	x		
Windowpane flounder (*Scopthalmus aquosus*)	x	x	x	x
Atlantic sea herring (*Clupea harengus*)			x	x
Monkfish (*Lophius americanus*)	x	x		
Bluefish (*Pomatomus saltatrix*)	x	x	x	x
Atlantic butterfish (*Peprilus tricanthus*)			x	
Summer flounder (*Paralicthys dentatus*)			x	x
Scup (*Stenotomus chrysops*)			x	x
Black sea bass (*Centropristus striata*)			x	x
Ocean quahog (*Artica islandica*)				x
King mackerel (*Scomberomorus cavalla*)	x	x	x	X
Spanish mackerel (*Scomberomorus maculatus*)	x	x	x	x
Cobia (*Rachycentron canadum*)	x	x	x	x
Dusky shark (*Charcharinus obscurus*)		x1	x	
Sand tiger shark (*Odontaspis taurus*)		x1		
Sandbar shark (*Charcharinus plumbeus*)		x1	x	x
Tiger shark (*Galeocerdo cuvieri*)		x1		
Shortfin mako shark (*Isurus oxyrhyncus*)		x1		
Bluefin tuna (*Thunnus thynnus*)			x	
Skipjack tuna (*Katsuwonus pelamis*)				x
Clearnose skate (*Raja eglanteria*)			x	x
Little skate (*Leucoraja erinacea*)			x	x
Winter skate (*Leucoraja ocellata*)			x	x

1 Shark larvae are neonate.

Table 5: Habitat utilization of identified EFH species for representative life stages in the SBOBA (USACE 2002)

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
Atlantic cod (*Gadus morhua*)				**Habitat**: Bottom (rocks, pebbles, or gravel) winter for Mid-Atlantic Prey: shellfish**Error! Bookmark not defined.**, crabs, and other crustaceans (amphipods) and polychaetes, squid and fish (capelin redfish, herring, plaice, haddock).
Whiting (*Merluccius* bilinearis)	**Habitat**: Pelagic continental shelf waters in preferred depths from 50-150 m.	**Habitat**: Pelagic continental shelf waters in preferred depths from 50-130 m.	**Habitat**: Bottom (silt-sand) nearshore waters in preferred depths from 150-270 m in spring and 25-75 m in fall. **Prey**: fish, crustaceans (euphasids, shrimp), and squids.	
Red hake (*Urophycis chuss*)	**Habitat**: Surface waters, May – Nov.	**Habitat**: Surface waters, May –Dec. Abundant in mid-and outer continental shelf of Mid-Atlantic. Bight. **Prey**: copepods and other micro crustaceans under floating eelgrass or algae.	**Habitat**: Pelagic at 25-30 m and bottom at 35-40 m. Young inhabit depressions on open seabed. Older juveniles inhabit shelter provided by shells and shell fragments. **Prey**: small benthic and pelagic crustaceans (decapod shrimp, crabs, mysids, euphasiids, and amphipods) and polychaetes).	
Witch flounder (*Glyptocephalus cynoglossus*)	.	**Habitat**: Pelagic generally over deep water in depths ranging from 10 – 1250 m.		
Winter Flounder (*Pseudopleuronectes americanus*)	**Habitat**: Pelagic and bottom water at depths less than 5 meters with a broad range of salinity, abundant February through July.	**Habitat**: Pelagic and bottom water at depths less than 5 meters with a broad range of salinity, abundant February through July.	**Habitat**: Young of the year (YOY) are demersal, nearshore low (primarily inlets and coves) energy shallows with sand, muddy sand, mud and gravel bottoms. **Prey**: YOY Amphipods and annelids JUV – Sand dollar, Bivalve siphons, Annelids,	**Habitat**: Demersal offshore (in spring) except when spawning where they are in shallow inshore waters (fall). **Prey**: Amphipods, Polychaetes, Bivalves or siphons, Capelin eggs, Crustaceans.

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			Amphipods.	
Yellowtail flounder (*Pleuronectes ferruginea*)	**Habitat**: Pelagic waters ranging from 10 to 750 meters.	**Habitat**: Pelagic waters. **Prey**: Polychaetes.		
Windowpane flounder (*Scopthalmus aquosus*)	**Habitat**: Surface waters <70 m, Feb-July; Sept-Nov.	**Habitat**: Initially in pelagic waters, then bottom <70m, May-July and Oct-Nov. **Prey**: copepods and other zooplankton.	**Habitat**: Bottom (fine sands) 5-125 m in depth, in nearshore bays and estuaries less than 75 m. **Prey**: small crustaceans (mysids and decapod shrimp) polychaetes and various fish larvae.	**Habitat**: Bottom (fine sands), peak spawning in May, in nearshore bays and estuaries less than 75 m **Prey**: small crustaceans (mysids and decapod shrimp) polychaetes and various fish larvae.
Atlantic sea herring (*Clupea harengus)*			**Habitat**: Pelagic waters and bottom, < 10 C and 15-130 m depths. **Prey**: zooplankton (copepods, decapod larvae, cirriped larvae, cladocerans, and pelecypod larvae).	**Habitat**: Pelagic waters and bottom habitats. **Prey**: chaetognath, euphausiids, pteropods and copepods.
Monkfish (*Lophius americanus*)	**Habitat**: Surface waters, Mar. – Sept. peak in June in upper water column of inner to mid continental shelf.	**Habitat**: Pelagic waters in depths of 15 – 1000 m along mid-shelf also found in surf zone. **Prey**: zooplankton (copepods, crustacean larvae, chaetognaths).		
Bluefish (*Pomatomus saltatrix*)	**Habitat**: April through August in Pelagic waters over the Continental shelf at mid-shelf depth at temp > 18^0C.	**Habitat**: Pelagic waters over the continental shelf and in Mid-Atlantic estuaries and intertidal and nearshore zones June through Sept.	**Habitat**: Pelagic waters of continental shelf and in Mid Atlantic estuaries and intertidal and nearshore zones from May-Nov.	**Habitat**: Pelagic waters; found in Mid Atlantic estuaries April – Oct.
Atlantic butterfish (*Peprilus tricanthus*)			**Habitat**: Pelagic waters in 10 – 360 meters. **Prey:** Feed mainly on planktonic prey, including thaliaceans, squids, copepods, amphipods, decapods, coelenterates,	

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			polychaetes, small fishes, and ctenophores.	
Summer flounder (*Paralicthys dentatus*)			**Habitat**: Demersal waters, muddy and sandy (preferred) substrates.	**Habitat**: Demersal waters (mud and sandy substrates). Shallow coastal areas in warm months, offshore in cold months.
Scup (*Stenotomus chrysops*)			**Habitat**: Demersal waters.	**Habitat**: Demersal waters offshore from Nov – April.
Black sea bass (*Centropristus striata*)			**Habitat**: Demersal waters over rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas and winters off shore at depths of 1-38 m in shell beds and shell patches.	**Habitat**: Demersal waters over structured habitats (natural and man-made), and sand and shell areas and winters off shore at depths of 25-50 m in shell beds and shell patches.
Ocean quahog (*Artica islandica)*				**Habitat**: Throughout the substrate to a depth of 3 m.
King mackerel (*Scomberomorus cavalla*)	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone.	**Habitat**: Pelagic waters with sandy shoals of capes an offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone.	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone.	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone.
Spanish mackerel (*Scomberomorus maculates*)	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone. Migratory.	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone. Migratory.	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone. Migratory.	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone. Migratory.
Cobia (*Rachycentron canadum*)	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone. Migratory.	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone. Migratory.	**Habitat**: Pelagic waters with sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters from the surf to the shelf break zone. Migratory.

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
		shelf break zone. Migratory.		
Sand tiger shark (*Odontaspis taurus)*		**Habitat**: is shallow coastal waters from Barnegat Inlet, NJ to Cape Canaveral, FL out to the 25m isobath, entirely outside of the project area.		
Dusky shark (*Charcharinus obscurus*)		**Habitat**: in shallow coastal waters, inlets, and estuaries to the 25m isobath from Montauk to Cape Lookout, NC.	**Habitat**: juveniles found in coastal and pelagic waters between the 25- and 200-meter isobath.	
Sandbar shark (*Charcharinus plumbeus*)		**Habitat**: is shallow coastal water from Barnegat Inlet, NJ to Cape Canaveral, FL out to the 25 m isobath, entirely outside of the project area. Also found in salinity greater than 22 ppt and temperatures greater than 70 F°.	**Habitat**: found in coastal and pelagic waters north of 40° North and at the shelf break in the mid-Atlantic during winter. Also found in salinity greater than 22 ppt and temperatures greater than 70 F°.	**Habitat**: demersal shallow coastal waters from the coast to the 50-meter isobath. Habitat areas of particular concern are shallow areas in the mouth of the Great Bay, NJ, lower and middle Delaware Bay, lower Chesapeake Bay, and on the Outer Banks, NC in areas of Pamlico Sound adjacent to Hatteras Island and offshore.
Tiger shark (*Galeocerdo cuvieri*)		**Habitat**: is from shallow coastal areas to 200 m isobath from Cape Canaveral, FL to Montauk, NY.		
Shortfin mako shark (*Isurus oxyrhyncus*)		**Habitat**: is found between the 25- and 50-meter isobath.		
Bluefin tuna (*Thunnus thynnus*)			**Habitat**: is primarily surface water, also found in inshore and pelagic waters between the 25 and 200-meter isobath.	
Skipjack tuna (*Katsuwonus pelamis)*				**Habitat**: is pelagic surface waters.
Clearnose skate (*Raja eglanteria*)			**Habitat**: is bottom habitats with soft bottom along the continental shelf and rocky or gravelly bottom, from shore to 500 meters, but	**Habitat**: is both soft bottom and rocky or gravelly bottom habitats, from the shore to 400 meters, but they are most abundant at depths less than 111 meters. Migration along the New Jersey shoreline

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			most abundant at depths less than 111 meters. Migration along the New Jersey shoreline occurs in late April through May and October through November. Temperature range of 9-30 °C, salinity ranges from 22-36ppt.	occurs in late April through May and October through November.
Little skate (*Leucoraja erinacea*)			**Habitat**: is found in sandy or gravelly substrate or mud, found from the shore to 137 meters, with the highest abundance from 73-91 meters, found between 4-15°C, at salinities of 15 ppt, but the preferred range is 31-34ppt. Move inshore during spring and autumn, and offshore in mid to late summer, and midwinter.	**Habitat**: is similar habitat as juveniles.
Winter skate (*Leucoraja ocellata*)			**Habitat**: is primarily sand and gravel bottom but also found in mud bottoms, from shoreline to about 400 meters and are most abundant at depths less than 111 meters, temperature range for these skates is from -1.2°C to around 21°C, with most found from 4-16 °C, salinities as low as 23 ppt but prefer a salinity range of 32-34ppt.	**Habitat**: is similar habitat as juveniles.

Other aquatic resources that occupy the SBOBA include phytoplankton, which is an important food source for filter-feeding bivalves. Infauna resources include polycheate worms mostly *Spiophanes bombyx* and *Prionospio malmgreni*. The most important bivalve species are the surf clam (*Spisula solidissima*), tellin (*Tellina agilis*), razor clam (*Ensis directus*). In addition, there are gastropods, amphipods, isopods, sand dollars, starfish and decapod crustaceans. Common decapod species include the blue claw crab (*Callinectes sapidus*), American lobster (*Homarus americanus*), rock crab (*Cancer *irroratus*), hermit crab (*Pagurus longicarpus*) and lady or calico crab (*Ovalipes ocellatus*) (USACE 1989).

VIII ANALYSIS OF EFFECTS ON EFH SPECIES

As discussed in the Section VII above, there are a number of Federally managed fish species where EFH was identified for one or more life stages within the SBOBA. Fish occupation of waters within the impact area is highly variable both 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 other species 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. Table 6 below briefly discusses the direct and indirect impacts on identified EFH species and their representative life stages.

Table 6: Direct and indirect impacts on identified EFH species for representative life stages (USACE 2002).

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
Atlantic cod (*Gadus morhua*)				**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions, but at deeper water depths. Adults should be capable of relocating during dredging. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.
Whiting (*Merluccius bilinearis*)	Eggs are pelagic and are concentrated in depth of 50 – 150 meters; therefore no **direct** or **indirect** effects are expected.	Larvae are pelagic and are concentrated in depth of 50 –150 meters; therefore no **direct** or **indirect** effects are expected.	**Direct**: Occur near bottom. Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect:** Temporary disruption of benthic food prey organisms in immediate dredging area. .	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Adults should be capable of relocating during dredging. **Indirect:** Temporary disruption of benthic food prey organisms in immediate dredging area.
Red hake (*Urophycis chuss*)	Eggs occur in surface waters; therefore, no	Larvae occur in surface waters; therefore, no **direct**	**Direct**: Physical habitat in the borrow site should remain	

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
	direct or **indirect** effects are expected.	or **indirect** effects are expected.	basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.	
Witch flounder (*Glyptocephalus cynoglossus*)		Larvae are typically found in surface waters and would not be affected by dredging; therefore, no **direct** or **indirect** impact is expected.		
Winter flounder (*Pseudopleuronectes americanus*)	Eggs are demersal in very shallow waters of coves and inlets in Spring. Dredging may have some effect on eggs if construction occurs during Spring.	Larvae are initially planktonic, but become more bottom-oriented as they develop. Potential for some to become entrained during dredging in borrow areas.	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Adults should be capable of relocating during dredging. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.
Yellowtail flounder (*Pleuronectes ferruginea*)	Eggs are pelagic, generally over deep water; therefore no **direct** or **indirect** effects are expected.	Larvae occur in pelagic waters; therefore, no **direct** or **indirect** effects are expected.		
Windowpane flounder (*Scopthalmus aquosus*)	Eggs occur in surface waters; therefore, no **direct** or **indirect** effects are expected.	Larvae occur in pelagic waters; therefore, no **direct** or **indirect** effects are expected.	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Adults should be capable of relocating during dredging. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.
Atlantic sea herring (*Clupea harengus*)			**Direct**: Occur in pelagic and near bottom. Physical habitat in borrow site	**Direct**: Occur in pelagic and near bottom. Physical habitat in borrow site

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect**: None, prey items are planktonic.	should remain basically similar to pre-dredge conditions. Adults should be capable of relocating during dredging. **Indirect**: None, prey items are primarily planktonic.
Monkfish (*Lophius americanus*)	Eggs occur in surface waters with depths greater than 75 ft; therefore, no **direct** or **indirect** effects are expected.	Larvae occur in pelagic waters with depths greater than 75 ft; therefore, no **direct** or **indirect** effects are expected.		
Bluefish *(Pomatomus saltatrix*)	Eggs occur in pelagic waters over the Continental Shelf. No **direct** or **indirect** impact is expected.	Larvae occur in pelagic waters over the Continental Shelf. No **direct** or **indirect** impact is expected.	**Direct:** Juvenile bluefish are pelagic species. No significant direct effects anticipated. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.	**Direct**: Adult bluefish are pelagic species and should be capable of relocating during dredging. No significant direct effects anticipated. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.
Atlantic butterfish (*Peprilus tricanthus*)			**Direct**: Juvenile butterfish are pelagic species. No significant direct effects anticipated. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.	
Scup (*Stenotomus chrysops*)			**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Adults should be capable of relocating during dredging. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.
Black sea bass (*Centropristus striata*)			**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Offshore sites are mainly	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Adults should be capable of

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			sandy soft-bottoms, however, some pockets of gravelly or shelly bottom may be impacted. Some mortality of juveniles could be expected from entrainment into the dredge. Some intertidal and subtidal, rocky habitat may be impacted due to sand partially covering groins and potential shipwrecks along the shoreline. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.	relocating during dredging. Offshore sites are mainly sandy soft-bottoms, however, some pockets of gravelly or shelly bottom may be impacted. Some intertidal and subtidal**Error! Bookmark not defined.** rocky habitat may be impacted due to sand partially covering groins and potential shipwrecks along the shoreline. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.
Ocean quahog (*Artica islandica*)				**Direct**: Complete removal within borrow site during dredging. Similar substrate and slight increase in depth would allow for recruitment. No adult quahogs were found in the SBOBA. **Indirect**: Temporary reduction in reproductive potential.
King mackerel (*Scomberomorus cavalla*)	**Direct**: Eggs are pelagic; therefore no adverse impacts are anticipated. **Indirect**: None anticipated.	**Direct**: Larvae are pelagic; therefore no adverse impacts are anticipated. **Indirect**: None anticipated.	**Direct**: Juveniles are pelagic; therefore no adverse impacts are anticipated. **Indirect**: Minor indirect adverse effects on food chain through disruption of benthic community; however, mackerel are highly migratory.	**Direct**: Adults are pelagic, highly migratory and should be capable of relocating during dredging. Therefore no adverse impacts are anticipated. **Indirect**: Minor indirect adverse effects on food chain through disruption of benthic community; however, mackerel are highly migratory.
Spanish mackerel (*Scomberomorus maculatus*)	**Direct**: Eggs are pelagic;, therefore no adverse impacts are anticipated. **Indirect**: None anticipated.	**Direct**: Larvae are pelagic; therefore no adverse impacts are anticipated. **Indirect**: None anticipated.	**Direct**: Juveniles are pelagic; therefore no adverse impacts are anticipated. **Indirect**: Minor indirect adverse effects on food chain through disruption of benthic community; however, mackerel are highly migratory.	**Direct**: Adults are pelagic, highly migratory should be capable of relocating during dredging., Therefore no adverse impacts are anticipated. **Indirect**: Minor indirect adverse effects on food chain through disruption of benthic community;

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
				however, mackerel are highly migratory.
Cobia (*Rachycentron canadum*)	**Direct**: Eggs are pelagic; therefore no adverse impacts are anticipated. **Indirect**: None anticipated.	**Direct**: Larvae are pelagic; therefore no adverse impacts are anticipated. **Indirect**: None anticipated.	**Direct**: Cobia are pelagic and migratory species. No significant direct effects anticipated. **Indirect**: Temporary disruption of benthic food prey organisms.	**Direct**: Cobia are pelagic, migratory and should be capable of relocating during dredging. No significant direct effects anticipated. **Indirect**: Temporary disruption of benthic food prey organisms in immediate dredging area.
Dusky shark (*Charcharinus obscurus*)		**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Mortality from dredge unlikely because embryos are reported up to 3 feet in length . Therefore, the newborn may be mobile enough to avoid a dredge. **Indirect**: Temporary disruption of benthic food prey organisms and small fish.	Due to the mobility of this life stages, no **direct** or **indirect** impact is expected.	
Sand tiger shark (*Odontaspis taurus)*		No **direct** of i**ndirect** effects are expected because they occur outside of the study area.		
26. Sandbar shark (*Charcharinus plumbeus*)		**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. However, some mortality of larvae may be possible from entrainment into the dredge **Indirect**: Temporary disruption of benthic food prey organisms and small fish .	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Juveniles are mobile and are capable of avoiding impact areas. **Indirect**: Temporary disruption of benthic food prey organisms, fish and food chain within borrow area.	**Direct**: Physical habitat in the borrow site should remain basically similar to pre-dredge conditions. Adults are highly mobile and are capable of avoiding impact areas. **Indirect**: Temporary disruption of benthic food prey organisms, fish and food chain within borrow area.
Tiger shark (*Galeocerdo cuvieri*)		Physical habitat in borrow site should remain basically similar to pre-dredge conditions. **Direct**: some mortality of larvae may be possible from entrainment into the dredge. Indirect: None are expected.		

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
Shortfin mako shark (*Isurus oxyrhyncus*)		**Direct**: May be affected by the entrainment into the dredge. However, due to the vertical distribution of this life stages, no more than minimal impact is expected. **Indirect**: None are expected.		
Bluefin tuna (*Thunnus thynnus*)			No more than minimal **direct** or **indirect** impact is expected because of their vertical distribution (surface waters) and high mobility would avoid dredge entrainment.	
Skipjack tuna (*Katsuwonus pelamis)*				No more than minimal **direct** or **indirect** impact is expected because of their vertical distribution (surface waters) and high mobility would avoid dredge entrainment.
Clearnose skate (*Raja eglanteria*)			**Direct**: Some skates will get entrained into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms and food chain within SBOBA.	**Direct**: Some skates will get entrained into the dredge, but have the ability to avoid entrainment. **Indirect**: Temporary disruption of benthic food prey organisms and food chain within SBOBA.
Little skate (*Leucoraja erinacea*)			**Direct**: Some skates will get entrained into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms and food chain within SBOBA.	**Direct**: Some skates will get entrained into the dredge, but have the ability to avoid entrainment. **Indirect**: Temporary disruption of benthic food prey organisms and food chain within SBOBA.
Winter skate (*Leucoraja ocellata*)			**Direct**: Some skates will get entrained into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms and food chain within SBOBA.	**Direct**: Some skates will get entrained into the dredge, but have the ability to avoid entrainment. **Indirect**: Temporary disruption of benthic food prey organisms and food chain within SBOBA

Direct Impacts

A major concern with respect to physical changes involves the potential reduction of sandy habitat due to the removal of sand for its placement onto the beach. The area of the SBOBA may be considered broad from an individual spatial perspective but it's insignificant when examined to the totality of nearshore sandy bottom habitat available for EFH species. The lowering of the physical habitat at the SBOBA, which is the main effect to the habitat, is expected to have minimal impact to EFH species because most of substrate that will be exposed after dredging has similar sedimentary characteristics as the current overlying sediments (USACE 1989). Furthermore, the depth of dredging will vary from 6 feet to no more than 20 feet. This type of construction allows for the formation of preferred feeding habitat (depression), which is generally considered attractive to fish. Entrainment of species with a designated EFH is also likely to occur. Adult winter and summer flounder and perhaps some juvenile winter flounder will be entrained and result in their mortality. However, the majority of bottom dwelling EFH species that are found within the SBOBA have matured to a state where the disturbance caused by dredging would alarm them resulting in their successful evacuation of the immediate area to nearby contiguous waters. In addition, EFH species that occupy levels of the water column that are above the sea bottom are located outside and away from the impacted sea floor. Overall, dredging operations at the SBOBA should have nominal mortality on adult and juvenile EFH species.

In general, fish larvae are known to occur in nearshore waters. The USACE (2001) collected larval fish in the nearshore that illustrated a diverse assemblage of fishes representing 33 families. Fish larvae designated as an EFH species are found within the area of the SBOBA. Their occurrence is limited to the upper portion of the water column, which is away from the impacted sea floor and only in restricted numbers. However, it is a possibility that maturing winter flounder larvae can be found at the bottom habitat of the SBOBA; but their quantity is also expected to be limited and restricted just to the springtime. In general, entrainment of ichthyoplankton is likely, but is not expected to have a detectable effect to designated EFH species.

Indirect Impacts

In general, adverse impacts to federally managed fish species stem from alterations of the bottom habitat, which results from dredging in the SBOBA. EFH can be adversely impacted temporarily through water quality impacts such as increased turbidity and decreased dissolved oxygen content. These impacts would subside upon cessation of dredging activities. More long-term impacts to EFH involve physical changes to the bottom habitat, which involve changes to bathymetry, sediment substrate, and benthic community as a food source.

In 1989, the District conducted an investigation to characterize the infauna and epifauna resources at the SBOBA. The results of this study (USACE 1991) and in consultation with the USACE's Engineering and Design Research Center (ERDC) (Burlas 2005, personnel communication) conclude that the infauna communities at the SBOBA and at the offshore borrow areas that were evaluated as a component of the District's BMP

(USACE 2001) are very similar. Since the offshore infauna resources are very similar, it's reasonable to conclude that impacts to the SBOBA fauna community and their subsequent recovery and recolonization rate is comparable to the results of the BMP study. The results of the BMP study are:

- In terms of abundance, diversity and biomass, the infauna resources are expected to recover and recolonize to pre-dredge condition in approximately 8 months, except for sand dollars biomass, which takes about 2 to 2.5 years to recover.

- Borrow area fish showed no detectable changes in abundance, species composition, or feeding habits.

- Important bottom-feeding fish, such as summer and winter flounder, did not appear to rely on the borrow area in particular for food.

- Grain size was smaller/finer due to dredging.

Since the SBOBA is located near land, another anticipated effect of dredging is change in wave refraction. The lowering of the ocean bottom can alter wave height, direction and angle potentially modifying the habitat of the nearby shoreline and intertidal zone. An analysis was performed using a numerical model that was subjected to various scenarios with respect to depth of dredging, frequency of wave occurrence and angle/direction of wave. The results showed that dredging at the SBOBA altered wave refraction, but only nominally. Accordingly, wave impacts to the nearby shoreline and intertidal zone are not expected (USACE 1989).

Table 6: Direct and indirect impacts on identified EFH species for representative life stages

SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
Atlantic cod (Gadus morhua)				**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. **Indirect:** Temporary disruption of benthic food prey organisms.
Whiting (Merluccius bilinearis)	Eggs are pelagic and are concentrated in depth of 50 –150 meters, therefore no direct or indirect effects are expected.	Larvae are pelagic and are concentrated in depth of 50 –150 meters, therefore no direct or indirect effects are expected.	**Direct:** Occur near bottom. Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect:** Temporary disruption of benthic	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. **Indirect:** Temporary disruption of benthic food prey organisms.

Table 6: Direct and indirect impacts on identified EFH species for representative life stages				
SPECIES	**EGGS**	**LARVAE**	**JUVENILES**	**ADULTS**
			food prey organisms.	
Red hake (Urophycis chuss)	Eggs occur in surface waters; therefore, no direct or indirect effects are expected.	Larvae occur in surface waters; therefore, no direct or indirect effects are expected.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect:** Temporary disruption of benthic food prey organisms.	
Witch flounder (Glyptocephalus cynoglossus)		Larvae are typically found in surface waters and would not be affected by dredging Therefore, no direct or indirect impact is expected.		
Winter flounder (Pseudopleuronectes americanus)	Eggs are demersal in very shallow waters (0.5 m) of coves and inlets in spring. Dredging may have some effect on eggs during spring if eggs drift into the SBOBA and are entrained. .	Larvae are initially planktonic, but become more bottom-oriented as they develop. Potential for some to become entrained during dredging in borrow areas.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect**: Temporary disruption of benthic food prey organisms	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. **Indirect:** Temporary disruption of benthic food prey organisms.
Yellowtail flounder (Pleuronectes ferruginea)	Eggs are pelagic, generally over deep water, therefore no direct or indirect effects are expected.	Larvae occur in pelagic waters; therefore, no direct or indirect effects are expected.		
Windowpane flounder (Scopthalmus aquosus)	Eggs occur in surface waters; therefore, no direct or indirect effects are expected.	Larvae occur in pelagic waters; therefore, no direct or indirect effects are expected.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect:** Temporary disruption of benthic prey within SBOBA..	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. . **Indirect:** Temporary disruption of benthic prey within SBOBA.
Atlantic sea herring (Clupea harengus)			**Direct**: Occur in pelagic and near bottom. Physical habitat in borrow site should remain	**Direct: Occur in** pelagic and near bottom. Physical habitat in borrow site should remain

Table 6: Direct and indirect impacts on identified EFH species for representative life stages				
SPECIES	**EGGS**	**LARVAE**	**JUVENILES**	**ADULTS**
			basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect:** None, prey items are planktonic	basically similar to pre-dredge conditions. **Indirect:** None, prey items are primarily planktonic
Monkfish (Lophius americanus)	Eggs occur in surface waters with depths greater than 75 ft; therefore, no direct or indirect effects are expected.	Larvae occur in pelagic waters with depths greater than 75 ft; therefore, no direct or indirect effects are expected.		
Bluefish (Pomatomus saltatrix)	Eggs occur in pelagic waters over the Continental Shelf. No direct or indirect impact is expected.	Larvae occur in pelagic waters over the Continental Shelf. No direct or indirect impact is expected.	**Direct**: Juvenile bluefish are pelagic species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic prey within SBOBA..	**Direct:** Adult bluefish are pelagic species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic prey within SBOBA.
Atlantic butterfish (Peprilus tricanthus)			**Direct:** Juvenile butterfish are pelagic species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic prey within SBOBA..	
Summer flounder (Paralicthys dentatus)			**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect:** Temporary disruption of benthic prey within SBOBA..	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. **Indirect:** Temporary disruption of benthic prey within SBOBA.
Scup (Stenotomus chrysops)			**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. **Indirect:** Temporary disruption of benthic prey within SBOBA..	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Adults should be capable of relocating during impact. **Indirect:** Temporary disruption of benthic prey within SBOBA..
Black sea bass			**Direct:** Physical	**Direct:** Physical

Table 6: Direct and indirect impacts on identified EFH species for representative life stages				
SPECIES	**EGGS**	**LARVAE**	**JUVENILES**	**ADULTS**
(Centropristus striata)			habitat in borrow sites should remain basically similar to pre-dredge conditions. Some mortality of juveniles could be expected from entrainment into the dredge **Indirect:** Temporary disruption of benthic prey within SBOBA..	habitat in borrow sites should remain basically similar to pre-dredge conditions. **Indirect:** Temporary disruption of benthic prey within SBOBA..
Ocean quahog (Artica islandica)				**Direct:** No adult quahogs were found in the SBOBA.
King mackerel (Scomberomorus cavalla)	**Direct Impacts:** Eggs are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** None anticipated.	**Direct Impacts:** Larvae are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** None anticipated.	**Direct Impacts:** Juveniles are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** Temporary disruption of benthic prey within SBOBA., however, mackerel are highly motile.	**Direct Impacts:** Adults are pelagic and highly motile, therefore no adverse impacts are anticipated. **Indirect Impacts:** Temporary disruption of benthic prey within SBOBA., however, mackerel are highly motile.
Spanish mackerel (Scomberomorus maculatus)	**Direct Impacts:** Eggs are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** None anticipated.	**Direct Impacts:** Larvae are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** None anticipated.	**Direct Impacts:** Juveniles are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** Minor indirect adverse effects on food chain through disruption of benthic community, however, mackerel are highly motile.	**Direct Impacts:** Adults are pelagic and highly motile, therefore no adverse impacts are anticipated. **Indirect Impacts:** Minor indirect adverse effects on food chain through disruption of benthic community, however, mackerel are highly motile.
Cobia (Rachycentron canadum)	**Direct Impacts:** Eggs are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** None anticipated.	**Direct Impacts:** Larvae are pelagic, therefore no adverse impacts are anticipated. **Indirect Impacts:** None anticipated.	**Direct:** Cobia are pelagic and migratory species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic prey within SBOBA..	**Direct:** Cobia are pelagic and migratory species. No significant direct effects anticipated. **Indirect** Temporary disruption of benthic prey within SBOBA..
Dusky shark (Charcharinus obscurus)		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Mortality from dredge unlikely because embryos are reported up to 3 feet in length (McClane, 1978). Therefore, the newborn may be	Due to the motility of this life stages, no direct or indirect impact is expected.	

Table 6: Direct and indirect impacts on identified EFH species for representative life stages				
SPECIES	**EGGS**	**LARVAE**	**JUVENILES**	**ADULTS**
		mobile enough to avoid a dredge. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within SBOBA.		
Sand tiger shark (*Odontaspis taurus)*		No direct of indirect effects are expected because they occur outside of the study area.		
Sandbar shark (Charcharinus plumbeus)		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of larvae may be possible from entrainment into the dredge **Indirect** Temporary disruption of benthic prey within SBOBA.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Juveniles are motile and are capable of avoiding impact areas. **Indirect** Temporary disruption of benthic prey within SBOBA.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Adults are highly motile and are capable of avoiding impact areas. **Indirect** Temporary disruption of benthic prey within SBOBA.
Tiger shark (Galeocerdo cuvieri)		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of larvae may be possible from entrainment into the dredge.		
Shortfin mako shark (*Isurus oxyrhyncus*)		**Direct:** May be entrained into the dredge. However, due to the vertical distribution of this life stages, no more than minimal impact is expected. No indirect impacts are expected.		
Bluefin tuna (*Thunnus thynnus*)			No more than minimal direct or indirect impact is expected because of their vertical distribution (surface waters) and high motility would avoid dredge entrainment.	
Skipjack tuna (*Katsuwonus pelamis)*				No more than minimal direct or indirect impact is expected because of their vertical distribution

Table 6: Direct and indirect impacts on identified EFH species for representative life stages				
SPECIES	**EGGS**	**LARVAE**	**JUVENILES**	**ADULTS**
				(surface waters) and high motility would avoid dredge entrainment
Clearnose skate (*Raja eglanteria*)			**Direct:** Some skates will get entrained into the dredge. Indirect: Temporary disruption of benthic prey within SBOBA.	**Direct:** Some skates will get entrained into the dredge, but have the ability to avoid entrainment. Indirect: Temporary disruption of benthic prey within SBOBA.
Little skate (*Leucoraja erinacea*)			**Direct:** Some skates will get entrained into the dredge. **Indirect:** Temporary disruption of benthic prey within SBOBA.	**Direct:** Some skates will get entrained into the dredge, but have the ability to avoid entrainment. **Indirect:** Temporary disruption of benthic prey within SBOBA.
Winter skate (*Leucoraja ocellata*)			**Indirect:** Temporary disruption of benthic prey within SBOBA.	**Indirect:** Temporary disruption of benthic prey within SBOBA

Cumulative Impacts

The USACE is also involved with beach nourishment along the middle and southern portions of New Jersey, as well as along Long Island, New York. Their proposed offshore borrow areas have similar characteristics to the SBOBA with respect to fauna and epifauna resources, grain size, water depth and gently sloping bathymetry. The removal of sand is expected to be the same because a hopper dredge or sometimes perhaps a cutter-head dredge will be used. Likewise, the depth of dredging will not exceed 20 feet below existing grade. Finally, these potential borrow may be considered large from an individual spatial perspective but they're insignificant when examined to the totality of nearshore sandy bottom habitat available for EFH species.

Given all these similarities, it is realistic to conclude that the effects to EFH species at these borrow areas are alike. Accordingly, as previously discussed in the above direct impact section, the cumulative direct impacts on designated EFH species are not considered significant. In the same manner, cumulative indirect effects to the recovery of benthic resources and the change in water quality variables are considered minor and temporary in nature.

IX MITIGATION

Through avoidance and minimization practices, the District plans to minimize adverse effects to designated EFH species and other aquatic resources that use or migrate thought the SBOBA by implementing the following procedures:

- The pumps that extract the sand will not be turned on until the drag-head is at or near the sea bottom and will be turned off prior to its being lifted from the sea bottom. The implementation of this measure will eliminate the entrainment of resources that occupy areas in the lower, middle and upper levels of the water column. This practice is common because it facilitates optimal operating efficiency to reduce operating costs.

- The maximum depth that will be dredged for each dredging event will not exceed 20 feet below existing grade. This practice will avoid making deep holes, thus minimizing the potential to create anoxic environments.

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APPENDIX F

CLEAN WATER ACT Section 404 (b) (1)

SECTION 404 (b) (1) GUIDELINES EVALUATION RARITAN BAY AND SANDY HOOK BAY, NEW JERSEY HURRICANE SANDY LIMITED REEVALUATION REPORT FOR COASTAL STORM RISK MANAGEMENT UNION BEACH, NEW JERSEY

INTRODUCTION

This document presents an evaluation of the Raritan Bay and Sandy Hook Bay, New Jersey Hurricane Sandy Limited Reevaluation Report for Coastal Storm Risk Management, Union Beach, NJ (Study) pursuant to the Clean Water Act section 404 (b)(1) guidelines. Specifically, this document evaluates the proposed construction of a sand dune and beach berm, levees, floodwalls, storm gates, revetments, and terminal groins along the coast of Union Beach, NJ from Chingarora Creek to East Creek.

404(b) (1) EVALUATION

I. Study Description

A. Location - The Study area is located in the northern portion of Monmouth County in Union Beach, NJ. The Study area is defined by Raritan Bay to the north, the Township of Hazlet to the south, the Borough of Keansburg to the east, and Chingarora Creek to the west. The Study area occupies a 1.8 square mile area of land along the coast of Raritan Bay between Chingarora Creek and East Creek.

B. General Description - The Study consists of a 3,160-ft-long and 50-ft-wide storm protection dune with a + 17 ft NGVD29 surface elevation, landward slope of 1 Vertical 5 Horizontal, and seaward slope of 1 Vertical:10 Horizontal along the shoreline from Conaskonk Point and Flat Creek. A beach berm, with a varying width between 50 – 164 ft extending seaward, would be located adjacent to the dune with subsequent re-nourishment scheduled throughout the Study's 50-year life. The constructed beach berm would have an elevation to +9 ft NGVD29 and a seaward slope of 1 Vertical: 15 Horizontal.

The eastern terminal groin would be 228 ft long and the western terminal groin would be 245 ft long. Two revetments would be placed in conjunction with the groins a 405-ft-long revetment on the northwest of the dune and a 630-ft-long revetment on the southeast of the dune. The northwestern revetment would have a slope of 1 Vertical: 2.5 Horizontal below +9 ft NGVD29 and a slope of 1 Vertical: l0 Horizontal above +9 ft NGVD29. The southeastern revetment would have a slope of 1 Vertical: 2.5 Horizontal below +9 ft NGVD29 and a slope of 1 Vertical: 10 Horizontal above +9 ft NGVD29. The terminal stone groins would have a crest elevation of +10 ft NGVD29 near the construction berm, which, will decrease in the seaward direction to +6 NGVD29 with a slope of 1 Vertical: 5 Horizontal. Offshore, the terminal stone groins will have a maximum elevation of +6 ft NGVD29 and decreasing towards the seaward ends of the terminal groins at a slope of 1 Vertical: 2 Horizontal. Side slopes along the length of the terminal groins will be 1 Vertical: 2 Horizontal.

Levees totaling 6,803 ft long (2,243 ft near Chingarora Creek and 4,560-ft near Flat and East creeks) would be constructed with a 10-ft crest width, a crest elevation of +15 ft NGVD29, and 2.5:1 side slopes. A 3,338-ft-long interior levee would be constructed between Flat and East creeks with a 2-ft crest width, a crest elevation of +8 ft NGVD29, and 2:1 side slopes. A 10,977 ft-long T-wall on piles floodwall would be constructed near Chingarora Creek. A 1,929-ft-long T wall on pilings would be placed near Flat and East creeks. The vertical floodwalls would have a maximum top elevation of +15 ft NGVD29.

Sluice gate storm barriers would be constructed at East Creek (35 feet long and +20 feet NGVD29) and Flat Creek (35 feet long and +20 feet NGVD29). The East Creek pump station would provide a maximum flow of 100 cfs; the Flat Creek pump station would provide a maximum of 250 cfs. The Chingarora Creek Pump station would provide with 40 cfs to revert water flow during storm events. In addition, road closure gates, stormwater retention basins, and environmental mitigation would be implemented in Chingarora, Flat, and East Creeks.

C. Authority and Purpose - The USACE's involvement in Raritan Bay and Sandy Hook Bay, New Jersey planning was first authorized in 1955 with a second study authorization issued in 1990. Construction of the Authorized Project was issued in 2007, and this reevaluation was authorized in accordance with P.L. 113-2 in 2013. The supplemental Environmental Assessment was developed pursuant to the requirements of the National Environmental Policy Act (NEPA) for the purpose of providing hurricane and storm damage risk reduction measures against wave attack, recession, and long-term erosion.

D. General Description of Fill Material - Construction of the storm protection dune, berm, terminal groins, and levees would require the placement of armor stone, under layer stone, bedding stone, and sand.

1. General Characteristics of Material - Sand would be required to construct the protection dune. Quarry stone, core, and bedding stone would be used to construct the two terminal revetments. Armor stone, underlayer stone, and bedding stone would be used for the construction of the revetments. Structural fill would be required to stabilize the levee/floodwall. The floodwalls would be constructed as a T-type floodwall on pile foundation.

2. Quantity of Material - Construction of the sand dune, berm, levees, revetment, and terminal groins would require the following quantities of materials (estimated): Beach and dune construction would require approximately 688,000 cubic yards (cy) of sand fill for initial fill and approximately 21,000 cy of sand would be required at 9-year intervals over the 50-year life of the Study. The terminal groin heads will be constructed with 4-ton armor stone over 2 to 40 pound (lb) core and bedding stone. The trunks of the groins will be constructed of 11-ton quarry stone and 2,200 lb core stone placed over 6 to 110 lb core and bedding stone. The northwest revetment would require two layers of 1,650 to 2,750 lb armor stone, two layers of 165 to 275 lb underlayer stone, and two layers of 1 to 11 lb bedding stone. The southeast revetment would require two layers of 1,875 to 3,125 lb armor stone, two layers of 188 to 313 lb underlayer stone, and two layers of 1 to 13 lb bedding stone. The total combined fill volume for the two levees would require 81,500 cubic yards of structural fill. The interior levee would require 3,997 cubic yard of structural fill.

3. Source of Material - Sources for fill material may include on-site and off site substrate dependent upon the composition of soils at the site-specific locations. Rocks and concrete materials will be obtained from commercial sources proximal to the Selected Plan. The sand used to fortify the duns and berm will come from an offshore borrow area.

E. Proposed Discharge Site

a) Location - The Study area location is described in I (a), above.

b) Size - The size/dimensions of the hurricane and storm damage reduction measures are described in I (d), above.

c) Type of Sites/Habitat - The potential hurricane and storm damage reduction measures would result in the following cover type impacts: 20.2 acres of wetland.

d) Time and Duration of Disposal - The Selected Plan will be constructed in various elements over a two-year period. Construction of the first elements is projected to begin in 2017.

2. Disposal Method - Construction equipment such as bulldozers, backhoes, and dump trucks will be used. Hydraulic dredging equipment to be used at the off shore borrow areas will be selected by the construction contractor.

II. Factual Determinations

A. Physical Substrate Determination

1. Substrate Elevation and Slope - The ground surface elevation along the western alignment varies from +3 to +12 NGVD29. The ground surface elevation along the eastern alignment varies from + 6 to +12 ft NGVD. The ground surface elevation along the Raritan Bay shoreline varies from +2 to +10ft NGVD29.

2. Sediment Type - The fill layer, the top layer of soil, along the western alignment varies from 0 to 6 ft and contains some cinders, bricks, wood, and glass. This layer overlies a deep silty layer with no uniform sub layers. The fill layer, along the eastern alignment varies from 0 to 2 ft followed by natural silty sands. The thickness of the sand layer varies from 6 to 15 ft. Stiff clayey silt with occasional pockets of organic material underlies the sand layer with its thickness varying from 15 to 60 ft. Dense strata of sand and clay soils exist below the clayey silt. The top layer along the Raritan Bay shoreline is silty sand with a thickness varying form 1 – 5 ft. An underlying layer of clayey silt with pockets of clay and silt exists from 0 to 16 ft. A very soft layer of organic material extends eastward from the mouth of Flat Creek, with its thickness varying from 4 to 50 ft and depth ranging from 13 to 20 ft.

3. Dredged Material Movement - As a result of the wave action from the Raritan Bay, eroded fill material from the beach berm would move in a westerly direction.

4. Physical Effects on Benthos - Some benthic invertebrates may be buried or smothered under the footprint of the beach berm. However, long-term adverse effects to benthic communities are not anticipated.

5. Other Effects - No major impacts are anticipated.

6. Action to Minimize Impacts - The Selected Plan was specifically designed to minimize impacts and to fill areas necessary for a comprehensive hurricane and storm damage reduction plan.

B. Water Circulation. Fluctuations, and Salinity Determinations

1. Water

a) Salinity - Impacts to salinity are expected to be minimal and short term as a result of the gates. The gates would be closed infrequently and only during unusually heavy coastal storms. Otherwise, the gates would be open and have been designed to not constrain tidal processes therefore allowing normal circulation and tidal inundation after construction is completed.

b) Water Chemistry- No impacts are anticipated.

c) Clarity - Temporary increases in turbidity and suspended sediment during hydraulic dredging and placement of sand along the beach. However, no long-term impacts are anticipated because the fill material consists of coarse sand that would quickly settle out of the water column. The selected plan is expected to cause short-term, localized increase in surface water turbidity and push the subtidal and intertidal zones further offshore. Smothered sessile shellfish are expected to colonize the new substrate rapidly from the surrounding areas (Wilber and Clarke, 1998). Short-term reduction in shellfish feeding efficiency and localized mortality would be offset by the overall benefit of additional sand, which is considered of a high quality benthic substrate material.

d) Color - Minor, temporary changes may occur due to the generation of suspended solids during hydraulic dredging and storm surge barrier and beach berm construction

e) Odor - Not measurable

f) Taste - Not Applicable

g) Dissolved Gas Levels - Potential short-term localized decrease in dissolved oxygen could occur if organic material is suspended in the water column. The source material is expected to include a very small organic fraction.

h) Nutrients - No major impacts are anticipated

i) Eutrophication - Not Applicable

j) Other - Not Applicable

2. Current Pattern and Circulation

a) Current Pattern and Flow - No impacts are anticipated.

b) Velocity - The placement of the fill materials, revetments, terminal groins, levees, and floodwalls are not anticipated to have significant impacts to current velocity.

c) Stratification - Not Applicable

3. Normal Water Level Fluctuations - Calculations have been conducted for the 2016 HSLRR proposed project that allows for the anticipated composite erosion rate for the beaches and has compensated for the projected sea level rise during the 50-year project life. The gates would close during a storm event to prevent tidal flooding of the adjacent communities. The gates would be open at all other times; therefore, normal water level fluctuations would be expected.

4. Salinity Gradients - No impacts are anticipated.

5. Actions that will be Taken to Minimize Impacts - Not Applicable

C. Suspended Particulate/Turbidity Determination

1. Expected Changes - Short-term, localized increases are expected during dredging/pumping activities. The 2016 HSLRR project is expected to cause short-term, localized increase in surface water turbidity and push the subtidal and intertidal zones further offshore. Smothered sessile shellfish are expected to colonize the new substrate rapidly from the surrounding areas (Wilber and Clarke, 1998). Short-term reduction in shellfish feeding efficiency and localized mortality would be offset by the overall benefit of additional sand, which is considered of a high quality benthic substrate material.

2. Effects on Chemical and Physical Properties of the Water Column

a) Light Penetration - Sediment dominated by coarse textured soil material would settle rapidly out of the water column. Minor, temporary impacts may be anticipated.

b) Dissolved Oxygen - Minor, temporary impacts may be anticipated in-stream during the construction of the gates. Potential short-term, localized decrease in dissolved oxygen could occur if organic material is suspended into the water column.

c) Toxic Metals and Organics - No adverse effects are anticipated.

d) Pathogens - Not Applicable.

e) Aesthetics - The installation of the dune and beach berm would increase the aesthetic character of the shoreline area. The levees and floodwalls would be constructed and landscaped in a manner considered generally pleasing to the public. Temporary increase in turbidity may affect water clarity along the shoreline.

f) Others as Appropriate - Not Applicable.

3. Effects on Biota

a) Primary Production, Photosynthesis - Potential short-term disruption as a result of berm construction. No long-term effects are anticipated.

b) Suspension/Filter Feeders - No major impacts are anticipated. Potential short-term disruption during construction.

c) Sight Feeders - Fish and motile invertebrates are generally capable of avoiding areas of degraded water quality. Short-term impacts to fish mobility may occur during severe storm events when the gates are closed. Otherwise, no significant impacts are anticipated.

4. Action to Minimize Impacts - In-stream construction activity has been reduced from original plans such that only the minimum amount of in stream and near-stream construction necessary to complete the 2016 HSLRR would occur.

D. Contaminant Determination - Sand for the beach fill and nourishment will not consist of contaminated material. Assessment of the sand sources was conducted as a separate evaluation. No major pollutant sources or contaminant concerns have been identified within the Study area.

E. Aquatic Ecosystems and Organisms Determination

1. Effects on Plankton/Nekton - Nekton that do not leave the Study area might experience short-term impacts if their gills become blocked or irritated by suspended sediment during the construction period. However, new beach berm, revetments, terminal groins, and storm gates may provide additional habitat for sessile aquatic vegetation and invertebrates. No significant resident aquatic resources are identified in the Study area. Long-term impacts are not anticipated.

2. Effects on Benthos - The 2016 HSLRR proposed plan is expected to have a direct, short-term impact on benthic resources. Beach nourishment is expected to smother benthic organisms causing their mortality. However, this impact is expected to be temporary and limited to the placement area during construction. The recovery of benthic resources to pre-construction conditions is expected to begin immediately after the placement of sand, and these resources are expected to recover within a 6-month period (USACE 1999). The 2016 HSLRR proposed plan may benefit horseshoe crabs, which are an important food source for numerous species of migratory birds along the Atlantic migratory pathway. A wider, sandy beach and improved intertidal habitat conditions may provide more suitable spawning habitat for the horseshoe crab, thus potentially increasing prey resources available for consumption by migratory birds. I t is well documented that the timing of the spring migration for many species is linked to the spawning activity of the horseshoe crab (Brady and Schrading 1997). Based on the variables identified in the USFWS's Habitat Suitability Index Model for the horseshoe crab, the 2016 HSLRR proposed plan will result in increased suitability of the beach area for horseshoe crab spawning (Brady and Schrading 1997). Long-term impacts are not anticipated.

3. Effects on Aquatic Food Web - No long-term adverse effects are anticipated. However, the selected plan is expected to have an indirect, short-term impact on food availability for benthic-feeding EFH designated species in the immediate beach fill placement areas. Long-term benefits

may result from the creation of additional habitat and the protection of nekton, and sessile aquatic vegetation and invertebrates, thus, increasing the area's overall productivity.

4. Effects on Special Aquatic Sites

a) Sanctuaries and Refuges – Not Applicable

b) Wetlands – Construction of the levees, floodwalls, and gates will impact up to 20.2 acres of wetlands. All impacted wetlands will be mitigated according to NJDEP and USFWS policies.

c) Mud Flat - Construction of the berm, revetment, and terminal groin would cause filling of the existing mud flat and burial of some benthic species. However, recolonization is expected, therefore no long-term impacts are anticipated.

d) Vegetated Shallows - Construction of the berm, revetment, and terminal groin would cause burial of the vegetated shallows. However recolonization is expected, therefore no long-term impacts are anticipated.

e) Bay Shoreline - Approximately 3,160 ft of Union Beach shoreline would be temporarily impacted during dune and beach berm, revetment, and terminal groin, and levee/floodwall construction.

f) Riffle and Pool Complexes – Not Applicable.

5. Threatened and Endangered Species - No adverse impacts to federal or state listed endangered or threatened species are anticipated from construction and maintenance of the Selected Plan. The loggerhead (*Caretta caretta*), the Kemp's ridley (*Lepidochelys kempi*), the green (*Chelonia mydas*) and the leatherback (*Dermochelys coriacea*) turtles may be found in the borrow site.

Three species of state and federally listed whales may also occur within the (offshore) project area. These species include the endangered North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), and fin or finback whale (*Balaenoptera physalus*). All are listed as endangered.

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus)* is anadromous, spending the majority of their adult phase in marine waters, returning to their natal freshwater rivers to spawn. Five DPS of Atlantic sturgeon were listed as threatened or endangered under the Endangered Species Act, including a New York Bight DPS.

Implementing the NMFS recommended resource management plans (RMPs) (including use of the deflector head, the instituted take statement, dredging only between November and May, and a long record of little to no dredge related impacts to any ESA species over the past 25 years), significant impacts that would jeopardize any local or regional population of ESA species is not anticipated. The National Marine Fisheries Service makes the same conclusion as they state in section 10 of their BO:

"*the proposed actions may adversely affect but are not likely to jeopardize the continued existence of any DPS of Atlantic sturgeon, Kemp's ridley and loggerhead sea turtles and is not likely to adversely affect leatherback or green sea turtles or right, humpback or fin whales. Because no critical habitat is designated in the action area, none will be affected by the action.*"

The New Jersey Natural Heritage Program (NJNHP) listed the endangered least tern, and the threatened yellow-crowned night heron and osprey as potentially located within the general vicinity of the Study Area (Breden 2000). The state listed Osprey (*Pandion haliaetus*) has been observed in the Study Area and there are nesting platforms in the Study Area. Platforms will be moved during the non-breeding season prior to construction. The District anticipates no adverse effects to these species as a result of the 2016 HSLRR proposed project construction and maintenance.

Federally listed species identified near the Union Beach Study area include the federally listed threatened piping plover (*Charadrius melodus*), a federally listed threatened plant, the seabeach amaranth (*Amaranthus pumilus*), a federally listed threatened bird the rufa red knot (*Calidris canutus rufa),* and the federally listed (threatened) northern long-eared bat (*Myotis septentrionalis)*.

The finding is a determination of may affect, but not likely to adversely affect, for the piping plover.

The finding is a determination of no effect to the seabeach amaranth.

The finding is a determination of may affect, but not likely to adversely affect the rufa red knot.

The finding is a determination of may affect, but not likely to adversely affect the northern long-eared bat.

The state-listed endangered least tern (*Sterna antillarum*) has been known to occur within 4 miles of the Union Beach Study area. Benefits to piping plovers, least terns, and seabeach amaranth may result by the implementation of the selected plan. The construction of a wider beach may restore suitable nesting habitat for the piping plover, least tern, and other shorebirds, as well as habitat for seabeach amaranth. In response to recommendations from the U.S. Fish and Wildlife Service (USFWS), the

District will conduct annual surveys for protected shorebirds and plants for the first five years following construction and each renourishment. If any species of concern are/is identified, the District will initiate a management program to provide education programs for the local municipalities and protection measures such as symbolic fencing. The District would also re-initiate Section 7 consultation with the USFWS prior to each re-nourishment cycle.

6. Other Wildlife - No significant adverse impacts anticipated. A much larger and wider sandy beach created by the construction of the Selected Plan should provide more roosting habitat for wintering waterfowl and increase the amount of potential nesting habitat for shorebirds. The implementation of the 2016 HSLRR proposed project will provide immediate and long-term benefit to the existing dune ecosystem. These dunes, that represent a habitat unique within the RBSHB estuary, are currently experiencing erosion during each high tide and excessive erosion during storm events. Furthermore, a wider, sandy beach and improved intertidal habitat conditions may provide more suitable spawning habitat for the horseshoe crab, thus potentially increasing prey resources available for consumption by migratory birds. It is well documented that the timing of the spring migration for many species is linked to the spawning activity of the horseshoe crab (Brady and Schrading 1997).

7. Actions to Minimize Impacts - Pre-construction monitoring for piping plovers and seabeach amaranth will be conducted prior to construction to ensure that implementation of the 2016 HSLRR proposed project will not adversely affect these species. Observation of environmental windows to reduce the risk of implementing the 2016 HSLRR proposed project.

F. Proposed Disposal Site Determination

1. Mixing Zone Determination - Because of the short-term duration of the effects, the vertical and horizontal mixing zones are negligible.

2. Determination of Compliance with Applicable Water Quality Standards - State water quality standards should not be exceeded by construction of the Selected Plan.

3. Potential Effects on Human Use Characteristic

a) Municipal and Private Water Supply - Not Applicable

b) Recreational and Commercial Fisheries - No commercial fisheries are located within the study area. Minimal adverse impacts to sport fishery may occur during construction. The restoration of a much wider beach is expected to improve recreational surf fishing opportunities.

c) <u>Water-Related Recreation -</u> Short-term degradation of quality due to turbidity may occur during the construction period. Increased long-term opportunities are likely due to the expansion of the existing beach area. The implementation of the selected plan can provide benefits to vessel and boating. The burial of wood pilings can be considered a benefit to navigation. Once buried, these structures would lose the ability to dislodge and become floating hazards to recreational boats and commercial vessels.

d) <u>Parks, National and Historical Monuments, National Seashores, Wilderness Areas. Research Sites, and Similar Preserves -</u> No impacts are anticipated.

e) <u>Determination of Cumulative Effects on the Aquatic Ecosystem -</u> No long-term adverse effects are anticipated. Construction of the beach berm may cause a temporary short-term impact to benthic and shallow aquatic plant species, and availability of spawning beds. However, recolonization of the study area is expected upon completion of construction

f) <u>Determination of Secondary Effects on the Aquatic Ecosystem -</u> No major impacts are anticipated. However, temporary short-term effect on food availability may be experienced by some fish species.

III. <u>Findings of Compliance or Noncompliance</u>

A. No significant adaptations of the guidelines were made relative to this evaluation.

B. Several alternatives to the alleviation of the hurricane and storm damage problem in the Study area were considered. The Selected Plan was determined to be the most practicable and feasible in accordance with the planning objectives.

C. The Study does not appear to violate applicable state water quality standards or effluent standards.

D. The Study will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

E. The Study will have no significant adverse impact on endangered species or their critical habitats as defined by the Endangered Species Act of 1973.

F. The Study will have no impacts on marine sanctuaries designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

G. The discharge of dredged material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Significant adverse effects on aquatic ecosystem diversity productivity and stability, and recreational, aesthetic, and economic values will not occur.

H. Appropriate steps to minimize potential adverse impacts of the discharge on aquatic systems include good engineering practices.

I. Based on the guidelines, the proposed discharge site fill material is specified as complying with the requirements of these guidelines.

IV. Conclusions

Based on all of the above, the Study is determined to comply with the Section 404(b) (1) Guidelines, subject to appropriate and reasonable conditions, to be determined on a case-by-case basis, to protect the public interest.

APPENDIX G

BIOLOGICAL ASSESSMENT AND BIOLOGICAL OPINION FOR USE OF SEA BRIGHT BORROW AREA

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT

BIOLOGICAL ASSESSMENT FOR: THE POTENTIAL IMPACTS TO FEDERAL ENDANGERED AND THREATENED SPECIES FROM BEACH NOURISHMENT PROJECTS UTILIZING THE SEA BRIGHT OFFSHORE BORROW AREA: UNION BEACH, PORT MONMOUTH AND ELBERON TO LOCH ARBOUR, NEW JERSEY

October 2013

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Appendix A – Letter Documenting March 8, 2013 Meeting/Conference between the New York District and NMFS to Discuss ESA Consultation and EFH Coordination Post Sandy

1.0 INTRODUCTION

This Biological Assessment (BA) is submitted to the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) by the U.S. Army Corps of Engineers (USACE)-New York District (District) as part of the formal consultation process under Section 7 of the Endangered Species Act (ESA), as amended November 10, 1978. Due to the impacts of Hurricane Sandy on October 29, 2012 in the District's Area of Responsibility (AOR), and the resulting accelerated schedules of multiple proposed construction projects, NMFS and the District NYD agreed to "batch" multiple projects into several consultations based on project schedule (see Appendix A). This BA assesses the potential impacts to threatened and endangered species from construction of three proposed shore protection and/or flood risk management projects: Elberon to Loch Arbour; Union Beach; and Port Monmouth.

All three projects are congressionally authorized Federal projects lead by District and sponsored by the New Jersey Department of Environmental Protection. The projects propose to nourish each beach using sand from the Sea Bright Offshore Borrow Area (SBOBA) located 1-3 miles offshore of the southern end of Sandy Hook, NJ (USACE-WES 1996). Each project also proposes to construct structures along the shoreline, and ultimately aims to reduce damages from storm events.

Section 7 of the ESA requires that a BA be prepared for all major Federal actions when a federally listed or proposed endangered or threatened species may be affected. In 1995, a BA for whales and sea turtles was completed for similar beach nourishment projects on the South Shore of Long Island and the northern New Jersey (NJ) shore, including Elberon to Loch Arbour (Sandy Hook to Manasquan). In 2001, a Draft BA was completed for impacts to sea turtles for Beach Renourishment and Offshore Borrowing in the Raritan Bay Ecosystem, including an evaluation of Union Beach (USACE-NYD 2001A). The purpose of this BA is to: address potential impacts to the Atlantic sturgeon, which was recently listed under the ESA (Federal Register Vol 77, No. 24, Monday February 6, 2012; 50 CFR Part 224); to update the existing beach nourishment consultations to include Elberon to Loch Arbour, Union Beach and Port Monmouth for listed sea turtles and whales; and to acknowledge the change to the listing of loggerhead sea turtles[1].

2.0 PROJECT BACKGROUND AND GENERAL DESCRIPTION OF THE PROJECT

Since the 1950's, USACE has been involved in the construction of shore protection projects (USACE-ERDC 2007), which are currently ongoing in the District's AOR. The impacts of Hurricane Sandy resulted in severe damage to the coastline, including the three areas covered by the projects discussed in this BA, thereby increasing the risks and vulnerability of the shore communities from future storm events (ASA 2013). In response and with the aid of the Disaster Relief Appropriations Act of 2013 (DRAA), the USACE has accelerated the schedules of many

[1] On March 16, 2010, NOAA published a proposed rule to list two distinct population segments (DPS) of loggerhead sea turtles as threatened and seven distinct population segments of loggerhead sea turtles as endangered (75 FR 12598). On September 16, 2011, a final listing determination was made designating the Northwest Atlantic Ocean DPS, South Atlantic Ocean DPS, Southeast Indo-Pacific Ocean DPS, and the Southwest Indian Ocean DPS as threatened. The Northeast Atlantic Ocean DPS, Mediterranean Sea DPS, North Indian Ocean DPS, North Pacific Ocean DPS, and South Pacific Ocean DPS have been designated as endangered (76 FR 58868). The listing became effective October 24, 2011, at which time, the species of loggerhead likely to be present in the action area went from globally listed threatened loggerhead, to the threatened Northwest Atlantic distinct population segment of loggerhead.

authorized storm damage reduction projects, including Union Beach, Elberon to Loch Arbour and Port Monmouth.

This assessment covers two projects in Raritan Bay (Union Beach and Port Monmouth) and one along the Atlantic Coast/NJ Shore (Elberon to Loch Arbour). Each proposed project, under separate authorizations and contracts, would dredge sand from the SBOBA for placement on the shoreline (Figure 1). The SBOBA is a 3-square mile area located 1-3 miles offshore of the southern end of Sandy Hook, NJ (USACE-WES 1996) and has been used for previous beach nourishment jobs. The mean water depth of the borrow area is 50 feet (USACE-NYD 2006).

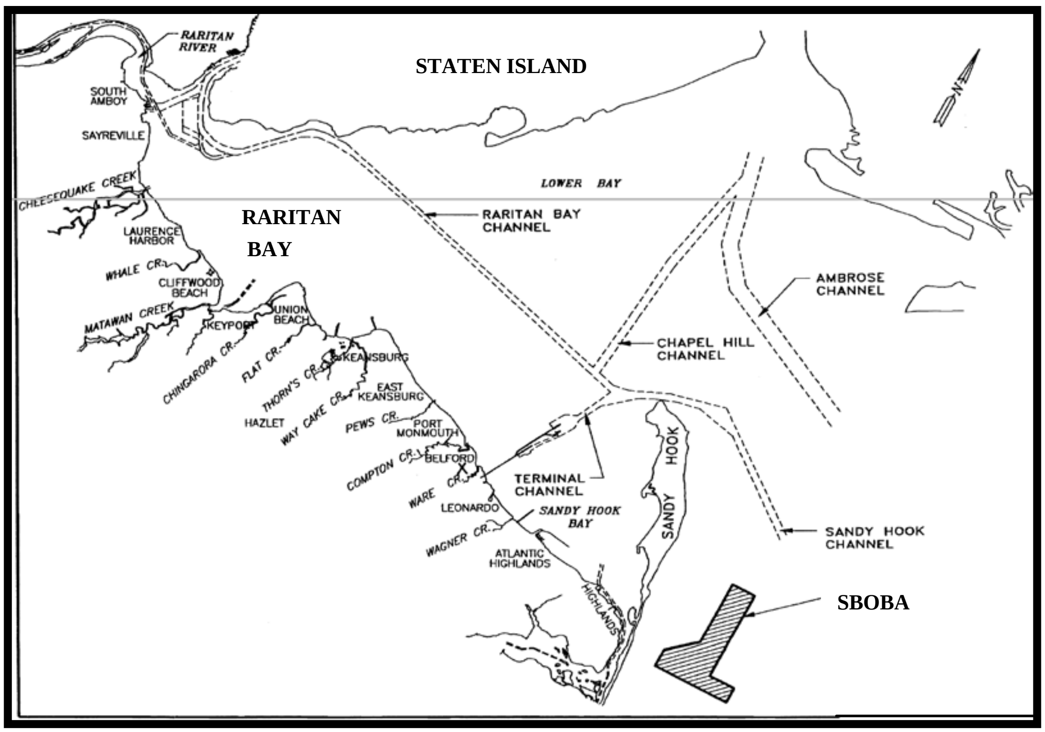

Figure 1: Location of the Sea Bright Offshore Borrow Area (SBOBA).

The order in which each project is currently scheduled for construction is Port Monmouth, Elberon to Loch Arbour, and Union Beach (schedule not yet determined).

2.1 PORT MONMOUTH

Construction of the Port Monmouth project was authorized under Section 101 of the Water Resources Development Act of 2000 but funds were never appropriated for its construction, making this an authorized but unconstructed project, in accordance with DRAA. Port Monmouth is located on Raritan Bay, NJ and is bordered by East Keansburg and Belford. The proposed project is separated into 2 components: Shore Protection and Flood Risk Management. Both phases have gone through the NEPA process, with a Record of Decision completed in May 2008 for both phases, and a Finding of No Significant Impact issued in February 2009 for a minor change to the Shore Protection design.

The Shore Protection component would extend from Pews Creek to the west and Compton Creek to the east (see Figure 2). This phase is currently scheduled for construction in the fall of 2013 and would be constructed prior to the Flood Risk Management component. It aims to reduce damages from coastal erosion and tidal inundation along the project's bay shoreline. Construction award is anticipated to occur in March 2014 and would last for approximately 13 months. The schedule and project duration could change based on contractual issues, inclement weather, equipment failures or other unforeseen circumstances.

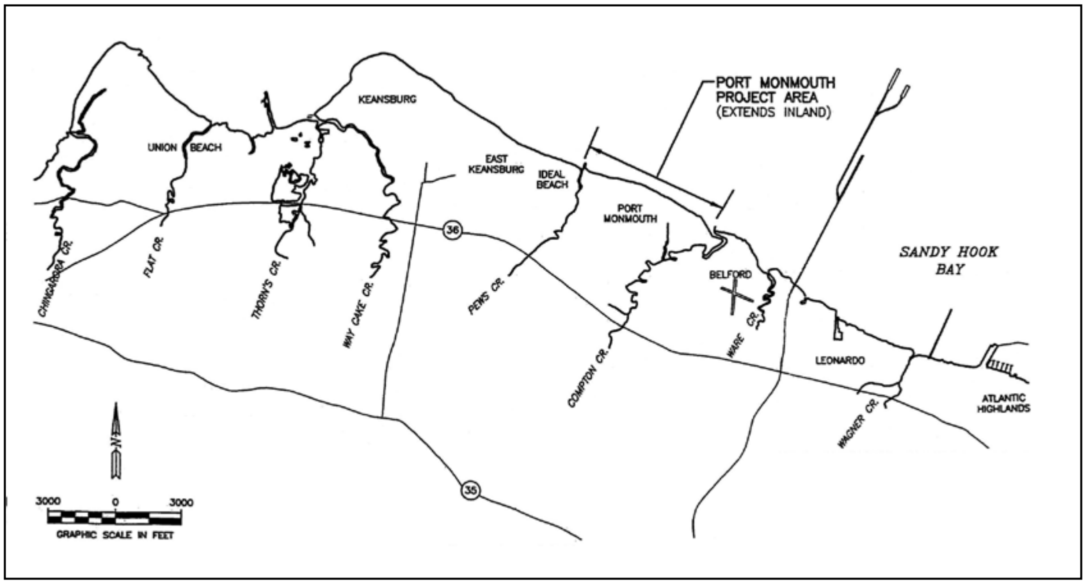

Figure 2: Location of Port Monmouth Project Area.

Several elements are proposed for construction:

1. Beach Nourishment and Sand Dune/Berm:
   a. Initial dredging of approximately 391,000 cubic yards (CY) of sand would occur at the SBOBA via a hopper dredge. The sand would be placed along approximately 3,300 linear feet of shoreline, and would include reconstruction of an existing dune.
   b. The hopper would dredge the material from the borrow area, sail to a pumpout area, and connect to a pumpout barge where it would pump the material from the hopper onto the shoreline via a pipeline. The approximate distance from the SBOBA to the pump out station is anticipated to be approximately 16 miles. The duration of actual dredging at the SBOBA would vary depending on the method used by the Contractor, including the number of dredges and size of the dredges. The dredge would vary from medium sized (e.g., the Padre Island and Dodge Island) to a larger sized dredge operating with two drag arms (e.g., The Terrapin Island). There are too many variables involved to predict the exact way in which the Contractor would carry out the sand nourishment operation (i.e., the dredge size or capacity to hold sand; the number of dredges; the distance of the pump-out equipment from shore; the type and number of pump-out equipment used, etc), including the duration of each segment of the operation (e.g., dredge sand at the SBOBA; transport of dredge to the pump-out station; hook-up of dredge to pump-out equipment; and transfer of sand from the dredge to the pump-out equipment

for placement on the beach). A beach nourishment project for Keansburg, NJ, which borders Port Monmouth, was recently awarded. Based on this project, and as an example of a construction scenario that may occur for a beach nourishment project, the Contractor has chosen to use one large hopper dredge. In one day, the amount of time the hopper spends dredging at SBOBA is approximately 4-6 hours. It takes the dredge approximately 3-6 hours per day to transport the sand from SBOBA to the pump-out equipment and back to the SBOBA. The remaining time is used for other work associated with the dredging equipment, but does not involved actual movement of the dredge vessel. This other work includes such tasks as: connecting and disconnecting the dredge to the pump-out equipment; and the transfer of sand from the dredge through the pump-out equipment into the project area. Typically, dredging operations occur 24 hours per day, but can vary depending on weather conditions and equipment break-down.

c. Since there has been evidence of unexploded ordnance (UXO) mined along with the sand at the SBOBA (USACE-WES 1996), and because of the danger to human safety posed by these objects if taken directly into a hopper dredge, dredging equipment utilizing suction heads (i.e., draghead of a hopper dredge) are equipped with UXO screens, which are longitudinal bar screens that typically have an opening of 1.25 - 1.5” x 6”. The dimensions of the screen bars are designed and constructed in a manner to maximize the total open area of the suction head through which sand can be dredged and maximize the hydraulic transport efficiency of the draghead.

d. The approximate and typical transit speed during the nourishment projects operating in the SBOBA to Raritan Bay are expected to be: 9.8-10.8 mph (8.5-9.4 knots) between the borrow area to Raritan Bay; and 2-3 mph (1.7-2.6 knots) while dredging. The area of SBOBA to be impacted by the dredge would be approximately 46 acres, with an average of 5.5 feet of dredged material to be removed.

2. <u>Beach Renourishment</u>: Dune integrity would be ensured by a beach cross-section seaward of the dune through periodic nourishment beginning approximately 10-years after initial construction and continuing at 10-year intervals for 40 years after initial construction; the interval can be shorter or longer depending on the project conditions over time. The estimated amount of sand for re-nourishment would be 95,200 CY per event and the source of sand would be upland. Sand would be transported via truck to the site.

   a. <u>Groin Construction</u>: Construction of one 305 ft-long stone terminal groin at the western end of the dune line. The groin would extend approximately 280 feet from the existing mean high water mark and approximately .57 acres of benthos would be affected by the footprint of the groin. Median armor stone size of approximately 6 tons would be used to construct the onshore and offshore portions of the structure. The cross-section consists of one layer of 6-ton median armor underlain by two layers of 1200 lb. median underlayer stone, underlain by a 1 ft thick layer of 60-lb. median bedding stone on top of geotextile. The stone placement method would not be dictated in the contract for the project. It is possible for the Contractor to begin construction of the groin at the furthest point from the shoreline using a barge and tugboat; alternatively, they may choose to begin construction from the landward side. If the landward side is chosen, typically all construction equipment would be initially placed on land and then on top of the partially constructed groin to continue building the structure. Potential equipment in both cases could include cranes, front end loaders, barge, tugboat or dozers. If constructed from the water, a crane mounted barge and excavator with a tugboat could be used to place the stones. Since the stones have to be placed in a precise manner and shape to meet the design of the structure (see sheets C-302-303), and to avoid fracturing the rock, the speed of equipment (tugboat/barge, and equipment used to place the stones from land or water) should be minimal. Additionally, since the stones stretch continuously along the groin structure, the barge/tugboat speed would be very slow while relocating to a new position to place new layers of stones. Once the contract is awarded, more specific details would be available.

   b. The groin would provide efficient transition from placed beach fill to the existing shoreline; reduce beach fill erosion rates: and reduce quantity of channel infilling and therefore the frequency of future dredging.

3. Fishing Pier Construction: Modifications to an existing timber fishing pier including a new ADA compliant access ramp and a 195 linear foot extension to the seaward end of the fishing pier to offset loss of water depth at the end of the pier due to placement of fill material.
   a. Per NJ DEP and NOAA-Sandy Hook requirements, all waterfront structures shall be constructed of non-polluting materials, such as plastic, natural cedar, or other untreated wood, concrete or other inert products.
   b. The method for placing the wood piles supporting the pier into the sediment would not be dictated in the contract for the project. The contractor will likely propose (bid) the method most cost effective for this aspect of the project. However, according to the District's Engineers, the most likely technique to be utilized would be to water jet/push the piles into place. Jetting using a pressurized water source could be used to install the piles via land and water. Jetting could be completed via land up to approximately 5-6 feet. A barge with a tugboat could be used beyond approximately 5-6 feet, which is the minimum depth these types of vessels need to safely navigate. The barge/tug would be stationary except when relocating to a new position to reach a new set of timber pile installation points. The speed of the tugboat/barge would be very minimal since the installation points are only 10 feet apart. Hammering/pile driving the wood pile is unlikely because the sand would compact under the pile and may cause it to split or break. Once the contract is awarded, more specific details would be available.
4. Pedestrian Walkover: Construction of two gravel surface pedestrian dune walkover.
5. Vehicular Walkover: Construction of two gravel surface vehicular dune crossover.

Through the contracting process, the mechanism in which the project components are built are not dictated by the District to the Contractor. In general, it is up to the Contractor to decide what equipment will be used and when the equipment will be deployed to accomplish the work. However, the District has developed an example of a potential **scenario** for this project, based on the assumption that the groin would be constructed prior to sand placement:

- Groin Construction – it is possible that the groin may be constructed prior to sand placement. In this case, starting in March 2014, the District estimates months 1-2 could be utilized for mobilization of equipment and to purchase the stone for the groin structure. Months 3-6 could be used to build the groin structure, with demobilization occurring in month 7.

- Dredging of Sand at SBOBA with placement of sand at Port Monmouth (to include sand replenishment at the beach, plus dune and berm construction): Mobilization of equipment could occur in months 6-7, with sand placement, dune and berm construction occurring in months 8-12. It is estimated that it would take approximately 65 days to dredge the material and place at the project site. Month 13 may be used for demobilization of equipment.
- Fishing Pier Construction Modification - mobilization of equipment could occur in month 6, with construction efforts occurring in months 7-9. Demobilization could occur in month 10.

In summary, the total amount of beach fill required for the Shore Protection construction events are as follows:

Projected Construction Year	**Estimated Beach Fill Quantity (CY)***	**Source of Sand**
Initial Construction – 2013	391,000	SBOBA
10 Years Post Initial Construction	95,200	Upland (trucking)
20 Years Post Initial Construction	95,200	Upland (trucking)
30 Years Post Initial Construction	95,200	Upland (trucking)
40 Years Post Initial Construction	95,200	Upland (trucking)
TOTAL	**771,800**	

Table 1: Estimated dredged quantities for Port Monmouth beach fill.
*Quantities based on surveys from April 2011 and would be updated prior to construction.

The second component of the project, Flood Risk Management, is currently scheduled for construction in 2014. This phase includes a system of levees and floodwalls to extend continuously from a levee in adjacent East Keansburg, NJ, across Pews Creek, to connect with the shore protection segment along the bay shore, and then along undeveloped lands adjoining Compton Creek to higher existing elevation (USACE-NYD 2000). Most features for this phase would be on land and would not impact threatened and endangered species outlined in this BA, except for a sector gate at Pews Creek. The gate would have a 40 ft width opening and would be 21 ft in height. The gate would be constructed across Pews Creek about 91.5 m (300 feet) south of the Pews Creek Bridge (e.g., where Port Monmouth road crosses the creek). This location is approximately 535 m (1,755 feet) from where the creek spills into Raritan Bay. The gate would connect to a concrete pile supported T-wall on the east side of Pews Creek for about 150 feet where it would join the existing Keansburg levee. Sheet piling may be used to support the gate. When a flood event is imminent, the gate would be closed and a bypass pump would divert Pews Creek flow into the Sandy Hook Bay. See Figure 3 for the approximate location.

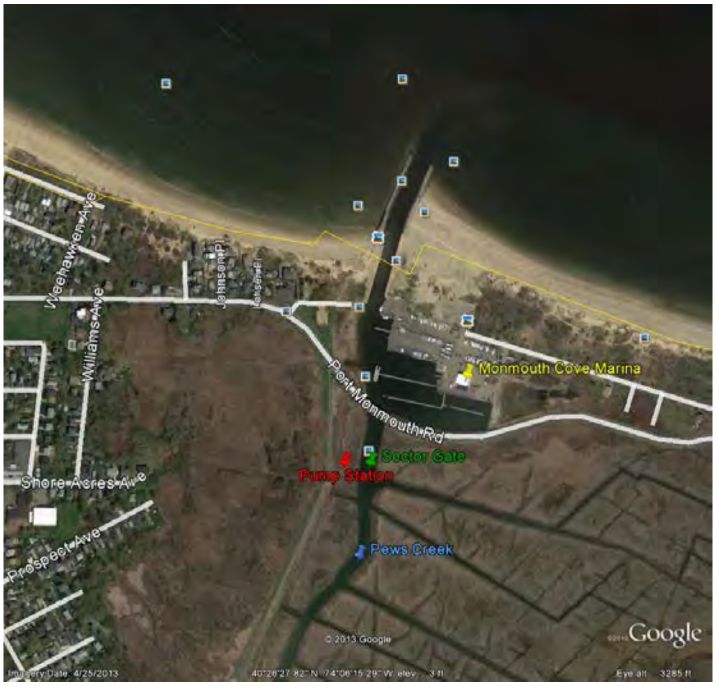

Figure 3: Approximate Locations for the Proposed Sector Gate and Pump Station.

2.2 ELBERON TO LOCH ARBOUR

The Elberon to Loch Arbour project is one designated reach within the larger 21 mile beach erosion control project that ranges from Sea Bright to Manasquan Inlet, NJ. The project provides beach erosion control and storm damage risk reduction to the highly populated communities and infrastructure located along this area of the NJ shoreline. Elberon to Loch Arbour is the only reach that has not been constructed because prior to Hurricane Sandy the property owners were not willing to provide easements; however, this is currently being re-visited.

The entire project was authorized under the River and Harbor Act of July 3, 1958, as modified by Section 854 of the Water Resources Development Act of 1986 (PL99-662), and further modified by Section 4 of the Water Resources Development Act of 1988 (PL100-676) and Section 102 (r) of the Water Resources Development Act of 1992 (PL102-580) but never constructed, characterizing it as an authorized but not constructed project, in accordance with DRAA. A Record of Decision was prepared in 1990 to meet NEPA requirements for projects from Sea Bright to Ocean Township and included Elberon to Loch Arbour; this project was also included as part of the Sandy Hook to Manasquan portion of the 1995 BO. An Environmental Assessment will be prepared to update NEPA requirements for the Elberon to Loch Arbour portion.

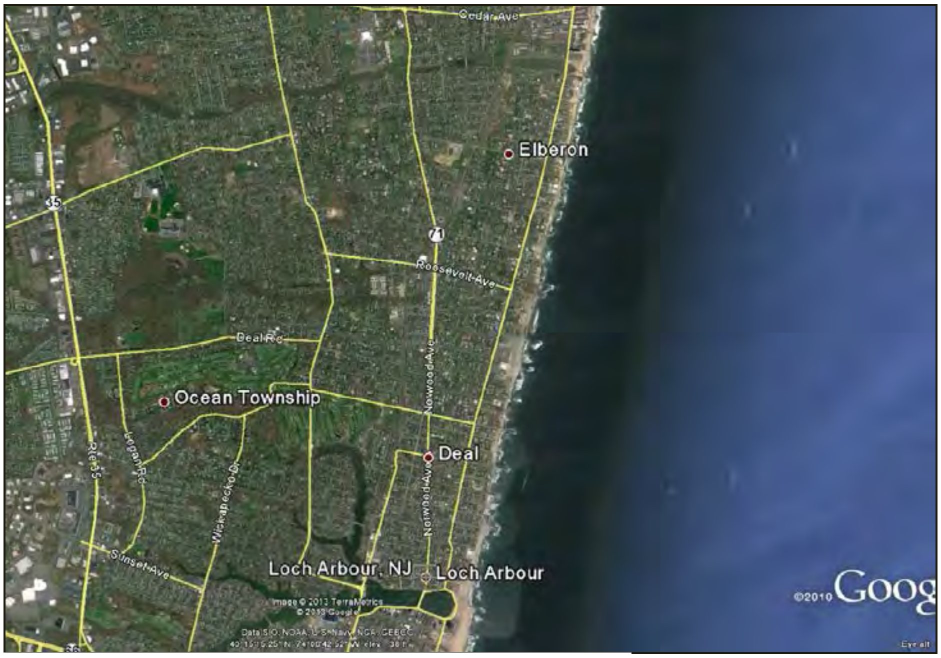

Figure 4: Elberon to Loch Arbour, Monmouth County, NJ

The Elberon to Loch Arbour project area covers approximately 3.5 miles from Lake Takanesee to Deal Lake. The construction schedule, as of October 2013, shows a contract award in early September 2014; dredging operations would not commence until the contractor mobilizes equipment, which typically takes 1-2 months after award. Construction would last for approximately 12-16 months (including both sand placement and outfall extensions). However, the project schedule and duration could change based on Contractor issues, inclement weather, equipment failure, and other unforeseen circumstances. The features of the project include:

1. <u>Beach Nourishment and Sand Berm</u>: Dredging of approximately 4,450,000 CY of sand would occur at the SBOBA via a hopper dredge equipped with a UXO screen. The sand would be placed along approximately 17,000 linear feet of shoreline, and would include construction of a 100 foot wide berm at an elevation of 10 feet above MLW with a 2 foot high storm berm cap.
    a. It is anticipated that the transport of the sand from the borrow area to the shoreline for pumpout would follow a similar process as described for Port Monmouth, including vessel speed and use of a UXO screen (see Section 2.1). Like Port Monmouth, dredging operations typically last 24 hours per day and include dredging of sand at SBOBA, transport of sand to the pump-out station, pumping sand onto the project area, and other tasks.
    b. Like the Port Monmouth project, the duration and details of the actual dredging operation would vary depending on the Contractor and equipment available. At this stage in the project, the area of SBOBA to be impacted by the dredge and the average number of feet of dredged material to be removed is unknown.
2. <u>Beach Renourishment</u>: The renourishment cycle is every 6 years for 50 years at an expected volume of 1,298,000 CY of sand per cycle (GDM).
3. <u>Groin Construction</u>: six existing stone groins within this reach of the project area would be notched to allow for sediment transport and to prevent sediment impoundment Notching involves removing a portion of the landward end of the groin such that water and sediment can follow its natural long shore flow and deposition patterns. It is

accomplished by land based heavy equipment, such as front loaders and cranes. Rocks from the groins are simply removed from the line of the groin and placed elsewhere, usually along side of the groin at the beach side of the “notch”. It is very shallow water, the equipment moves slowly, and most of the activity is land based.

4. Outfall Pipe Extensions: Since pipe plugging and trenching can occur from fill covering the pipe outfall, fourteen storm water outfalls will be extended beyond the construction template (final number of extensions may change based upon final construction template). Outfall extensions are to be supported by timber crib structures or a similar type structure fabricated from composite materials. The cribbing and outfall extensions would be constructed after the sand fill is placed under the pipe alignment. This allows for completion of pipe extension before placement of final grades of the pipe. The exact construction methods will be determined by the contractor, however it is possible that operations would consist of driving piles to anchor the cribs and placing and securing the outfall pipe. This operation will also take place in near shore waters. Construction in the landward (shallowest) sections of the pipe alignment will be done with land based equipment. For the outfall alignments that extend further seaward into subtidal areas it is possible that barge based equipment may be utilized. Although it has not been finalized at the time this document was developed, the District anticipates that some of the outfall work will begin as early as September 2014. All outfalls would not be constructed at once and would be sequenced throughout the overall beach construction schedule.

In summary, the total amount of beach fill required from the SBOBA for the construction and maintenance of Elberon to Loch Arbour is as follows:

Projected Construction Year	**Estimated Beach Fill Quantity (CY) from SBOBA***
Initial Construction – 2014	4,450,452
6 Years Post Initial Construction	1,298,000
12 Years Post Initial Construction	1,298,000
18 Years Post Initial Construction	1,298,000
24 Years Post Initial Construction	1,298,000
30 Years Post Initial Construction	1,298,000
36 Years Post Initial Construction	1,298,000
42 Years Post Initial Construction	1,298,000
48 Years Post Initial Construction	1,298,000
TOTAL	**50,438,068**

Table 2: Estimated dredged quantities for Elberon to Loch Arbour beach fill.
*Quantities would be updated prior to construction.

2.3 UNION BEACH

Union Beach is a residential community that occupies a 1.8 square miles area of land, including approximately 3,000’ of project shoreline along the coast of Raritan Bay, NJ. Union Beach is bordered by the Borough of Keansburg to the east and Chingarora Creek to the west. Construction of the Union Beach project was authorized in the Water Resources Development

Act of 2007 (Public Law 110-114) on November 8, 2007. However, Union Beach remains an authorized but unconstructed project under DRAA.

A Draft BA was completed for impacts to sea turtles for Beach Renourishment and Offshore Borrowing in the Raritan Bay Ecosystem, including an evaluation of Union Beach in 2001 (USACE-NYD 2001A). In addition, a final Feasibility report and Environmental Impact Statement (EIS) were approved and released to the public in January 2004. The report recommended implementation of a storm damage reduction project consisting of a combination of levees and floodwalls, tide gates, pump stations and a dune and beach berm with terminal groins. The project would also construct wetland mitigation sites to mitigate for the loss of wetlands. The final feasibility report and EIS were approved by Corps of Engineers Headquarters on January 4, 2006. The Record of Decision for the EIS was finalized in July 2008. In coordination with State and Borough representatives the Corps of Engineers began moving forward with the Preconstruction, Engineering and Design (PED), which was underway when the project area was struck by Hurricane Sandy in late October 2012. Figure 4 presents the recommended plan for Union Beach intended to provide protection against hurricane and storm damage, as well as shoreline erosion and wave attack along the Raritan Bay shoreline.

Figure 5: Location of the recommended plan for Union Beach

The significance of the damages caused by Hurricane Sandy requires re-visiting the engineering design of the recommended plan and applying the latest flood stage frequency curves. It is assumed that the project would continue with the recommended plan as determined before Hurricane Sandy and as described below. However, if details in the recommended plan for Union Beach change enough to influence this BA, the USACE would continue the on-going coordination with the NMFS.

The Union Beach project consists of the following three elements:

1. A levee/floodwall along Chingarora Creek. The **Chingarora Creek element** consists of a levee and floodwall alignment starting near the intersection of Florence Avenue and Bank Street and ending at the northwestern end of the shorefront element. Closure gates are provided at the Chingarora tributary and Broadway Avenue, and drainage structures are intended to provide interior drainage of runoff.
2. Beach nourishment along the Raritan Bay shoreline. The **Shorefront element** consists of a beach and dune incorporating terminal groins with adjoining revetments stretching from the Chingarora Creek levee/floodwall alignment to the southeastern limit of the dune that ties into the levee alignment near Flat Creek. The dune generally follows the shoreline and extends bayward along the existing bulkhead and beach.
3. A levee/floodwall along Flat and East Creeks. The **Flat Creek/East Creek element** consists of a floodwall and levee alignment that begins at the southeastern limit of the shorefront element and ties into the existing Keansburg levee at the eastern end of the project limits. A small interior levee is proposed for the low lying area between East Creek and an unnamed East Creek tributary. Drainage structures are included to provide interior drainage of runoff, and closure gates are proposed at Flat Creek, East Creek, and the East Creek tributary.

The construction schedule and project phasing for the recommended plan are currently under development. Current estimates (October 2013) have award scheduled for August 2014, with construction to be completed in approximately 2 years for all project components (beach nourishment and interior drainage); this may or may not include one continuous contract. The schedule and project duration could change based on contractual issues, inclement weather, equipment failure or other unforeseen circumstances. The USACE would continue the on-going coordination as details are developed, including construction timing and duration of the beach berm, dune, revetments, and terminal groins.

Since beach nourishment is a component of the proposed project in the shorefront element, impacts to the nearshore shallows of Raritan Bay and the offshore borrow area are addressed in this BA. Except for the storm surge barriers within the levees/floodwalls element, all other structures would be built on land and therefore do not require analysis in this BA. Fill material for the levees/floodwalls of the Flat Creek/East Creek element would require fill material sourced from a quarry.

The shorefront element of the Union Beach project includes the following components. Note that fill material quantities will be updated based on new surveys:

1. Construction of 3,160 ft of beach berm and dune system using sand from the existing SBOBA. The dune would be at 17 feet NGVD with a 50-foot-wide crest extending down to the 9 feet NGVD berm elevation. The width of the berm would range from 15 m (50 feet) near the two terminal groins to a maximum of 50m (164 feet) between Beach Street and Florence Avenue. The beach and dune are designed to contain 688,000 CY of fill, including advance fill, overfill, and tolerance. The dune section would be stabilized with dune grass and fencing, and three wood overwalks would be constructed to protect dune vegetation and provide public access to beach areas. In addition, a walkway connecting the overwalks would run along the crest of the dune to provide views of the bayfront. It is

anticipated that the transport of the sand from the borrow area to the shoreline for pumpout would follow a similar process as described for Port Monmouth (see Section 2.1), including duration of the trip, use of a UXO screen, vessel speed, and example described for Keansburg, which is approximately 2 miles east of Union Beach.

2. Construction of a 228-foot eastern terminal groin with an associated 630-foot revetment and a 245-foot western terminal groin with a 405-foot revetment. The heads of the groins will be constructed of 4-ton quarry stone placed over 2 to 40 lb core and bedding stone. The trunks of the groins will be constructed of 11-ton quarry stone and 2,200 lb underlayer stone placed of 6 to 110 lb core and bedding stone. The armor layers and underlayers will be two units thick. The bedding layers will be two feet thick. The total amount of acreage of benthos to be affected by groin placement would be .09 acres. The groin construction method described for Port Monmouth in Section 2.1 also applies to this project.
3. Beach nourishment every 9 years after initial construction, continuing for 50 years.

The levees/floodwalls along Chingarora Creek element and the Flat Creek/East Creek elements include the following components:

1. Construction of 3,313 m (10,870 feet) of levees at 15 feet NGVD and 1,033 m (3,388 feet) of interior levees at 2.5 m (8 feet) NGVD, requiring 85,500 CY of fill.
2. Construction of 2038 m (6,885 feet) of floodwalls with a top elevation of approximately 15 feet NGVD.
3. Construction of interior drainage features including 11 primary and 37 secondary interior drainage structures within the levee footprint to allow for drainage during normal conditions. The selected plan also includes three pump stations (40 cfs, 100 cfs, and 250 cfs capacity), six 6-ft by 6-ft sluice gates, raising of 580 ft of existing roads, and approximately 4.61 acres of ponding areas.
4. Construction of two primary swing storm surge barriers (across Flat Creek and East Creek) with pump stations that would be utilized to remove excess water from interior drainage areas during storm events when the drainage structures and storm gates are closed.

Construction of the beach and dune section would be accomplished by utilizing fill from the SBOBA. The shorefront element requires 688,000 CY of initial fill to be placed from the SBOBA including 18,000 CY of advance nourishment, and 21,000 CY of fill trucked from documented upland sites every nine years (five nourishment cycles) thereafter for 50 years. The construction of the levees requires 85,500 CY of fill that would be sourced from a quarry.

In summary, the total amount of beach fill required per Shore Protection construction event for the Union Beach project is listed in the table below. Please note the quantity of fill material will be updated based on a new survey. The nourishment cycles post-initial construction are projected to utilize sand sources from upland areas.

Projected Construction Year	Beach Fill Quantity (CY)*	Total SBOBA source (CY)	Total Upland source (CY)
Initial Construction – date TBD	688,000	688,000	0
Advance Nourishment – date TBD	18,000	18,000	0

9 Years Post Initial Construction	21,000	0	21,000
18 Year Post Initial Construction	21,000	0	21,000
27 Years Post Initial Construction	21,000	0	21,000
36 Years Post Initial Construction	21,000	0	21,000
45Years Post Initial Construction	21,000	0	21,000
TOTAL	**811,000**	**706,000**	**105,000**

Table 3: Projected beach fill quantities and sand sources for the Union Beach project.
*Quantities would be updated based on a new survey.

3.0 HISTORY OF HOPPER DREDGING PROJECTS WITH THREATENED AND ENDANGERED SPECIES OBSERVERS

Numerous hopper dredging projects have been completed by the District in this area to deepen or maintain navigation channels and for borrowing sand to source beach nourishment projects. Table 4 shows a list of completed the District's hopper dredging projects that had a certified threatened and endangered species observer onboard, as well as recent dredging projects from the New England District (NED). Project and observer data from the NED and District were grouped because sea turtle ecology including abundance is regionally similar but distinct from USACE Districts south of NY/NJ. The dredged quantities in Table 4 are based on dredging that occurred during May 1 through November 15[2] during the year(s) of operation. Since the recent 2012 listing of Atlantic sturgeon, the table also includes dredged quantities for the Harbor Deepening Project (HDP) following the October 2012 BO requirement to including monitoring for Atlantic sturgeon take. In the cases where monthly quantities were not available, an average monthly quantity was calculated over the life of the project and multiplied by the number of months that dredging occurred during the turtle season to determine the total dredged quantity. It is important to note that for all the projects monitored in Table 4, only one take of a threatened turtle has ever been recorded for a total of approximately 22.5 million CY dredged from 1993 – 2013.

Project Name or Location	**Year(s) of Operation**	**Project Type**	**Dredged Quantity during Turtle/Sturgeon Season (CY)**	**Turtle/ Sturgeon Take?**	**UXO Screen?**
S-AM-3a	2011-2012	Channel Deepening	1,906,635	No	Yes
S-AM-3b	2011-2013	Channel Deepening	1,844,840	1 sub-adult Atlantic Sturgeon	Yes
Sandy Hook, NJ	October 2008	Maintenance Channel Dredging	3,138 (this represents one load from channel to HARS)	Sturgeon (species not identified)*	Unknown
S-AM-1, Ambrose Channel	2006 – 2008	Channel Deepening	2,449,038	No	Yes

[2] *Turtles are known to be present in the NY/NJ area from June through October. NMFS monitoring requirements extend from May 1 through November 15.*

S-AM-2b, S-AN-1B, Ambrose and Anchorage Channels	2009 – 2010	Channel Deepening	827,615	No	Yes
Buttermilk Channel, NY	2000	Maintenance Channel Dredging	95,000	No	Unknown
Buttermilk Channel, NY	2005	Maintenance Channel Dredging	78,000	No	Unknown
Westhampton, NY	1993	Beachfill	1,455,071	No	No
Westhampton, NY	1996	Beachfill	2,518,592	No	No
Westhampton, NY	1997	Beachfill	884,571	No	No
East Rockaway, NY	1995	Channel Deepening/ Maintenance	412,000	No	No
East Rockaway, NY	1996	Beachfill	2,685,000	No	No
East Rockaway, NY	2002	Channel Deepening/ Maintenance	140,000	No	No
Sea Bright, NJ	1996	Beachfill	2,058,333	No	Yes
Asbury, NJ	1999 – 2000	Beachfill	1,268,182	No	Yes
Kennebeck River, New England	2003	Maintenance Channel Dredging	57,469	No	No
Kennebeck River, New England	2003	Emergency Channel Dredging	22,310	No	No
Asbury Park, NJ	1997	Beachfill	3,758,333	1 Loggerhead	Yes

Table 4: Hopper Dredging Projects with sea turtle and Atlantic sturgeon take based on dredged quantity in the NY, NJ and New England region.
** Found in turtle cage during dredged material inspection and was noted on the disposal log sheets from Dredged Material Inspectors, who accompany all vessels disposing dredged material at the HARS. Dredging was East of Sandy Hook between coordinates: 40.41087, -73.88474 to 40.41080, -73.88464.*

4.0 SPECIES OF CONCERN: ATLANTIC STURGEON (*Acipenser oxyrinchus oxyrinchus*)

4.1 GENERAL ATLANTIC STURGEON INFORMATION

NMFS has determined that Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is comprised of five distinct population segments (DPSs) that qualify as listed species under the ESA: Gulf of Maine (GOM), NY Bight (NYB), Chesapeake Bay (CB), Carolina, and South Atlantic. The Northeast Region of NMFS has listed the GOM DPS as threatened, and the NYB and CB DPSs as endangered. The proposed shore protection projects covered in this BA fall within the boundaries of the NYB population, although the marine range for all DPSs extends from Canada to Florida (NMFS 2012C) and it is therefore possible that any DPS may be present in/around the project areas.

The 2012 HDP BO (NMFS 2012A) contains a detailed outline of known Atlantic sturgeon life history characteristics and is incorporated by reference in this BA. A summary of the most relevant information to the proposed projects is provided in this document.

Atlantic sturgeon are anadromous, spending the majority of their adult phase in marine waters, migrating up rivers to spawn in fresh water and migrating to brackish waters in the juvenile growth phases (Bain 1997).The NYB DPS includes all Atlantic sturgeon whose range occurs in watersheds that drain into coastal waters, including Long Island Sound, the NYB, and Delaware Bay, from Chatham, MA to the Delaware-Maryland border on Fenwick Island. Within this range, Atlantic sturgeon have been documented from the Hudson and Delaware Rivers as well as at the mouth of the Connecticut and Taunton Rivers, and throughout Long Island Sound, (ASSRT 2007, as cited by USACE-NAP 2011).

There is little information on the behavior of the sturgeon in marine waters (Bain 1997). More recently, attention is being focused on understanding how oceanic habitat is used by migrant Atlantic sturgeon (Dunton et al. 2010, Erickson et al. 2011). By examining five fishery-independent surveys of Atlantic sturgeon, Dunton et al. (2010) determined potential coastal migration pathways for northerly summer and southerly winter migrations. Although Atlantic sturgeon are highly migratory, primary juvenile habitat and migrations are limited to narrow corridors in waters less than 20 m deep (Dunton et al., 2010). A hotspot of juvenile Atlantic sturgeon captures was found in waters less than 20 m along the eastern side of Sandy Hook, NJ and off of Rockaway, NY. The authors suggest that depth restricts movements, aggregations are related to food availability, and movement is triggered by temperature cues.

The Hudson River population of Atlantic sturgeon is one of two U.S. populations for which there is an abundance estimate (approximately 870 spawning adults/year, 600 males and 270 females; Kahnle et al. 2007) and it is considered one of the healthiest populations in the U.S. (ASSRT 2007). The Hudson River is the most significant spawning system within the NYB DPS (Erickson et al. 2011).

Adult females migrate to spawning grounds, which are deep, channel or off-channel habitats within the Hudson River Estuary starting in mid-May (Dovel and Berggren 1983), spawn from May through July or possibly August, and return to marine habitat the following fall (Dovel and Berggren 1983, Van Eenennaam et al. 1996). Mature males are present in the Hudson River from April to November (Dovel and Berggren 1983) and appear at spawning sites in association with females, suggesting they search for females while moving about in the river (Van Eenennaam et al. 1996).

4.2 DISTRIBUTION OF ATLANTIC STURGEON IN AND AROUND THE PROJECT AREAS – NEW YORK DISTRICT SURVEYS

As part of a project specific Aquatic Biological Survey (ABS) conducted by the District, there have been several sightings of sturgeon in Upper, Lower and Raritan Bays. From 1998 through 2011, bottom trawl surveys were conducted as part of the HDP from December to June. Throughout the 13-year sampling period, two Atlantic sturgeon were captured (Table 5). The first Atlantic sturgeon was captured in June 2005 at a non-channel station in the Upper Bay. It measured 790 mm total length and presumably was a late juvenile (Table 5). The other Atlantic sturgeon captured in the ABS surveys was 638 mm total length (an intermediate juvenile, Table 3) and was captured in December of 2009 at a channel station in the Lower Bay.

Bottom trawl surveys were also conducted in the fall of 2008 near the approach to

Ambrose channel in Lower Bay as part of an investigation of a navigational hazard. Two Atlantic sturgeon were captured in October 2008 (Table 5). The first Atlantic sturgeon measured 1,220 mm and the second measured 1,180 mm.

Another extensive Biological Monitoring Program was conducted by the District for the Atlantic Coast of NJ (USACE-NYD 2001B). A total of 300 tows were made during spring and fall 1995-1999. During this program, only 2 sturgeon were captured.

Observations of Atlantic sturgeon during the District's biological sampling programs and random sightings aboard USACE vessels are summarized in Table 5. Throughout these investigations, only 6 Atlantic sturgeon were observed over 17 years (1995-2011).

Species	**Date**	**Location**	**Length**	**Data Source/Comments**
Sturgeon (species not identified – may be a shortnose or Atlantic)	September 2010	1 1/2 miles south of the Verrazano Bridge and 1/2 mile east of Hoffman Island near coordinate 40.57917, -74.04017	42"- 48" long (estimate)	Injured sturgeon (head injury) spotted by USACE vessel while conducting routine drift patrol
Atlantic sturgeon	December 2009	Lower Bay(chapel hill south channel)	638 mm	HDP ABS program
Atlantic sturgeon	October 2008	Lower Bay near approach to Ambrose Channel (between 40.457833, -73.89633 and 40.46117, -73.90267	1220 mm	Investigation near navigational obstruction
Atlantic sturgeon	October 2008	Lower Bay near approach to Ambrose Channel (between 40.457833, -73.89633 and 40.46117, -73.90267	1180 mm	Investigation near navigational obstruction
Sturgeon (species not identified – likely Atlantic based on habitat requirements)	October 2008	East of Sandy Hook between coordinates: 40.41087, -73.88474 to 40.41080, -73.88464	not recorded	Found in turtle cage during dredged material inspection. Noted on disposal log sheets from Dredged Material Inspectors, who accompany all vessels disposing dredged material at the HARS)

Species	Date	Location	Length	Data Source/Comments
Atlantic sturgeon	June 2005	Port Jersey (east of Liberty Golf Course)	790 mm	HDP ABS program
Sturgeon (species not identified - may be a shortnose or Atlantic)*	October 1998	Port Jersey (adjacent and east of Global Marine Terminal)	not recorded	HDP ABS program
Atlantic sturgeon	1995-1998	Not recorded	Not recorded	Biological Monitoring program, Atlantic Coast of NJ: Asbury Park to Manasquan
Atlantic sturgeon	1995	borrow area (BBA-5), between Belmar and Manasquan	Not recorded	Biological Monitoring program, Atlantic Coast of NJ: Asbury Park to Manasquan

Table 5: Sturgeon observations in and around the New York District's AOR

4.3 FOOD RESOURCES

Overall, sturgeon appear to feed indiscriminately throughout their lives (Bigelow and Schroeder 1953, Vladykov and Greeley 1963, Murawski and Pacheco 1977, van den Avyle 1984, as cited by Gilbert 1989) and are generally characterized as bottom feeding carnivores (Bain 1997). Adult Atlantic sturgeon feed on polychaetes, oligochaetes, amphipods, isopods, mollusks, shrimp, gastropods, and fish (Johnson et al. 1997, Haley 1998, Bigelow and Schroeder 1953, Vladykov and Greeley 1963, Smith 1985b, as cited in Gilbert 1989).

5.0 GENERAL FACTORS THAT MAY AFFECT ALL DISTINCT POPULATION SEGMENTS OF ATLANTIC STURGEON

As described in Section 4.1, five Distinct Populations Segments (DPS) of Atlantic sturgeon were listed as threatened or endangered under the Endangered Species Act, including a New York Bight DPS. Known spawning populations for the New York Bight DPS exist in two rivers: the Hudson and Delaware Rivers. However, since the marine range for all DPSs extends from Canada to Florida (NMFS 2012C), this assessment is applicable to all DPSs. In the Hudson River estuary, spawning, rearing, and overwintering habitats were reported to be intact by Bain (1997), supporting the largest remaining Atlantic sturgeon stock in the U.S., however, a population decline from overfishing has also been observed for this area (Bain 1997, Bain 2001, Peterson et al. 2000). This section describes the general factors that may affect Atlantic sturgeon, many of which are not relevant to the projects assessed in this BA. However, this section is included to demonstrate the variety of threats to Atlantic sturgeon, most of which pose greater challenges to the species than the projects assessed in this BA.

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 (ASSRT, 2007, as cited by USACE-NAP 2011). Atlantic sturgeon also exhibit life history characteristics that make them particularly vulnerable to population collapse from overfishing (Boreman 1997, as cited by Bain 1997), including: "advanced age and large size at maturity, eggs that are numerous and small in relation to body size, and spawning that is episodic and seasonal" (Winemiller and Rose 1992, as cited by Bain 1997). Other threats to the species include vessel strikes.

Dredging in riverine, nearshore and offshore areas has the potential to impact aquatic ecosystems by removal/burial of benthic organisms, increased turbidity, alterations to the hydrodynamic regime and the loss of shallow water or riparian habitat (which is not within the habitat being assessed in this BA). Hydraulic dredges can directly impact sturgeon and other fish by entrainment in the dredge (ASSRT 2007, as cited by USACE-NAP 2011). According to Smith and Clugston (1997, as cited by USACE-NAP 2011), dredging may also impact important habitat features of Atlantic sturgeon if these actions disturb benthic fauna, or alter rock substrates (which does not occur in the project areas). 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 resuspension of sediments in spawning areas.

Atlantic sturgeon 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 (Ryder 1890, Vladykov and Greely 1963, Hoff 1980, ASMFC 1990, and Smith and Clugston 1997, as cited in ASSRT 2007 and USACE-NAP 2011). 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 (ASSRT 2007, as cited by USACE-NAP 2011).

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 (ASSRT 2007). There are some concerns that predation may adversely affect sturgeon recovery efforts in fish conservation and restoration programs, and by fishery management agencies (Brown et al. 2005, and Gadomski and Parsley 2005, as cited by ASSRT 2007; ASSRT 2007). However, further research is needed on predation affects on Atlantic sturgeon.

Atlantic sturgeon may compete with other bottom feeding species for food, although there is "no evidence of abnormally elevated interspecific competition" (ASSRT 2007), and it has been suggested by van den Avyle (1984, as cited by Gilbert 1989) that "non-selective feeding of juvenile and adult sturgeons may reduce the potential for competition with other fish species".

6.0 POTENTIAL PROJECT IMPACTS TO ATLANTIC STURGEON

The following sections (5.1 – 5.2) discuss the potential direct and indirect dredging impacts to Atlantic sturgeon from beach nourishment activities at Elberon to Loch Arbour, Union Beach and Port Monmouth. Potential impacts for all three projects at the SBOBA are addressed as one assessment (Section 5.1), while potential impacts at the placement sites (Section 5.2) are broken into Raritan Bay (Union Beach and Port Monmouth) and the Atlantic Coast (Elberon to Loch Arbour).

6.1 POTENTIAL DREDGING IMPACTS AT THE SBOBA (ELBERON TO LOCH ARBOUR, PORT MONMOUTH AND UNION BEACH)

6.1.1 POTENTIAL PHYSICAL INJURY AND BEHAVIORAL IMPACTS AT THE SBOBA

Direct potential impacts linked to dredging at SBOBA include physical injury or mortality of adult or sub-adult Atlantic sturgeon due to drag head strikes, entrainment or vessel strikes. Other direct impacts may include avoidance behavior due to noise disturbance or impacts associated increased turbidity from re-suspension of sediments. Re-suspension of sediments has the potential to cause respiratory impacts (gill abrasion). There would be no dredging related impacts to spawning activities since the closest known spawning site is in the Hudson River (i.e., km 60 – 148, Dovel and Berggren 1983), which is up-current from the projects and given the substantial spatial buffer, would have no direct impacts to spawning areas from dredging.

It is possible for Atlantic sturgeon to be entrained in a dredge via physical contact with a hopper dredge's drag-arm and impeller pumps. A minimum take of 0.6 Atlantic sturgeon per year in the Atlantic and Gulf coasts was estimated based on hopper dredge takes since 1995 and assuming dredging efforts were relatively similar among years (USACE-NYD 2006, as cited by ASSRT 2007). Dickerson (2006, as cited by USACE-NAP 2011) summarized sturgeon takes from Atlantic and Gulf Coast dredging activities conducted by the USACE between 1990 and 2005, which documented takes of 24 sturgeons (2 – Gulf, 11- Shortnose, and 11-Atlantic). The majority of the interactions were with a hopper dredge: sixteen takes with a Hopper dredge; five takes with a cutterhead dredge; and three takes with a mechanical dredge. Fifteen of the sturgeons were reported as mortalities, eight as alive, and one as unknown. These documented takes occurred during dredging operations in rivers and harbors, mainly in waterways along the eastern coast that, from the map in the report, appear to be more narrow than the wide pathways available to Atlantic sturgeon in the Raritan and Lower Bays and Atlantic Ocean off the coast of NJ (i.e., compared to Delaware River, Savannah Harbor, etc) . However, the risk still exists for Atlantic sturgeon to become entrained in a hopper dredge during mining of sand at the SBOBA. The SBOBA occupies 1.4%[3] compared with the surrounding area, a small percentage of the open

[3] *This percentage was calculated based on the following approximate values: SBOBA area of 5.81 square miles (3,719 acres) vs. Raritan Bay area of 61.6 square miles + Lower NY Bay area of 45 square miles + 10 miles off the coast of Manasquan to the western end of Rockaway area of 300 square miles. Except for the SBOBA, all other values were calculated in Google Earth. Maps of Lower NY Bay and Raritan Bay were outlined based on definition/ maps in Wikipedia.*

water (benthic) habitat available for migration. Although dredging would occur in a small area, this area is relatively close to the Sandy Hook hotspot for juvenile Atlantic sturgeon captures and is potentially within the sturgeon's migratory pathway. Therefore, the District proposes minimization measures outlined in Section 6 to further reduce the risk of entrainment.

Although the ASSRT (2007) reports that dredging activities impact sturgeon by disrupting spawning migrations and through dredge noise disturbance, it does not clearly state what the cause and rationale are for this threat, or specify the type of dredging equipment; however, this seems more relevant to narrow channels and rivers. In the case of the SBOBA, a noisy underwater environment is typical since dredging activities have been ongoing for over 100 years (e.g., for shore protection, and deepening and maintenance of navigation channels), and constant large vessel ship traffic to and from the NY/NJ Harbor is part of the ambient conditions. Despite a noisy aquatic environment (even greater in the harbor), the Hudson River population of Atlantic sturgeon is considered one of the healthiest populations in the U.S. (ASSRT 2007). Therefore, it would appear that Atlantic sturgeon are still finding and utilizing pathways through the NYB, including the Atlantic Ocean off the coast of NJ and potentially through Raritan Bay to reach spawning grounds in the Hudson River. This is likely because the waterways available for migration extending from the mouth of the Hudson River to the marine environment are sufficiently deep enough and wide enough to permit Atlantic sturgeon to avoid potential dredging-related disturbances, including active dredges and any associated noise, and that long-term impacts to their habitat and food source are not adversely affecting the population.

6.1.2 POTENTIAL HABITAT IMPACTS AT THE SBOBA

The potential impacts of dredging to Atlantic sturgeon habitat may include loss of habitat, prey resources and water quality changes. If sturgeon are present during changes to water quality this represents a direct impact while changes to depth, sediment type and prey resources are secondary.

At the SBOBA, there may be the potential for Atlantic sturgeon to be temporarily impacted by water quality changes, such as from increased turbidity and decreased dissolved oxygen content. Significant changes in turbidity due to dredging, such as sediment plumes, have only been observed with mechanical dredges working in areas that contain a majority of fine particles such as muds and clays etc. Hydraulic dredges removing coarse sands, as is the case for the three projects assessed here, have not been shown to create significant turbidty increases. Similarly benthic disturbances that can lead to decreases in dissolved oxygen are related to microbial decay (and respiration) of resuspended organic materials associated with fine sediments. Again, this would not occur with the coarse sands required for beach nourishment.

By definition, beach fill sediment must contain less than 10% fine particles (USACE-NYD 2011), therefore making the dredged sediment a majority of coarser material (sand). Also, hopper dredges draw in sand via suction while in contact with the sea floor, consequently there is very little re-suspended sediment or creation of turbidity related to the sediment removal process. An insignificant amount of very localized and temporary turbidity may be created by the mechanical action of the drag head running across the sand. However, re-suspension of sediment would not disperse to any degree. Any localized turbidity is not anticipated to impact Atlantic sturgeon since they are highly mobile and the areas in question are not restrictive in nature, providing much space within which to avoid a plume by moving away from the source. Even if Atlantic sturgeon movement is altered, it is unlikely that any temporary and localized suspended sediment would have a long term and adverse impact on Atlantic sturgeon migration to/from spawning grounds, or in the ability to find other food resources outside of the dredged area, which is small compared to the entire area available in the Raritan Bay, Lower Bay and Atlantic Ocean. Also, since Atlantic sturgeon are indiscriminate feeders, any turbidity would likely have little or no effect on finding alternate feeding grounds.

6.1.3 POTENTIAL IMPACTS TO FOOD RESOURCES AT THE SBOBA

Atlantic sturgeon are primarily benthic feeders and changes in bottom habitat that alter the benthic faunal community could result in a subsequent temporary loss of, or change in, prey resources. Sturgeon generally feed when the water temperature is greater than 10^{o}C (Dadswell 1979, and Marchette and Smiley 1982, as cited by USACE-NAP 2011) and in general, feeding is heavy immediately after spawning in the spring and during the summer and fall, and lighter in the winter. Haley and Bain (1997, as cited in ASSRT 2007) retrieved primarily polychaetes and isopods from Atlantic sturgeon in the Hudson River. The SBOBA represents a small area compared with the surrounding area in which additional resources are available for feeding; therefore, adverse significant impacts are not anticipated.

In 1989, the District conducted an investigation to characterize the infauna and epifauna resources at the SBOBA. Results revealed a diversity of species including those types considered primary prey species for Atlantic sturgeon. During the District's NJ Biological Monitoring Program (NJ BMP; USACE-NYD 2001B), multiple borrow sites were monitored for benthic characterization and showed similar faunal species including those considered sturgeon prey base. The NJ BMP also analyzed impacts of dredging on recovery times of the impacted habitat. The study concluded that in terms of abundance, diversity and biomass, the infauna resources are expected to recover and recolonize to pre-dredge condition in approximately 8 months, except for sand dollars biomass, which takes about 2 to 2.5 years to recover.

A comparison of the NJ BMP borrow areas to the SBOBA (Ray 2010) concluded that the infauna communities at the SBOBA and at the other NJ offshore borrow areas were very similar. Since the habitats and fauna are comparable it's reasonable to conclude that impacts to the SBOBA fauna community and their subsequent recovery and re-colonization rate are also analogous to the results of the BMP study.

In general, the changes in the benthic community observed between pre- and post-dredging time periods is typical of benthic responses to disturbance in which larger, longer-lived species are initially replaced by smaller, opportunistic taxa prior to full recovery. These studies have also shown that borrow area habitats and the regions that surround them support abundant and diverse communities of typical sturgeon prey species. Because these habitats supporting sturgeon prey exist on a regional scale temporary impacts to localized portions of the SBOBA over the duration of the projects describe would not significantly reduce the availability of prey resources of resident or migratory Atlantic sturgeon.

6.2 POTENTIAL IMPACTS DURING SHORELINE CONSTRUCTION (PLACEMENT AND STRUCTURES) AT THE ATLANTIC COAST- ELBERON TO LOCH ARBOUR

6.2.1 POTENTIAL PHYSICAL INJURY AND BEHAVIORAL IMPACTS DURING SHORELINE CONSTRUCTION

There is the potential for sturgeon to be directly impacted by transiting hopper dredges or other vessels associated with the project. Most reported vessel strikes have been associated with relatively confined areas, such as shipping channels, where the bottom of the hull and the propellers are relatively close to the sea bottom. This would not be the case at SBOBA or along the transit route to the booster (pump out) station. The depths that exist at the borrow area along the route to the booster would not bring the vessel or its propellers into proximity of the bottom since the vessels do not typically sail into areas where maximum water depth is not at least 6 feet greater than the maximum vessel draft. These are extensive flat areas that would not bottleneck sturgeon and necessarily bring them close to a vessel. Since sturgeon are demersal and rarely seen at the surface, their foraging and migratory behavior should keep them well below any vessels (in sufficiently deep water).

Potential direct impacts to Atlantic sturgeon due to placement in intertidal and littoral nearshore waters may consist of impacts related to an increase in suspended sediment; however, since sturgeon do not typically utilize the intertidal and very shallow nearshore waters, it is unlikely that any turbidity would affect sturgeon. Direct impacts from equipment leading to physical injury are extremely unlikely. Impacts from increased suspended sediments and resultant turbidity could include physical damage to gill structures, or avoidance behavior and movement away from the disturbance. Movement out of the area would minimize any physiological impacts.

Placement of notches in the existing groins, and extension of the existing outfall and pipes are not anticipated to have a significant impact on Atlantic sturgeon since they are unlikely to be present in relatively shallow waters. If present, any noise generated by the construction activities described in Section 2.2 would likely result in avoidance behavior and movement away from the disturbance.

6.2.2 POTENTIAL HABITAT IMPACTS DURING SHORELINE CONSTRUCTION

Results of the area wide and site intensive beach nourishment placement TSS monitoring (Sea Bright to Manasquan, N.J. USACE 1994-2000) yielded the following results with respect to temporal and spatial scales of sediment dispersal along ocean beaches. Placement operations resulted in short-term increases in turbidity/TSS conditions limited to a relatively localized area (less than 500 m) from the discharge point. Sediment dispersal was strongly influenced by prevailing surf and turbulence conditions, as well as by long shore currents. Long shore currents in the vicinity of Sandy Hook run predominantly to the north. Dispersal of suspended sediments was prominent in the swash zone in the immediate vicinity of the discharge operations. Observed elevated concentrations decline rapidly with dispersal through the surf zone. Another mitigating factor is the relatively low fractions of silts and clays of the sediments excavated from the borrow areas, generally less than 10 percent by weight. Slightly elevated turbidities/TSS (from ambient) extended into the surf zone along a narrow swath of beach, and into the near shore bottom portion of the water column.

The maximum TSS values measured near the fill operations were not outside the range that organisms would be exposed to during periods of high wave energies. With the exception of swash zone samples, the magnitude of elevation above ambient TSS conditions appears to be negligible. Measured TSS concentrations outside the swash zone seldom exceeded 25 mg/l, which can be considered the low end of the range of ambient TSS concentrations that many marine/estuarine species of the northern New Jersey shore, including Atlantic sturgeon, experience in estuaries including the Hudson-Raritan estuary. Ranges of ambient TSS within the Hudson estuary range from 20 to 60 mg/L (USACE Kate and PJ etc). Atlantic sturgeon within the Hudson/Raritan estuary experience ambient TSS/turbidity conditions generally much greater than those measured during fill activities along the Atlantic coast of NJ, except for the within the surf/swash zone. It is expected that the mobile behavior of the sturgeon would serve to limit the duration of exposure to any exceptionally elevated levels of TSS/turbidity.

Monitoring of NJ beaches, including both re-nourished beaches and reference beaches during strong storms revealed elevated TSS levels that extended well past the near shore zone to an extent much greater than the dispersal distances measured during placement activities. During storms, elevated TSS levels were often an order of magnitude greater than levels measured during placement activities, and, unlike the very localized affects seen during fill operations, these higher concentrations occurred over *regional coastal areas*.

In summary, the spatial scales of elevated turbidity/TSS associated with beach fill operations are relatively small. Likewise, the increment of suspended sediment concentrations above ambient attributable to fill operations is relatively small once sediments have dispersed outside the swash zone. No adverse affects to dissolved oxygen were observed in the surf or near shore zones during TSS and water quality monitoring during fill activities. TSS samples collected during or immediately after storm events showed that even mildly strong storms or wind events produce much greater impacts related to TSS or turbidity increases relative to beach fill operations.

6.2.3 POTENTIAL IMPACTS TO FOOD RESOURCES DURING SHORELINE CONSTRUCTION

As part of the NJ BMP (Sea Bright to Manasquan) 30 sample transects were established along approximately 10 km of intertidal beach (core) and adjacent near shore area (5 m depth, grab). Samples were collected and analyzed from 1994 through 2000. Sampling occurred before during and after nourishment.

The principal conclusions from this portion of the study are as follows:

1. Prior to any post construction sampling, monitoring results revealed that species abundance and diversity showed “natural” seasonal and annual variations.
2. Infaunal assemblages of intertidal and nearshore beach environments were similar in species composition and abundance to those reported elsewhere on the Atlantic Coast (USACE 2001C). Abundance was somewhat lower than that reported for beaches in Southern New Jersey.
3. Intertidal abundances were highest in the summer and lowest in mid-winter.
4. Intertidal sediments varied between depths, seasons, and years. Mean grain size declined

with depth and was generally highest in the spring.

5. Beach nourishment resulted in short-term declines in abundance, biomass, and taxa richness.
6. Recovery of intertidal assemblages was complete within 2-6.5 months of the conclusion of filling. Differences in the rate of recovery were most likely due to differences in when nourishment was complete. Sites where filling did not conclude until the low point in the seasonal cycle of infaunal abundance took the longest to recover.
7. Recovery rates are similar to those reported from other studies, particularly where the grain size of the fill material matched that of the beaches to be nourished.
8. There is no evidence of long-term impacts of beach nourishment operations on intertidal or nearshore infaunal assemblages.

Loss of the benthic community is anticipated to occur within the foot print of the fill, which would include intertidal areas and the nearshore littoral immediately adjacent. However, the area's temporary (see above) loss of benthic organisms is mitigated by the fact that this is a tiny percentage of available, comparable shore line environment and, sturgeon are not known to frequent or forage in this extremely shallow and energetic ocean environment.

6.3 POTENTIAL IMPACTS DURING SHORELINE CONSTRUCTION (PLACEMENT AND STRUCTURES) IN RARITAN BAY – PORT MONMOUTH AND UNION BEACH

6.3.1 POTENTIAL PHYSICAL INJURY AND BEHAVIORAL IMPACTS DURING SHORELINE CONSTRUCTION

During vessel transit from the SBOBA to Raritan Bay booster pump stations for sand placement, it is possible that the dredge could encounter sturgeon. However this is unlikely for the same reasons discussed in section 5.2.1. Also, a study conducted in the Delaware estuary, concluded that vessel strikes accounted for 50% of Atlantic sturgeon mortalities (Brown and Murphy 2010, as cited by USACE-NAP 2011). However, since the Delaware estuary is narrower and shallower than the area in which the dredge would travel for the proposed projects (e.g., SBOBA to Raritan Bay), it is less likely that the dredge would strike an Atlantic sturgeon.

Analogous to potential placement impacts along the Atlantic coast significant adverse direct impacts to Atlantic sturgeon associated with placement of sand are highly unlikely. The two types of physical impacts associated with this environment include direct contact with one or more pieces of equipment and movement of sediment, both of which are highly unlikely to occur. Since sand is carried to the beach and deposited on the dry beach by a stationary pipe, there is no threat of impact from the pump out equipment. Bulldozers, front-end loaders and similar equipment that could be used to re-grade the sand would have minimal contact with the swash zone making impacts with sturgeon unlikely, especially because sturgeon, adults or juveniles are not known to inhabit this zone. However unlikely, there is always the small possibility of a (small) sturgeon moving into this area but their ability to avoid the slow moving construction equipment that could be used to re-grade the sand (<5 mph), or the sand that is being moved, makes any contact doubtful. Consequently, contact or burial due to equipment or movement of sand into the intertidal and adjacent near shore zone is not expected to occur.

Placement of sand into the nearshore would cause localized increases in turbidity.

Because of the extreme shallow nature of the Raritan Bay nearshore zone, wind mixing may cause a greater duration and further extent of resuspended sediments then on the Atlantic coast. Thus, there may be a greater potential for a sturgeon to come into contact with a zone of high turbidity. However, sturgeon are not known to inhabit areas of high turbidity and it is unlikely that any impacts other than avoidance behavior would occur.

Features of the Port Monmouth project include construction of a terminal stone groin and extension of the fishing pier. Construction of these features, as described in Section 2.1, is extremely unlikely to cause any significant impacts to sturgeon given the types and speed at which these kinds of construction activities would take place. If an Atlantic sturgeon is present, its mobility would allow it to easily avoid contact with piles as they are being placed via jetting, as well as avoid stones being placed in the slow and precise manner required to avoid fracturing during construction of the groin. Although some of the construction equipment associated with building of the groin and pier may create a new and temporary sound source in the project area, this equipment is not known to create sounds/vibrations that would be harmful or disturbing to Atlantic sturgeon, as is the case with explosives and pile driving equipment. Also, the shallow nature of portions of the project site may greatly reduce the probability of sturgeon from being in the area.

Construction and operation of the sector gate at Port Monmouth and the storm surge barriers in Union Beach are not anticipated to significantly impact sturgeon. Both the gate and barriers would be placed in creeks that drain into Raritan Bay. In the unlikely event that a sturgeon would be present in the creeks, it is anticipated that they would move away from the source of noise during construction. Once constructed, the gates would be closed during a storm event, cutting off access between the creeks and Bay. It is possible, although highly unlikely, that a sturgeon could get temporarily caught in the creek until the gates re-opened.

6.3.2 POTENTIAL HABITAT IMPACTS DURING SHORELINE CONSTRUCTION

There are no Atlantic sturgeon spawning grounds in Raritan Bay; therefore impacts from the proposed projects on spawning grounds are not anticipated.

USACE has not conducted any TSS monitoring in Raritan Bay; however, monitoring was conducted along the Atlantic coast beaches in NJ (Sea Bright to Manasquan; USACE-NYD 1994-2000) and is summarized in Section 5.2.2. It can be inferred that turbidity/TSS conditions at the swash zone along project sites in Raritan Bay may be less than those on the Atlantic coast of NJ, which generally experiences greater surf zone wave activity. However, as previously described, the extreme shallow nature of the bay's nearshore may prolong resuspension of finer sediments that "winnow" out of the newly placed sand under strong wind conditions. Nevertheless, turbidity impacts would be temporary, and the spatial scales of elevated turbidity/TSS are expected to be localized. Any increased localized turbidity is not anticipated to impact Atlantic sturgeon since they do not typically frequent the near shore placement zone and they are highly mobile and are capable of taking advantage of the unconfined space offshore to avoid a plume by moving away from the source.

6.3.3 POTENTIAL IMPACTS TO FOOD RESOURCES DURING SHORELINE CONSTRUCTION

A baseline (e.g., pre-construction) study to examine the distribution of infauna inhabiting the intertidal zone of beaches along the south shore of Raritan and Sandy Hook Bays was initiated in September 2002 by the District. Survey areas included Union Beach, Port Monmouth, Port Comfort and Keansburg. Results of the study were consistent with previous studies in the area (Ray 2004).

For Port Monmouth, annelids dominated the biomass at MLW and subtidal depths, while mollusks (principally *I. obsoleta*) made up most of the biomass at mid-tide depths. At Union Beach, T. heterochaetus (13.5%), Tubificidae (12.5%) and G. gemma (12.2%) were most abundant in the area. Therefore, these areas are a potential food resource for Atlantic sturgeon.

Based on information in the Final EIS for the Union Beach project (September 2003), construction of the revetments, terminal groins, beach berm, and periodic re-nourishments would result in a one-time, short-term adverse impact on the benthic communities. Negative impacts to the benthic community would include direct smothering of sessile benthic invertebrates within the construction area. During initial nourishment and periodic re-nourishments, motile invertebrates would be able to escape without injury. The construction of the levees, floodwalls, pump stations, and storm gates would be limited to the upland areas adjacent to the salt marshes and some other wetlands areas and are not expected to impact any life stages of the Atlantic sturgeon. In areas where they are constructed in the wetlands, a short, one-time burial of existing marsh invertebrates would occur if any are present at the time. No long-term adverse impacts to the existing marsh surface benthic invertebrates are expected as a result of the construction of the levees and floodwalls. These impacts are also applicable to the Port Monmouth project.

Even as other projects occur in the surrounding area, such as channel deepening in Ambrose channel (completed in 2012) and other beach nourishment projects (e.g., Sea Bright to Manasquan, all of which use the SBOBA), these areas still represent a small portion of the surrounding habitat available for Atlantic sturgeon, impacts would be temporary, and are not anticipated to have an adverse cumulative impact on the benthic community.

7.0 OTHER SPECIES OF CONCERN

The remaining federally listed species that may occur in the project areas are: the endangered Northwest Atlantic Ocean DPS of the loggerhead turtle (*Caretta caretta*); the endangered Kemp's ridley turtle (*Lepidochelys kempi*); the endangered green turtle (*Chelonia mydas*); the endangered leatherback turtle (*Dermochelys coriacea*); the endangered North Atlantic right whale (*Eubalaena glacialis*); the endangered humpback whale (*Megaptera novaeangliae*); and the endangered fin whale (*Balaenoptera physalus*).

NMFS issued a Biological Opinion (BO) to the District in 1995 to address the impacts of beach nourishment projects along the South Shore of Long Island and the Northern NJ Shore Sandy Hook to Manasquan) for sea turtles and whales. A BA was also developed in 2001 to assess impacts to sea turtles from beach re-nourishment and offshore borrowing in the Raritan Bay Ecosystem. The biological information in both documents is still relevant, and the conclusions are not anticipated to drastically change.

7.1 SEA TURTLES

7.1.1 GENERAL SEA TURTLE INFORMATION

In general, listed sea turtles are seasonally distributed in coastal US Atlantic waters, migrating to and from habitats extending from Florida to New England, with overwintering concentrations in southern waters.

As water temperatures rise in the spring, some of these turtles begin to move northward and reside in relatively shallow inshore waters of the north east to take advantage of abundant forage. As temperatures begin to decline rapidly in the fall, turtles in the north east Atlantic begin to migrate back to southern waters. Sea turtles can be expected to be in the vicinity of the SBOBA when the water temperature surpasses 15 C (60 F) which generally coincides with June 1. However, the window of residence for the 4 listed species is considered to be May1 through November 30. Southern migration begins when the water drops below 15 C. Turtles are migrating out of the NYB by the beginning of November. Future warming ocean trends may cause this window to be expanded.

Life history descriptions for each of the 4 listed sea turtle species were described in the NYD 1995 BA and the 1999 Harbor Deepening BA and are incorporated here by reference. There have been no significant changes to the distribution, population size, food availability requirements etc. of any of the species since that time. However, since the 1995 consultation, a change in the listing of loggerhead turtles has occurred, as described in Footnote 1 of Section 1.1.

7.1.2 POTENTIAL DREDGING IMPACTS AT THE SBOBA (ELBERON TO LOCH ARBOUR, PORT MONMOUTH AND UNION BEACH)

Direct entrainment of sea turtles during hopper dredging at the SBOBA is a possibility during the season in which they are present in NY/NJ waters (May through November). However, the likelihood of a migrating turtle being impacted by a hopper dredge is remote; only one take has been documented since monitoring procedures have been established in the NYB in 1993 (Table 4), during which approximately 22.5 million cy of material has been dredged from the navigation channels, SBOBA and other borrow sites.

Loggerhead and Kemp's ridley turtles, which normally spend much time at or near the bottom feeding on benthic invertebrates, would be less vulnerable to contact with a draghead when they are migrating. Green turtles, which are the least common turtles in the north east, forage on submerged aquatic vegetation (SAV). This species is also expected to be only passing through the borrow area, not spending much time on or near the bottom due to the lack of sea grasses or other SAV. Leatherback turtles are fast swimming pelagic organisms and the least likely to be found in near shore coastal waters, especially at or near the bottom. This species feeds in the water column where it forages for jellyfish which is its primary prey. The bathymetry and topography of the project site also differs greatly from those confined areas where turtles have been most commonly encountered by hopper dredges in the south east.

The risk of injury or mortality due to contact during transit of the hopper exists for this project. However, the magnitude of risk to any of the populations of loggerhead, leatherback, green, and Kemp's ridley sea turtles is so small that it is unlikely to jeopardize the continuing existence of the populations of sea turtles that seasonally inhabit NYB waters. Best management practices under the guidance of NMFS would be implemented to assure minimization of direct risk to sea turtles during construction of these projects.

Boat strikes and propeller hits are probably the greatest source of injury and mortality to sea turtles in coastal areas in the northeast. Most of these are due to the abundance of speeding recreational boats. An injurious strike by a much slower moving hopper dredge is far less likely but possible.

Dredging sand from SBOBA would temporarily remove all non-mobile benthic fauna from the action footprint. Swimming crabs such as the blue claw *Callinectes sapidus* and the lady crab *Ovalipes occletus* are likely capable of avoiding the draghead. Slower moving crabs including spider crabs may be entrained or crushed. Bivalves, other infauna and non mobile epi-fauna would be lost. Crabs, both swimming and walking are important proponents of the diets of the loggerhead and Kemp's ridley turtles. These young turtles are known to be migrating through and tracking them via satellite has shown that they do not linger in these coastal oceanic waters. Finding prey during their migration would simply be a matter of foraging anywhere along their route outside the dredge footprint, which makes up a very small portion of the overall habitat available for foraging. Previously referenced USACE studies have shown that the abundance and diversity of turtle prey items (crabs and mollusks) which can be found at the SBOBA are available throughout the entire NYB. As was also established previously, benthic recovery within the dredge footprint is relatively rapid and, more mobile species such as crabs are likely to re-occupy those areas within days.

7.1.3 POTENTIAL IMPACTS DURING SHORELINE CONSTRUCTION (ATLANTIC COAST AND RARITAN BAY)

In the event that a loggerhead or Kemp's ridley sea turtles would migrate or forage close to shore during placement of sand, there is little probability that impacts might arise from direct contact with equipment utilized for placement, and/or potential burial from placement of sand. Reasons for this are similar to those predicted for sturgeon. Studies in the north east have shown that turtles spend almost all of their time in waters greater than 15' which would put them well out of harm's way in Raritan Bay. Coastal migratory corridors have also been observed to be in waters much greater than 15', again keeping them well offshore. Generally speaking a healthy turtle would not be in the surf zone, which is the only area where it might come in contact with placement machinery. It is possible that a sea turtle may encounter a zone of increased turbidity along the Atlantic coast or in Raritan Bay during placement. Chances of this might increase under certain (weather) conditions. However, no significant impacts would be encountered since turtles are visual predators and they would likely move off into waters with better visibility.

As analogously discussed for sturgeon, Port Monmouth groin and pier construction methods, depth of water, and sea turtle mobility and behavior leads to similar expectations of no significant impacts. Turtles are not likely to be found in these shallow areas but in the unlikely case that they are, they would be able to avoid any direct impacts by moving away from the potential danger.

7.2 WHALES

7.2.1 POTENTIAL IMPACTS TO WHALES IN THE PROJECT AREAS

During coordination with NMFS, Danielle Palmer advised that listed species of whales do not occur in Raritan Bay or within the Lower Bay, and thus, there will be no direct or indirect effects to listed whales from any shoreline work to occur at Port Monmouth or Union Beach. Therefore, this section will only address impacts to whales at the SBOBA, while transiting from SBOBA to Elberon to Loch Arbour, and while transiting from SBOBA to the bend at the tip of Sandy Hook, and before entering Raritan Bay to reach the Port Monmouth and Union Beach project areas.

As described in the 1995 NY and NJ beach nourishment BO and 2012 HDP BO, several species of whales may occur in the NYB:

1. Right whales in the NYB are primarily transiting the area on their way to more northerly feeding and concentration areas. During late winter and early spring, they begin moving north along the coast past Cape Hatteras and near the Long Island Coast. Individuals have been sighted along the south shore of Long Island, Block Island Sound, Gardiners Bay and south shore inlets and bays. They are most likely to occur around the project areas from November 1 – April 30.
2. Humpback whale presence in the northwestern Atlantic is variable and probably a response to the changing distribution of preferred food sources. For the most part, humpbacks are in transit through the NY area from June through September on their northward migration to summering areas in the Gulf of Maine.
3. Finback whales occupy both deep and shallow waters and are probably the most abundant large cetacean in NY waters. They are most abundant in spring and summer, but do have some presence during the winter months.

Impacts to listed species of whales during sand mining are unlikely because the hopper dredge would move very slowly at $\leq$ 2.6 knots, a speed at which whales can avoid contact with the dredge. On the other hand, collisions with a transiting hopper dredge between SBOBA and the project areas might occur on the Atlantic side of the project areas. An analysis by Vanderlaan and Taggart (2006, as referenced in HDP BO) showed that at speeds greater than 15 knots, the probability of a ship strike resulting in death of a whale increases asymptotically to 100%. At speeds below 11.8 knots, the probability decreases to less than 50%, and at ten knots or less, the probability is further reduced to approximately 30%. The speed of the dredge in the proposed projects is not expected to exceed 2.6 knots while dredging and 9.4 knots while transiting to/from the SBOBA and shoreline, thereby reducing the likelihood of vessel collision impacts.

The proposed projects would cause a small, temporary increase in vessel traffic within the action area. This increase is not expected to significantly increase the risk of a collision relative to the existing vessel traffic traversing in and out of the Port of NY and NJ, which enters the Harbor through the Ambrose Channel. The approach areas to the channel are shown as shaded in pink in Figure 5. Vessels using the channel and approach areas should not cross paths with the dredge while transiting from the SBOBA to the project areas; therefore . There are ferries that operate from Belford, Highlands, Atlantic Highlands and Sandy Hook New Jersey to

New York City (Seastreak and the NY Waterway), and there are marinas for private boats along Raritan Bay and the NJ shore. Although vessel strikes are acknowledged as being one of the primary known sources of whale mortality in the northeast, ship strikes remain relatively rare events and a small increase in vessel traffic within the project area does not necessarily translate into an increase in ship strike events (NMFS Consultation Letter to USACE, NYD, Daniel S. Morris 1/20/2012).

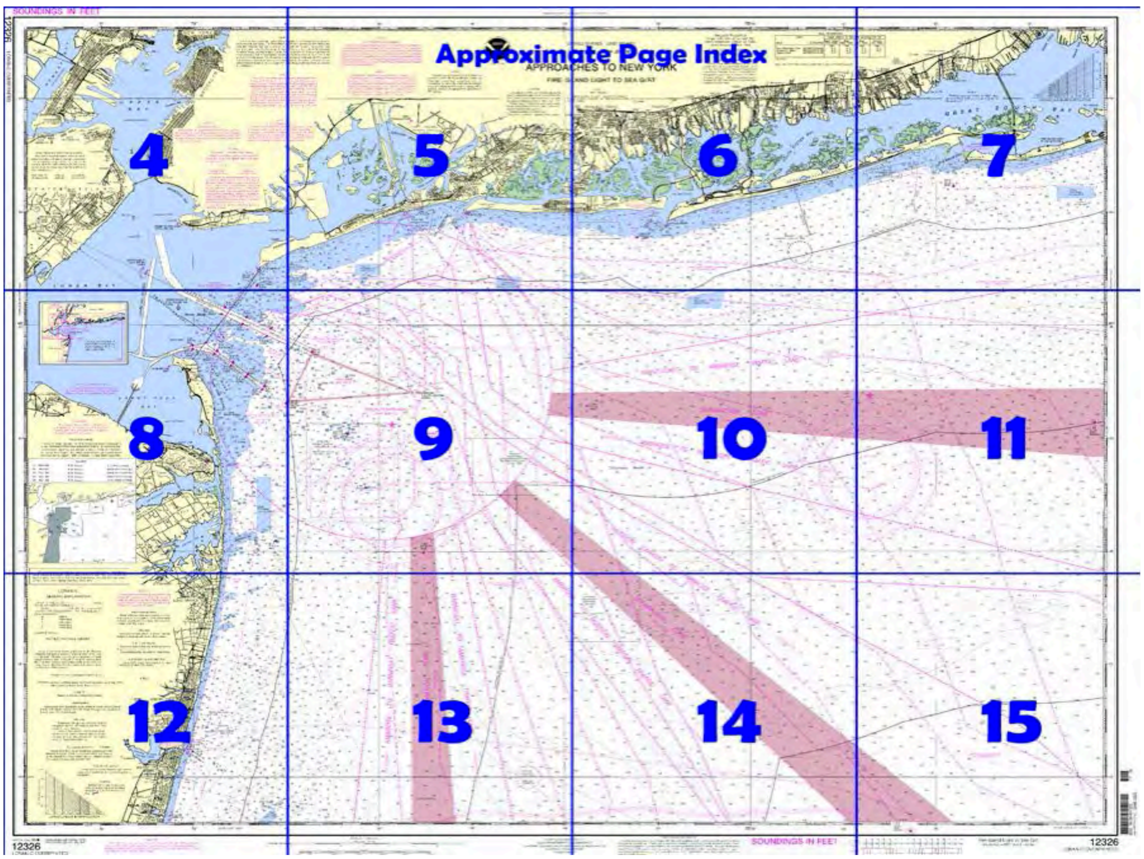

Figure 6: Approach areas, shaded in pink, to the Ambrose Shipping Channel. Source: http://ocsdata.ncd.noaa.gov/BookletChart/12326_BookletChart.pdf

For the Elberon to Lock Arbour project, it is possible that pile driving equipment would be used in the construction of outfall pipe extensions in the near shore waters. Noise from pile driving equipment generates sound waves within the water that have the potential to disturb or present a physical hazard to marine mammals (ICRC 2009). The intensity of sound decreases as it travels through a medium, including water. Underwater noise studies have not been conducted by the District for pile driving activities. However, underwater surveys done for the Port of Anchorage Marine Terminal Redevelopment Project during a pre-construction test pile-driving effort established marine mammal harassment zones at 350 m from impact pile driving and at 800 m from vibratory pile driving (ICRC 2009). A marine mammal exclusion and buffer zone of 152 m[4] was also established by NMFS to avoid exposing marine mammals to sounds at or above 180 dB from pile driving activities in Cobscook Bay, Maine (NMFS 2012B). On this basis, and in the event that a whale would be found within 152 m (500 ft) from the construction activity, it is possible that sound waves generated from pile driving activities could disturb any whales

[4] This radius was subject to change once underwater sounds were measured during construction.

transiting through the area.

Noise from the construction of the terminal groin and pier at Port Monmouth is not anticipated to cause a significant adverse impact to whales since the likely method of placing the wooden legs into the sand would be via jetting/pushing, as opposed to hammering. Similarly, the stones for the terminal groin are anticipated to be smoothly placed into the water to avoid fracturing.

8.0 CUMULATIVE EFFECTS

In the 2012 HDP BO, NMFS outlined the cumulative effects associated with sources of human-induced mortality, injury, and/or harassment of Atlantic sturgeon, whales, or sea turtles. In the BO, the definition of cumulative effects was referenced in 50 CFR 402.02 to include "*the effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions are not considered in the definition of cumulative effects."* The following provides an excerpt from the BO, as it is applicable to this document.

> *"Sources of human-induced mortality, injury, and/or harassment of Atlantic sturgeon, whales, or sea turtles' resulting from future State, tribal, local or private actions in the action area that are reasonably certain to occur in the future include incidental takes in state-regulated fishing activities, pollution, global climate change, and vessel collision. While the combination of these activities may affect Atlantic sturgeon, whales, or sea turtles, preventing or slowing the species' recovery, the magnitude of these effects in the action area is currently unknown...*
>
> *State Water Fisheries-Fishing activities are considered one of the most significant causes of death and serious injury for sea turtles. A 1990 National Research Council report estimated that 550 to 5,500 sea turtles (juvenile and adult loggerheads and Kemp's ridleys) die each year from all other fishing activities besides shrimp fishing. Fishing gear in state waters, such as bottom trawls, gillnets, trap/pot gear, and pound nets, take sea turtles each year… Action has been taken by some states to reduce or remove the likelihood of sea turtle takes in one or more gear types. However, given that state managed commercial and recreational fisheries along the Atlantic coast are reasonably certain to occur within the action area in the foreseeable future, additional takes of sea turtles in these fisheries are anticipated. There is insufficient information by which to quantify the number of sea turtle takes presently occurring as a result of state water fisheries as well as the number of sea turtles injured or killed as a result of such takes. While actions have been taken to reduce sea turtle takes in some state water fisheries, the overall effect of these actions on reducing the take of sea turtles in state water fisheries is unknown, and the future effects of state water fisheries on sea turtles cannot be quantified.*
>
> *Right and humpback whale entanglements in gear set for state fisheries are also known to have occurred (e.g., Waring et ai. 2007; Glass et ai. 2008). Actions have been taken to reduce the risk of entanglement to large whales, although more information is needed on the effectiveness of these actions. State water fisheries continue to pose a risk of entanglement to large whales to a level that cannot be quantified.*
>
> *Information on interactions with Atlantic sturgeon with state fisheries operating in the*

action area is not available, and it is not clear to what extent these future activities will affect listed species…

Vessel Interactions-…private vessel activities in the action area may adversely affect listed species in a number of ways, including entanglement, boat strike, or harassment. As vessel activities will continue in the future, the potential for a ·vessel to interact with a listed species exists; however, the frequency in which these interactions will occur in the future is unknown and thus, the level of impact to sea turtle, whale, or Atlantic sturgeon populations cannot be projected…

Pollution and Contaminants -Human activities in the action area causing pollution are reasonably certain to continue in the future, as are impacts from them on Atlantic sturgeon, sea turtles, or whales. However, the level of impacts cannot be projected. Sources of contamination in the action area include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, and industrial development. Chemical contamination may have an effect on listed species reproduction and survival…"

9.0 DISCUSSION/CONCLUSION

From reviewing the best available information on the life history and behavior of the threatened and endangered species that may be present in and around the proposed project areas, the following species may be affected:

1. Atlantic sturgeon: may be present in the vicinity of the project areas in three major capacities: as adults primarily while migrating between spawning grounds in the Hudson River and oceanic environments; migrating throughout their marine range as adults of any DPS; and as juveniles in waters less than 20 m along the eastern side of Sandy Hook, NJ, possibly aggregating due to food availability.
2. Sea Turtles: due to the feeding behavior of green and leatherback turtles, it is unlikely that either species would be encountered during construction of the proposed projects. However, migrating loggerhead and Kemp's Ridley turtles may be present within the projects areas during May through November.
3. Whales: depending on the time of year in which construction takes place for the proposed projects, right, humpback or fin whales may be present. Beach replenishment projects are typically constructed in the fall/winter, outside of the tourist season. If this trend continues, right and fin whales may be present in the project areas.

9.1 ATLANTIC STURGEON

Based on the information contained in this BA, several direct and indirect impacts to the Atlantic sturgeon from the proposed beach nourishment projects were identified. However, as summarized below, the threats are not likely to jeopardize the continued existence and recovery of the species.

As the dredge travels to/from the SBOBA to the shoreline for sand placement, it could encounter a migratory sturgeon. Although vessel strikes are possible, they are more common in narrower and shallower areas (e.g., Delaware estuary) compared to the wide-open areas of Raritan Bay and the Atlantic shoreline; it is also anticipated that an Atlantic sturgeon would avoid a slower moving dredge. Therefore, it is unlikely that injury or death from a dredge strike would occur.

A temporary and short-term loss and/or shift in the benthic communities within a localized area of SBOBA and at the sand placement site in each of the project areas would occur. Given the nature of the impact, the availability of resources surrounding the area of impact (i.e., the Lower Bay, Raritan Bay and Atlantic Ocean), and that Atlantic sturgeon are indiscriminate feeders, the impact of dredging on benthic resources is unlikely to have an adverse impact on the species.

Impacts to water quality from dredging activities at the SBOBA and at the sand placement sites are not anticipated to impact Atlantic sturgeon. Re-suspension of sediment (e.g., sand) would not disperse to any degree. Any localized turbidity that might be encountered by a sturgeon in the offshore borrow area could be avoided since they are highly mobile and capable of avoiding the tiny amount of re-suspended sediment that might form from dredging coarse sand. Impacts at the near shore placement sites are unlikely as sturgeon do not typically utilize the intertidal and very shallow nearshore waters.

Direct impacts to Atlantic sturgeon during construction at the shoreline are possible, but unlikely since they do not normally frequent such a shallow and high energy zone and equipment is largely confined to upland or intertidal portions of placement site. Impacts might arise from direct contact with one or more pieces of equipment used for placement, from potential burial or displacement during sand deposition, or during construction of the structures at Port Monmouth and Union Beach (e.g., terminal groin, pier, etc). It is anticipated that Atlantic sturgeon would avoid any equipment, structures, or sand that is being moved to make any contact unlikely.

Though the greatest potential risk to Atlantic sturgeon comes from the proposed activities is entrainment during dredging activities, even this is a very unlikely occurrence. Since the SBOBA and sand placement sites in the proposed project areas represent a small portion of the surrounding Atlantic Ocean, Lower and Raritan Bays, there are many opportunities available for Atlantic sturgeon to avoid active dredges. Despite this, an interaction between an Atlantic sturgeon and the draghead of a hopper is possible. As per the conditions outlined in the NMFS 1995 (beach nourishment) and 2000 (channel deepening) BOs, the District equips the draghead of hopper dredges with sea turtle deflectors during the turtle season. This measure is meant to reduce the risk of interaction with sea turtles that may be present in the impact area, and is expected to operate in a similar manner for encounters with migrating Atlantic sturgeon.

Additionally, as part of the Terms and Conditions of the 1995 and 2000 BOs, USACE has been required to use NMFS-approved sea turtle observers to monitor for sea turtle take onboard hopper dredges. The 2012 updated consultation for the HDP (NMFS 2012A) called into question the effectiveness of observers when a UXO screen is deployed on the dredge. Through discussions with NMFS, USACE Engineer Research Development Center, and other USACE Districts in the North Atlantic Division, the general opinion was that it is unlikely that a sea turtle or Atlantic sturgeon would fit through a UXO screen (1.25 – 1.5” x 6”), and that any parts that make it through would be difficult to find, identify, and confirm as a take.

A number of alternatives to observers were reviewed during the 2012 HDP consultation process, however, most were considered unviable. The alternatives were determined to be either inappropriate to monitor take, ineffective given the conditions of dredging in the Ambrose Channel (e.g., depth, light, turbidity, anthropogenic objects on seafloor; and uneven surface), or the technology is incompatible with the proper identification of a species. Alternatives considered include: camera deployed on the draghead; use of sonar/acoustic system; relocation trawling; shark silhouette fitted underneath the dredge and near the draghead; and inspection of sea turtle deflector for proper installation. During the consultation process, the District and NMFS concluded that a proxy take was the most appropriate method to monitor take when a UXO screen is deployed.

Since the 2012 BO, an intact sub-adult Atlantic sturgeon was found onboard a hopper in the Ambrose channel, and sea turtle parts were recently found onboard a hopper in the south east, well outside of the project impact area. (personal communication with Danielle Palmer); both dredges were operating with a UXO screen. In the case of the District's take, it was believed that a bar on the UXO grid was bent and allowed the sturgeon to pass through the screen intact.

In addition to the limited impacts of dredging activities in the District's AOR, and as described in Section 4.0, there are a variety of other factors that may contribute to the vulnerability of Atlantic sturgeon to habitat impacts and potential further population collapse, many of which are more likely to impact the Atlantic sturgeon than a dredging project exercising prudent measures to avoid/minimize takes. These include: their unique life history characteristics, vessel strikes, overfishing, dam construction and operation, water quality modifications, bycatch and poaching. In order for recovery efforts to succeed, it is vital to practically address all potential threats to Atlantic sturgeon.

9.2 SEA TURTLES

Based on the information contained in this BA, direct and indirect impacts to the leatherback and green turtles from the proposed beach nourishment projects are unlikely. The more pelagic offshore nature and water column feeding habits of the leatherback and the lack of vegetative forage at the project site required by green turtles all but remove these two species from the potential dangers of entrainment. Also, disruption of the existing benthic habitat would not affect the foraging of these two species as it does not provide them with a significant food source. Thus, the proposed actions are not likely to jeopardize the continued existence of these sea turtle populations.

Direct and indirect impacts to Kemp's ridley and the Northwest Atlantic DPS of loggerhead sea turtles during dredging at SBOBA are possible, but limited to a very low risk of entrainment by hopper dredge or by collision with a transiting hopper from the SBOBA to the pump out station. The potential for indirect impacts also exist via a temporary loss and/or shift in benthic community abundance, diversity, or habitat within the dredging footprint; however, these impacts are offset by the abundance of prey in the surrounding areas and relatively quick re-colonization times.

Based on the many years of documented sea turtle observer data (1993-2010), there was only one observed loggerhead turtle take out of approximately 22.5 million CY of dredged material in NY, NJ and New England. The take was considered a freak incidence and occurred during a beach re-nourishment project along the Sandy Hook to Barnegat Inlet in 1997 (Long

Branch borrow area), which is along the NJ shore. Also, when compared to other dredging projects along the East Coast (see Sea Turtle Warehouse at: http://el.erdc.usace.army.mil/seaturtles), the overwhelming majority of turtle takes has been in the Gulf (208 takes) and South Atlantic Regions (481 takes) where sea turtles may cluster in channels to over winter, not in the North Atlantic (68) or District (1) where juveniles migrate to feed. Based on this information, observed take appears to be a rare occurrence within the District and should be an indication that sea turtle occurrence is rare in the District project areas.

The District acknowledges that even though the probability of negatively impacting a sea turtle is rare, the possibility still exists and some level of protection is warranted. Therefore, turtle deflectors would continue to be used. Whether or not the use of sea turtle observers is an effective method when a UXO screen is deployed is questionable and the NYD is committed to work with NMFS. While we work with NMFS to evaluate appropriate measures to quantify take, the District will continue to employ onboard lookouts to determine if the deflectors are deployed properly, to check the UXO screen for any turtles or turtle parts, and to identify presence of turtles to vessel operators to avoid collisions.

Impacts from direct contact with equipment utilized for placement at all project areas, installation of various structures at Port Monmouth and Union Beach, and/or potential burial or displacement related to deposition of sand is unlikely since turtles have the ability to avoid these project elements and are unlikely to be in very shallow water where much of the construction activity would occur. Consequently, significant adverse impacts are not anticipated.

The proposed actions are not likely to jeopardize the continued existence of Kemp's ridley and Northwest Atlantic Ocean distinct population segment of loggerhead sea turtles.

9.3 WHALES

Impacts to listed species of whales during dredging operations are unlikely because during sand mining a hopper dredge moves very slowly (≤2.6 knots) and it is anticipated that whales can avoid contact with the dredge. Collisions with a transiting hopper might occur, but the suggested reduced speed (10 knots) during transit lessens the probability of a ship strike resulting in death. Although vessel strikes are acknowledged as being one of the primary known sources of whale mortality in the northeast, ship strikes remain relatively rare events and a small increase in vessel traffic within the project area does not necessarily translate into an increase in ship strike events (NMFS Consultation Letter to USACE, NYD, Daniel S. Morris 1/20/2012). Onboard lookouts would also reduce the risk of vessel-whale collisions. If the lookout on board the hopper dredge observes a whale in the vicinity of the vessel during transit throughout the project area, maximum vessel speeds would be limited to 10 knots. If a Right Whale is observed, the vessel would maintain a 500 yard buffer from the whale. For all other whale species, a 100 yard buffer would be maintained.

During construction of the outfall pipe extensions at Elberon to Loch Arbour, if pile driving activity occurs, there is a possibility that any whales transiting the area would be disturbed by pile driving in the near shore waters. However, this disturbance is not likely to cause a significant adverse affect.

The proposed actions are not likely to jeopardize the continued existence of these marine mammal populations.

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Appendix A – Letter Documenting March 8, 2013 Meeting/Conference between the New York District and NMFS to Discuss ESA Consultation and EFH Coordination Post-Sandy

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

REPLY TO
ATTENTION OF

Planning Division

March 22, 2012

John K. Bullard - Regional Administrator
Northeast Regional Office
NOAA Fisheries
55 Great Republic Drive
Gloucester, MA 01930

Attention: Mary Colligan, Assistant Regional Administrator
Protected Species Division
Lou Chiarella, Assistant Regional Administrator
Habitat Conservation Division

Dear Mr. Bullard:

This letter is in reference to the March 8, 2013 meeting/conference call on the emergency activities occurring within the U.S Army Corps of Engineers, New York District's (District) Areas of Responsibility (AOR) that were a result of Super Storm Sandy. These activities include the rehabilitation of federally authorized and constructed hurricane or shore protection projects under Public Law (PL) 84-99, Flood and Coastal Storm Emergencies and PL 113-2, The Disaster Relief Appropriations Act - 2013. As you are aware, it is critical that the District moves out quickly to return protection to the communities and infrastructure before the upcoming storm season is within the AOR. It was a disappointment that our respective staffs did not meet in person at the Milford Lab, but weather conditions dictated prudence as far as not driving such long distances under those adverse conditions. Under the circumstances the conference call was the next best thing and I feel the group was successful in accomplishing our respective goals.

This letter is intended to execute one of the more immediate tasks that came out of that call by identifying a number of projects proceeding under our emergency authority contained in PL84-99 and PL 113-2. This request is specifically for:

- Atlantic Coast of New York City - Rockaway Inlet to Norton Point (Seagate), Brooklyn Coney Island Area Shore Protection Project;
- Atlantic Coast of New York City- East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York;
- Atlantic Coast of Long Island - Fire Island Inlet to Montauk Point, New York
  - Moriches to Shinnecock Reach (Westhampton Interim Shore Protection Project)
  - West of Shinnecock Inlet Interim Shore Protection Project.
- Atlantic Coast of New Jersey, Sea Bright to Ocean Township Beach Erosion Control Project, Sea Bright to Manasquan Inlet NJ; and
- Raritan Bay and Sandy Hook Bay, NJ Hurricane and Storm Damage Reduction (Borough of Keansburg, East Keansburg and Laurence Harbor).

As discussed, the above referenced projects are high priority emergency response actions intended to protect life and property in the most vulnerable, hardest hit portions of the coast before the next storm season threatens them. As that storm season is fast approaching time is of the essence, with projects scheduled to begin as early as this May to restore the damaged projects and return the authorized level of protection to the affected areas.

Endangered Species Act Consultation

Where emergency actions are required that may affect ESA-listed species and/or critical habitats, an emergency Section 7 consultation may be conducted (50 CFR§ 402.05). An emergency is a situation involving an act of God, disasters, casualties, national defense or security emergencies, etc., and includes response activities that must be taken to prevent the imminent loss of human life or property. The District is requesting emergency consultation pursuant to Section 7 of the ESA of 1973, as amended, for the above projects proceeding under PL84-99 and PL 113-2.

In accordance with those procedures, the District will continue to coordinate with your offices to minimize impacts to listed species. The District requests that your office provides us with a list of measures to be incorporated into the proposed actions that will serve to minimize and monitor effects to listed species during the emergency response activities. Because consultation on the effects of these beach nourishment projects on listed whales and sea turtles has been previously completed, the District expects many of the measures will already be included in the project description (refer to Attachment 1). Pursuant to the emergency consultation procedures, once the emergency response is completed, the District will provide you with a biological assessment that contains a description of the activities that were carried out and an assessment of any impacts on listed species, including documentation of any take that occurred.

A description of the emergency actions is attached (Attachment 2). It is important to stress that each of the actions is intended to restore the storm-damaged projects to their authorized conditions; no changes to the beach dimensions or new borrow areas will be employed and will utilize the same protective measures and conservation recommendations that the District put in place following the District's previously completed consultations (Attachment 1). It is the District's belief that these measures will be as protective of Atlantic sturgeon as they proved to be for the listed species that were successfully consulted on originally. Consequently, the District would very much appreciate your office confirming the initiation of emergency consultation for these activities as soon as possible.

Following the initiation of emergency consultation for the activities authorized under PL 84-99 and PL 113-2, the District will seek to initiate consultation for the next group of projects designed to address the impacts of Super Storm Sandy by quickly moving into construction projects that Congress has already authorized, but had not yet appropriated funds to build. These projects, funded under the PL 113-2, are intended to extend protection to areas deemed at risk to future storms. These actions are to be expedited as soon as their Plans and Specifications can be updated to reflect current conditions. As such, the District will be requesting that consultation be completed as expeditiously as possible. As highlighted in the attached table (Attachment 3), the District would like to bundle the consultation requests for projects to be executed later his year, and separately bundle those likely to be constructed in 2014. As with the emergency projects, the District will follow the designs authorized by Congress and apply the protective measures and conservation recommendations that came out of the prior consultations prior to their respective authorization. The District will shortly be providing you the details needed to initiate these consultations.

Essential Fish Habitat Coordination

Since all of the projects in the groups discussed up to now have completed coordination under the Magnusson-Stevens Act (MSA), and all are to be built to the same specifications identified during that coordination, no further action is intended to be initiated for Essential Fish Habitat (EFH) except to confirm our intent to implement the conservation measures identified during the authorization process for each of the projects. The last group of Sandy-related projects to be funded under the Sandy Relief Bill includes expedited completion and authorization/construction of ongoing studies for coastal protection in areas not covered by the first two groups. As these studies are not likely to be completed until 2014 and their recommended actions implemented shortly after, there is more time for them to complete consultation under ESA and MSA. It is hoped that our close collaboration to expedite the authorized projects will serve to quicken this process while ensuring the appropriate protection for listed species and EFH. This coordination will be coordinated via separate correspondence.

The District looks forward to our close collaboration as our respective staffs work toward achieving our respective missions. The District has every reason to expect these missions to be complimentary and encourage you to contact me as soon as there are any issues or questions that could enhance this effort, or delay it. For further questions or comments, please contact me at 917-790-8702/leonard.houston@usace.army.mil.

Sincerely,

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Leonard Houston, Chief
Environmental Analysis Branch

Enclosures

CF:
CENAN-EOC
Tavolaro, Deputy Chief, Operations Division, CENAN

NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Agency: Army Corps of Engineers (USACE), New York District

Activity: Beach Nourishment Projects Utilizing the Sea Bright Offshore Borrow Area: Union Beach, Port Monmouth, and Elberon to Loch Arbour, New Jersey
(NER-2014-10606)

Conducted by: National Marine Fisheries Service
Northeast Regional Office

Date Issued: 3/7/2014

Approved by: for John Bullard

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1.0 INTRODUCTION

This constitutes the biological opinion (Opinion) of NOAA's National Marine Fisheries Service (NMFS) issued pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, on the effects of the U.S. Army Corp of Engineers (USACE) conducting three beach nourishment projects utilizing the Sea Bright Offshore Borrow Area (SBOBA):

- Port Monmouth
- Union Beach
- Elberon to Loch Arbour

This Opinion is based on information provided in the Biological Assessments (BA) dated October 2013, past consultations with the USACE New York District, and scientific papers and other sources of information as cited in this Opinion. We will keep a complete administrative record of this consultation at our Northeast Regional Office. Formal consultation was initiated on October 29, 2013.

2.0 CONSULTATION HISTORY

The USACE submitted a biological assessment (BA) to us on August 26, 2013, along with a request to initiate consultation on three dredging projects, with supplemental information provided in a revised BA on November 1, 2013. The three proposed actions are in response to the impacts sustained from Hurricane Sandy on October 29, 2012. Because the projects are similar, they take place in the same geographic area, and affect the same species in the same manner, we determined it would be most efficient to combine the analysis of effects in one consultation. As such, while there are three independent actions considered here (i.e., beach nourishment projects for Port Monmouth, Union Beach, and Elberon to Loch Arbour), we are producing one Opinion. This type of "multi-action" consultation is contemplated in the NMFS-USFWS Section 7 Consultation Handbook (see page 5-5).

In the future, reinitiation of consultation may be necessary (see Section 14 and 50 CFR§ 402.16). Depending on the circumstances associated with the cause for reinitiation, it may not be necessary to reinitiate consultation for all of the actions considered here. For example, if a new species is listed that may be affected by dredging activities, it would likely be necessary to reinitiate consultation on all of the activities considered here. However, if the cause for reinitiation has effects that are limited to one action (for example, a change in dredge type, dredge volume or disposal area), reinitiation of consultation on only that action may be necessary. We expect that determinations about the scope of any future reinitiation(s) will be made in cooperation with the USACE and us.

3.0 DESCRIPTION OF THE ACTION

This Opinion considers the effects of three new beach nourishment projects located in New Jersey: Port Monmouth, Union Beach, and Elberon to Loch Arbour. The projects will use sand from the SBOBA which is located 1-3 miles offshore of the southern end of Sandy Hook, NJ. The mean water depth of the borrow area is 50 feet (USACE-NYD 2006). Each project will also construct structures along the shoreline that aim to reduce damages from future storm events. These activities are carried out by the USACE and their contractors as independent actions as detailed below. As described below, each of the three projects have different start dates with the durations ranging from 1 to 50 years.

3.1 Action area

The action area is defined in 50 CFR § 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area for this consultation includes the SBOBA, Raritan Bay, and the Atlantic Ocean waters off Elberon to Loch Arbour, specifically those areas where dredging, beach nourishment, and construction events will be completed (i.e., SBOBA, Port Monmouth, Union Beach, Elberon to Loch Arbour) (See Figures 1 through 4. In addition, the action area also includes the waters between and immediately adjacent to these areas where project vessels will travel and dredged material will be transported to these sites. The action area will also encompass the underwater area where dredging or fill placement will result in increased suspended sediment and where sound pressure waves associated with pile driving will be experienced. The size of the sediment plume will vary depending on the type of dredge used and is detailed below. Effects of pile driving are expected to be limited to an area with a radius of 30 meters around the pile driving site.

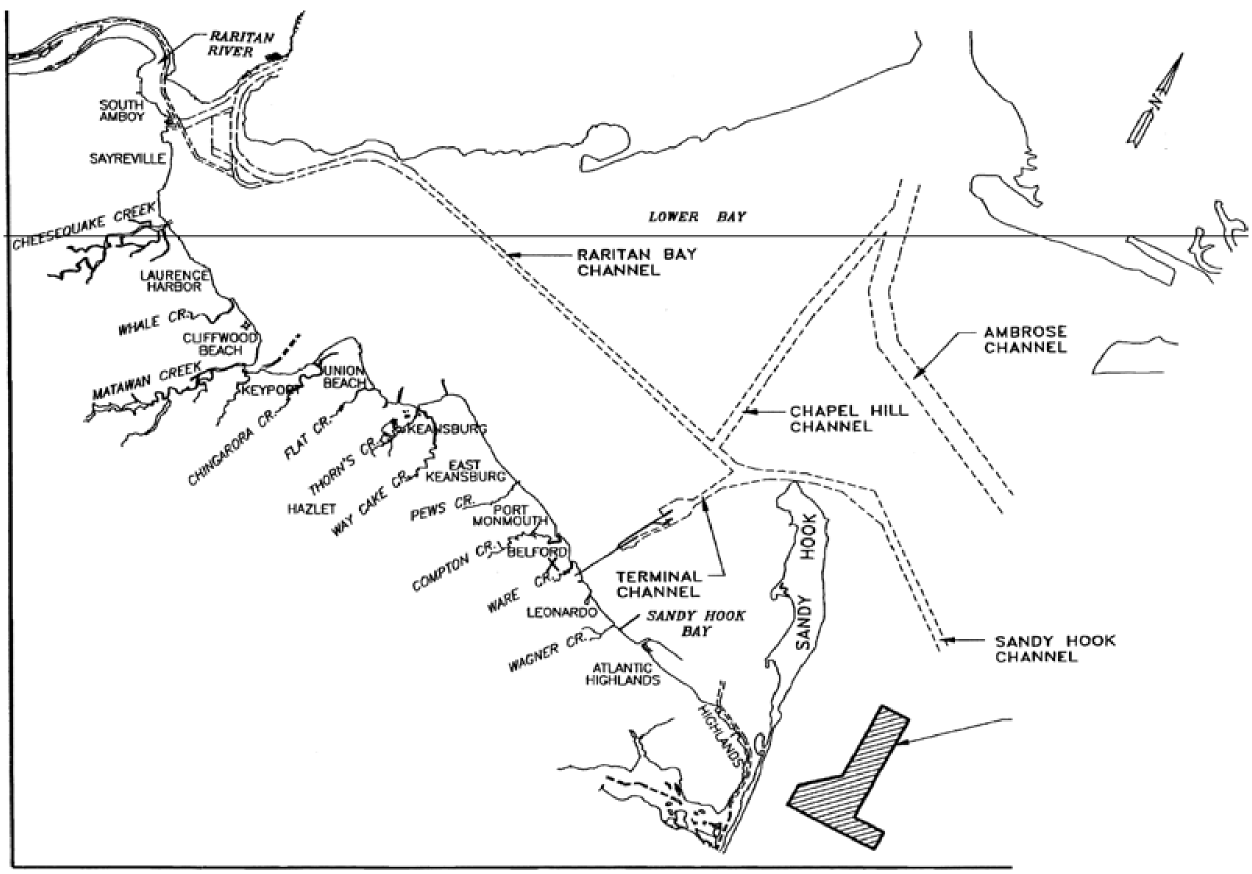

Figure 1: Location of the Sea Bright Offshore Burrow Area

3.2 Port Monmouth

Port Monmouth is located on Raritan Bay, NJ and is bordered by East Keansburg and Belford. The action is anticipated to begin in March, 2014, and will last for approximately 13 months.

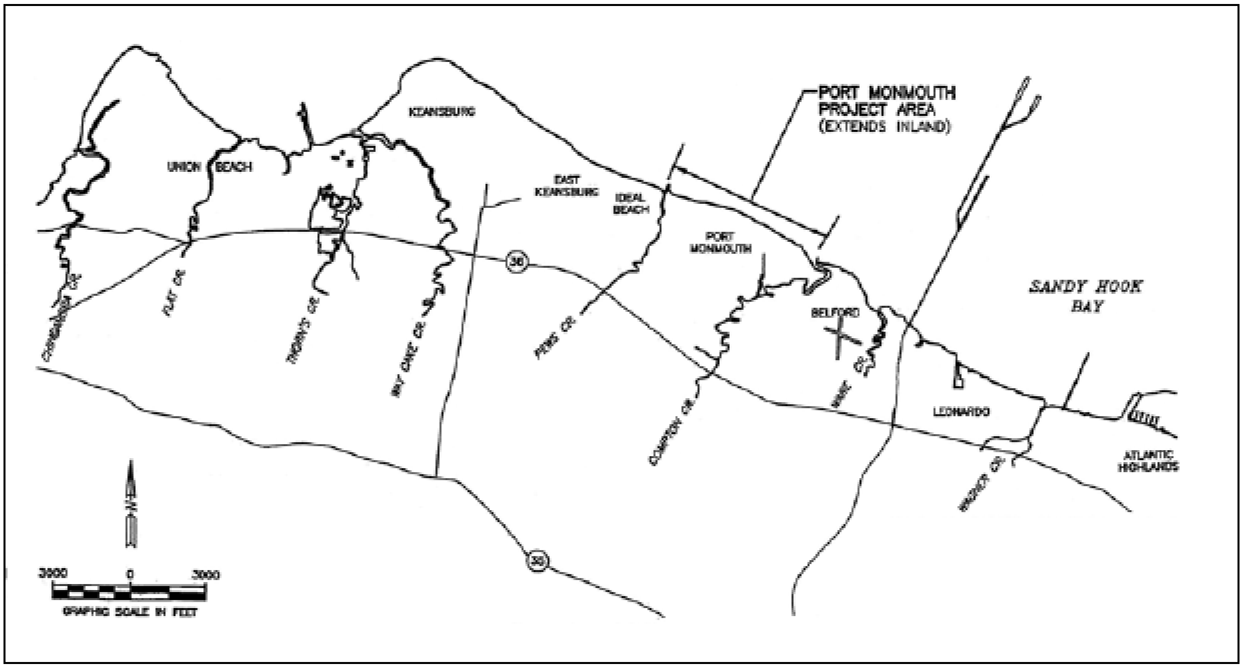

Figure 2. Location of Port Monmouth Project Area

The shoreline protection component of the proposed action aims to reduce damages from coastal erosion and tidal inundation along the project's bay shoreline. Approximately 391,000 cubic yards (CY) of sand will be dredged from SBOBA via a hopper dredge equipped with an unexploded ordnance (UXO) screen (longitudinal bar screens that typically have an opening of 1.25 - 1.5" x 6"). The hopper will dredge the material from approximately 46 acres of the SBOBA, with an average of 5.5 feet of dredged material removed, and then sail to a pumpout area. Resuspension of fine-grained dredged material during hopper dredging operations is caused by the dragheads as they are pulled through the sediment, turbulence generated by the vessel and its prop wash, and overflow of turbid water during hopper filling operations. Nearfield concentrations ranged from 80.0-475.0 mg/l. By a distance of 4,000 feet from the dredge, plume concentrations are expected to return to background levels.

The approximate distance from the SBOBA to the pump out station is anticipated to be approximately 16 miles. The approximate and typical transit speed during the nourishment projects operating in the SBOBA to Raritan Bay are expected to be: 9.8-10.8 mph (8.5-9.4 knots) between the borrow area to Raritan Bay; and 2-3 mph (1.7-2.6 knots) while dredging. The hopper will then connect to a pumpout barge where it will pump sand from the hopper onto the shoreline via a pipeline along approximately 3,300 linear feet of shoreline from Pews Creek to Compton Creek.

Dune integrity will be ensured by a extending a section of beach seaward of the dune through periodic nourishment beginning approximately 10 years after initial construction and continuing at 10 year intervals for 40 years after initial construction; the interval can be shorter or longer depending on the project conditions over time. The estimated amount of sand for renourishment will be 95,200 CY per event and the source of sand will be upland. The sand will be transported via truck to the site.

One 305 foot long stone terminal groin at the western end of the dune line will be constructed. The groin will extend seaward approximately 280 feet from the existing mean high water mark and approximately 0.57 acres of seafloor will be affected by the footprint of the groin. Approximately 6 tons of median size armor stone will be used to construct the onshore and offshore portions of the structure. The cross-section consists of one layer of 6-ton median armor underlain by two layers of 1200 lb. median underlayer stone, underlain by a 1 ft thick layer of 60-lb. median bedding stone on top of geotextile. A tugboat/barge will be used to place the stones from water, and a crane or dozer will be used to place the stones from land. The stones will stretch continuously along the groin structure and the barge/tugboat will relocate to a new position to place new layers of stones. The placement of stone (bedding, armor, and underlayer) during the construction of the groins will disturb shoreline sediments and may cause a temporary increase in suspended sediment in the nearshore area. Turbidity levels associated with any sediment plume are expected to be < 5mg/L.

An existing timber fishing pier will be modified to include a new access ramp and a 195 linear foot extension to the seaward end of the fishing pier. Approximately 40 timber piles, one foot in diameter will be installed via jetting. Jetting may be completed via land, up to approximately 5-6 feet. A barge with a tugboat will be used beyond approximately 5-6 feet seaward. The barge/tug will be stationary except when relocating to a new position to reach a new set of timber pile installation points.

A system of levees and floodwalls will be constructed to extend continuously from a levee in adjacent East Keansburg, NJ, across Pews Creek, to connect with the shore protection segment along the bay shore, and then along undeveloped lands adjoining Compton Creek to higher existing elevation (USACE-NYD 2000). With the exception of a sector gate at Pews Creek, this part of the project will be on land.

The sector gate at Pews Creek will have a 40 foot wide opening and will be 21 feet in height. The gate will be constructed across Pews Creek at approximately 91.5 meters south of the Pews Creek Bridge (e.g., where Port Monmouth road crosses the creek). This location is approximately 535 meters from where the creek meets Raritan Bay. The gate will connect to an existing concrete pile supported T-wall on the east side of Pews Creek for about 150 feet where it will join the existing Keansburg levee. During construction of the gate, steel sheet piling may be installed via a vibratory or impact hammer to support the structure.

In summary, the total amount of beach fill required for the shore protection construction events are as follows:

Construction Year	Estimated Beach Fill Quantity (CY)	Source of Sand
Initial Construction – 2013	391,000	SBOBA
10 Years Post Initial Construction	95,200	Upland (trucking)
20 Years Post Initial Construction	95,200	Upland (trucking)
30 Years Post Initial Construction	95,200	Upland (trucking)
40 Years Post Initial Construction	95,200	Upland (trucking)
TOTAL	**771,800**	

Table 1. Estimated dredged quantities for Port Monmouth beach fill.

3.3 Union Beach

Union Beach occupies a 1.8 square mile area of land, including approximately 3,000 feet of shoreline along the coast of Raritan Bay, NJ. Union Beach is bordered by the Borough of Keansburg to the east and Chingarora Creek to the west. The proposed action is expected to begin in August, 2014, and will last for approximately two years.

Figure 3. Location of the recommended plan for Union Beach

Approximately 688,000 CY of sand will be dredged from SBOBA via a hopper dredge equipped with a UXO screen similar to that described for Port Monmouth. The hopper will dredge the material and then sail to a pumpout area. The distance from the SBOBA to the pump out station is anticipated to be approximately 16 miles. The approximate transit speed of the dredge from the SBOBA to the project area is expected to be: 9.8-10.8 mph (8.5-9.4 knots); and 2-3 mph (1.7-

2.6 knots) while dredging. The hopper will then connect to a pumpout barge where it will pump sand from the hopper onto the shoreline via a pipeline along approximately 3,000 feet of shoreline.

Beach renourishment will occur every 9 years for 50 years at an expected volume of 21,000 CY of sand per event and the source of sand will be upland. Sand will be transported via truck to the site.

A 3,160 foot beach berm and dune system will be constructed using sand from the SBOBA. The dune will be at 17 feet National Geodetic Vertical Datum (NGVD) with a 50 foot wide crest extending down to the 9 feet NGVD berm elevation. The width of the berm would range from 15 m (50 feet) near the two terminal groins, to a maximum of 50 m (164 feet) between Beach Street and Florence Avenue. The beach and dune are designed to contain 688,000 CY of fill. The dune section will be stabilized with dune grass and fencing, and three wood overwalks will be constructed to protect dune vegetation and provide public access to beach areas. In addition, a walkway connecting the overwalks will run along the crest of the dune. The construction of the beach berm and dune system will take place on land.

A 228 foot eastern terminal groin, with an associated 630 foot revetment, and a 245 foot western terminal groin, with a 405 foot revetment will be constructed. The heads of the groins will be constructed of 4 ton quarry stone placed over 2 to 40 lb core and bedding stone. The trunks of the groins will be constructed of 11 ton quarry stone and 2,200 lb underlayer stone placed on 6 to 110 lb core and bedding stone. The armor layers and underlayers will be two units thick. The bedding layers will be two feet thick. The total amount of acreage of seafloor to be affected by groin placement would be .09 acres. The groin construction method described for Port Monmouth in Section 3.2 also applies to this project.

Multiple levee/floodwalls will be constructed. With the exception of storm surge barriers, all levee/floodwall elements of the project will be built on land and will not affect any ESA-listed species. Therefore, this part of the project will not be considered in this Opinion

Storm surge barriers (across Flat Creek and East Creek) with pump stations and sluice gates will be constructed. On East Creek Tributary, the existing bridge on the Henry Hudson Trail will be removed and replaced with a gate structure containing three 6 foot by 6 foot box culverts with sluice gates. The existing bridge is 18.4 feet wide and the proposed opening with three 6 foot by 6 foot sluice gates will be 18 feet wide. Steel sheet piles will be installed via a vibratory or impact hammer during the construction of sluice gates and storm surge barriers.

In summary, the total amount of beach fill required per shore protection construction event for the Union Beach project is listed in the table below.

Construction Year	Beach Fill Quantity (CY)	Total SBOBA source (CY)	Total Upland source (CY)
Initial Beach Nourishment – date TBD	688,000	688,000	0
Beach Berm and Dune System Construction – date TBD	18,000	18,000	0
9 Years Post Initial Construction	21,000	0	21,000
18 Years Post Initial Construction	21,000	0	21,000
27 Years Post Initial Construction	21,000	0	21,000
36 Years Post Initial Construction	21,000	0	21,000
45 Years Post Initial Construction	21,000	0	21,000
TOTAL	811,000	706,000	105,000

Table 2. Projected beach fill quantities and sand sources for the Union Beach project.

3.4 Elberon to Loch Arbour

Elberon to Loch Arbour is one designated reach along the coast of NJ. The project area covers approximately 3.5 miles from Lake Takanassee to Deal Lake. The initial construction of the proposed action is expected to begin in September, 2014, and will last for approximately 12-16 months. Beach nourishment cycles will take place every 6 years for approximately 50 years.

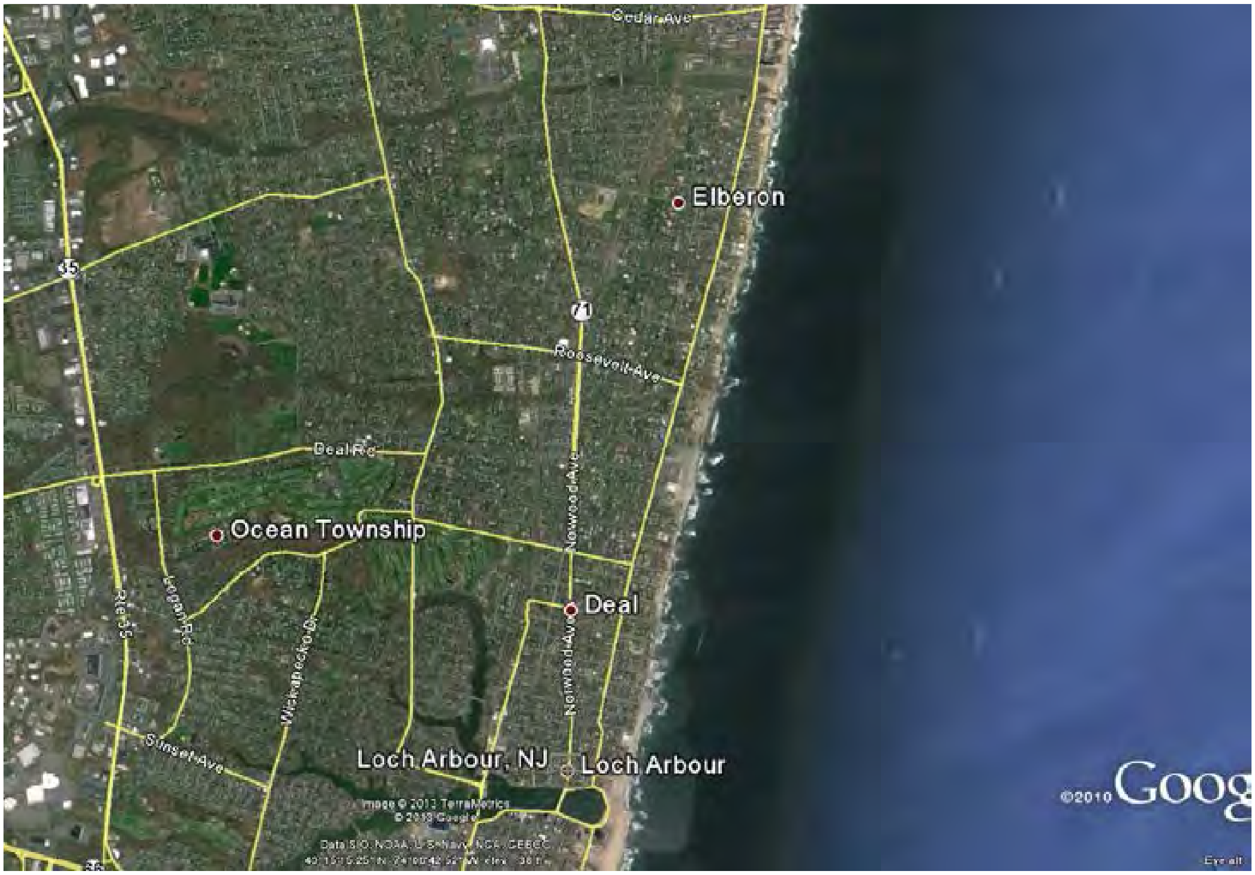

Figure 4. Elberon to Loch Arbour, Monmouth County, NJ.

Approximately 4,450,000 CY of sand will be dredged from SBOBA via a hopper dredge equipped with a UXO screen similar to the previous two projects. The hopper will dredge the material and then sail to a pumpout area. The distance from the SBOBA to the pump out station is anticipated to be approximately 12 miles. The approximate transit speed from the SBOBA to the project area are expected to be: 9.8-10.8 mph (8.5-9.4 knots); and 2-3 mph (1.7-2.6 knots) while dredging. The hopper will then connect to a pumpout barge where it will pump sand from the hopper onto the shoreline via a pipeline along approximately 17,000 linear feet of shoreline and would include construction of a 100 foot wide berm at an elevation of 10 feet above MLW with a 2 foot high storm berm cap.

Beach Renourishment will occur every 6 years for 50 years at an expected volume of 1,298,000 CY of sand per cycle. The sand will be dredged from SBOBA and will follow the same procedure as the initial dredging operation.

Six existing stone groins within this reach of the project area will be notched to allow for sediment transport and to prevent sediment impoundment. Notching involves removing a portion of the landward end of the groin such that water and sediment can follow its natural long shore flow and deposition patterns. It is accomplished by land based heavy equipment, such as front loaders and cranes. Rocks from the groins are simply removed from the line of the groin and placed elsewhere, usually along side of the groin at the beach side of the “notch.”

Approximately 14 storm water outfalls will be extended beyond the construction template. Outfall extensions are to be supported by timber piles (10 to 12 inches in diameter) or a similar composite material pile. The piles and outfall extensions will be constructed after sand fill is placed under the pipe alignment. The piles will be driven via an impact or vibratory hammer. This operation will take place in near shore waters. Effects of increased underwater noise levels will be present within a 30 meter radius surrounding the piles being driven. Construction in the landward (shallowest) sections of the pipe alignment will be done with land based equipment. For the outfall alignments that extend further seaward into subtidal areas barge based equipment may be utilized. All outfalls will not be constructed at once and would be sequenced throughout the overall beach construction schedule.

In summary, the total amount of beach fill required from the SBOBA for the construction and maintenance of Elberon to Loch Arbour is as follows:

Construction Year	Estimated Beach Fill Quantity (CY) from SBOBA
Initial Construction – 2014	4,450,452
6 Years Post Initial Construction	1,298,000
12 Years Post Initial Construction	1,298,000
18 Years Post Initial Construction	1,298,000
24 Years Post Initial Construction	1,298,000
30 Years Post Initial Construction	1,298,000
36 Years Post Initial Construction	1,298,000
42 Years Post Initial Construction	1,298,000
48 Years Post Initial Construction	1,298,000
TOTAL	14,834,452

Table 3. Estimated dredge quantities for Elberon to Loch Arbour beach fill.

4.0 STATUS OF LISTED SPECIES IN THE ACTION AREA

Several species listed under our jurisdiction occur in the action area for this consultation. We have determined that the actions being considered in the Opinion are not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum*) and hawksbill sea turtles (*Eretmochelys imbricata*), both of which are listed as endangered species under the ESA. These species are not known to occur in the action area. Thus, these species will not be considered further in this Opinion.

We have determined that the actions being considered in this biological opinion may affect the following endangered or threatened species under our jurisdiction:

Sea Turtles

Northwest Atlantic DPS of Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered/Threatened[1]

Cetaceans

North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)

Gulf of Maine DPS	Threatened
New York Bight DPS	Endangered
Chesapeake Bay DPS	Endangered
South Atlantic DPS	Endangered
Carolina DPS	Endangered

This section will focus on the status of the various species within the action area, summarizing information necessary to establish the environmental baseline and to assess the effects of the proposed actions.

4.1 Status of Sea Turtles

With the exception of loggerheads, sea turtles are listed under the ESA at the species level rather than as subspecies or distinct population segments (DPS). Therefore, information on the range-wide status of leatherback, Kemp's ridley and green sea turtles is included to provide the status of each species, overall. Information on the status of loggerheads will only be presented for the DPS affected by this action. Additional background information on the range-wide status of these species can be found in a number of published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995; Hirth 1997; Marine Turtle Expert Working Group [TEWG] 1998, 2000, 2007, 2009; NMFS and USFWS 2007a, 2007b, 2007c, 2007d; Conant *et al*. 2009), and recovery plans for the loggerhead sea turtle (NMFS and USFWS 2008), Kemp's ridley sea turtle (NMFS *et al*. 2011), leatherback sea turtle (NMFS and USFWS 1992, 1998a), and green sea turtle (NMFS and USFWS 1991b, 1998b).

The April 20, 2010, explosion of the Deepwater Horizon oil rig affected sea turtles in the Gulf of Mexico. There is an on-going assessment of the long-term effects of the spill on Gulf of Mexico marine life, including sea turtle populations. Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. Approximately 536 live adult and juvenile sea turtles were recovered from the Gulf and brought into rehabilitation centers; of these, 456 were visibly oiled (these and the

[1] Pursuant to NMFS regulations at 50 CFR §223.205, the prohibitions of Section 9 of the Endangered Species Act apply to all green turtles, whether endangered or threatened.

following numbers were obtained from http://www.nmfs.noaa.gov/pr/health/oilspill/). To date, 469 of the live recovered sea turtles have been successfully returned to the wild, 25 died during rehabilitation, and 42 are still in care but will hopefully be returned to the wild eventually. During the clean-up period, 613 dead sea turtles were recovered in coastal waters or on beaches in Mississippi, Alabama, Louisiana, and the Florida Panhandle. As of February 2011, 478 of these dead turtles had been examined. Many of the examined sea turtles showed indications that they had died as a result of interactions with trawl gear, most likely used in the shrimp fishery, and not as a result of exposure to or ingestion of oil.

During the spring and summer of 2010, nearly 300 sea turtle nests were relocated from the northern Gulf to the east coast of Florida with the goal of preventing hatchlings from entering the oiled waters of the northern Gulf. From these relocated nests, 14,676 sea turtles, including 14,235 loggerheads, 125 Kemp's ridleys, and 316 greens, were ultimately released from Florida beaches.

A thorough assessment of the long-term effects of the spill on sea turtles has not yet been completed. However, the spill resulted in the direct mortality of many sea turtles and may have had sublethal effects or caused environmental damage that will impact other sea turtles into the future. The population level effects of the spill and associated response activity are likely to remain unknown for some period into the future.

4.1.1 Northwest Atlantic DPS of loggerhead sea turtle

The loggerhead is the most abundant species of sea turtle in U.S. waters. Loggerhead sea turtles are found in temperate and subtropical waters and occupy a range of habitats including offshore waters, continental shelves, bays, estuaries, and lagoons. They are also exposed to a variety of natural and anthropogenic threats in the terrestrial and marine environment.

Listing History

Loggerhead sea turtles were listed as threatened throughout their global range on July 28, 1978. Since that time, several status reviews have been conducted to review the status of the species and make recommendations regarding its ESA listing status. Based on a 2007, 5-year status review of the species, which discussed a variety of threats to loggerheads including climate change, NMFS and FWS determined that loggerhead sea turtles should not be delisted or reclassified as endangered. However, it was also determined that an analysis and review of the species should be conducted in the future to determine whether DPSs should be identified for the loggerhead (NMFS and USFWS 2007a). Genetic differences exist between loggerhead sea turtles that nest and forage in the different ocean basins (Bowen 2003; Bowen and Karl 2007). Differences in the maternally inherited mitochondrial DNA also exist between loggerhead nesting groups that occur within the same ocean basin (TEWG 2000; Pearce 2001; Bowen 2003; Bowen *et al.* 2005; Shamblin 2007; TEWG 2009; NMFS and USFWS 2008). Site fidelity of females to one or more nesting beaches in an area is believed to account for these genetic differences (TEWG 2000; Bowen 2003).

In part to evaluate those genetic differences, in 2008, NMFS and FWS established a Loggerhead Biological Review Team (BRT) to assess the global loggerhead population structure to determine whether DPSs exist and, if so, the status of each DPS. The BRT evaluated genetic data, tagging and telemetry data, demographic information, oceanographic features, and geographic barriers to determine whether population segments exist. The BRT report was completed in August 2009 (Conant *et al.* 2009). In this report, the BRT identified the following nine DPSs as being discrete from other conspecific population segments and significant to the species: (1) North Pacific Ocean, (2) South Pacific Ocean, (3) North Indian Ocean, (4) Southeast Indo-Pacific Ocean, (5) Southwest Indian Ocean, (6) Northwest Atlantic Ocean, (7) Northeast Atlantic Ocean, (8) Mediterranean Sea, and (9) South Atlantic Ocean.

The BRT concluded that although some DPSs are indicating increasing trends at nesting beaches (Southwest Indian Ocean and South Atlantic Ocean), available information about anthropogenic threats to juveniles and adults in neritic and oceanic environments indicate possible unsustainable additional mortalities. According to an analysis using expert opinion in a matrix model framework, the BRT report stated that all loggerhead DPSs have the potential to decline in the foreseeable future. Based on the threat matrix analysis, the potential for future decline was reported as greatest for the North Indian Ocean, Northwest Atlantic Ocean, Northeast Atlantic Ocean, Mediterranean Sea, and South Atlantic Ocean DPSs (Conant *et al.* 2009). The BRT concluded that the North Pacific Ocean, South Pacific Ocean, North Indian Ocean, Southeast Indo-Pacific Ocean, Northwest Atlantic Ocean, Northeast Atlantic Ocean, and Mediterranean Sea DPSs were at risk of extinction. The BRT concluded that although the Southwest Indian Ocean and South Atlantic Ocean DPSs were likely not currently at immediate risk of extinction, the extinction risk was likely to increase in the foreseeable future.

On March 16, 2010, NMFS and USFWS published a proposed rule (75 FR 12598) to divide the worldwide population of loggerhead sea turtles into nine DPSs, as described in the 2009 Status Review. Two of the DPSs were proposed to be listed as threatened and seven of the DPSs, including the Northwest Atlantic Ocean DPS, were proposed to be listed as endangered. NMFS and the USFWS accepted comments on the proposed rule through September 13, 2010 (75 FR 30769, June 2, 2010). On March 22, 2011 (76 FR 15932), NMFS and USFWS extended the date by which a final determination would be made and solicited new information and analysis. This action was taken to address the interpretation of the existing data on status and trends and its relevance to the assessment of risk of extinction for the Northwest Atlantic Ocean DPS, as well as the magnitude and immediacy of the fisheries bycatch threat and measures to reduce this threat.

On September 22, 2011, NMFS and USFWS issued a final rule (76 FR 58868), determining that the loggerhead sea turtle is composed of nine DPSs (as defined in Conant *et al*., 2009) that constitute species that may be listed as threatened or endangered under the ESA. Five DPSs were listed as endangered (North Pacific Ocean, South Pacific Ocean, North Indian Ocean, Northeast Atlantic Ocean, and Mediterranean Sea), and four DPSs were listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean). Note that the Northwest Atlantic Ocean (NWA) DPS and the Southeast Indo-Pacific Ocean DPS were originally proposed as endangered. The NWA DPS was determined to be threatened based on review of nesting data available after the proposed rule was published, information provided in public comments on the proposed rule, and further discussions within the agencies. The two primary factors considered were population abundance and population trend. NMFS and USFWS found that an endangered status for the NWA DPS was not warranted given the large size of the nesting population, the overall nesting population remains widespread, the trend for the nesting population appears to be stabilizing, and substantial conservation efforts are underway to address threats. This final listing rule became effective on October 24, 2011.

The September 2011 final rule also noted that critical habitat for the two DPSs occurring within the U.S. (NWA DPS and North Pacific DPS) will be designated in a future rulemaking. Information from the public related to the identification of critical habitat, essential physical or biological features for this species, and other relevant impacts of a critical habitat designation was solicited. Currently, no critical habitat is designated for any DPS of loggerhead sea turtles, and therefore, no critical habitat for any DPS occurs in the action area.

Presence of Loggerhead Sea Turtles in the Action Areas

The effects of these proposed actions are only experienced within the Atlantic Ocean. NMFS has considered the available information on the distribution of the 9 DPSs to determine the origin of any loggerhead sea turtles that may occur in the action areas. As noted in Conant *et al*. (2009), the range of the four DPSs occurring in the Atlantic Ocean are as follows: NWA DPS – north of the equator, south of 60° N latitude, and west of 40° W longitude; Northeast Atlantic Ocean (NEA) DPS – north of the equator, south of 60° N latitude, east of 40° W longitude, and west of 5° 36' W longitude; South Atlantic DPS – south of the equator, north of 60° S latitude, west of 20° E longitude, and east of 60° W longitude; Mediterranean DPS – the Mediterranean Sea east of 5° 36' W longitude. These boundaries were determined based on oceanographic features, loggerhead sightings, thermal tolerance, fishery bycatch data, and information on loggerhead distribution from satellite telemetry and flipper tagging studies. While adults are highly structured with no overlap, there may be some degree of overlap by juveniles of the NWA, NEA, and Mediterranean DPSs on oceanic foraging grounds (Laurent *et al*. 1993, 1998; Bolten *et al*. 1998; LaCasella *et al*. 2005; Carreras *et al*. 2006, Monzón-Argüello *et al*. 2006; Revelles *et al*. 2007). Previous literature (Bowen *et al*. 2004) has suggested that there is the potential, albeit small, for some juveniles from the Mediterranean DPS to be present in U.S. Atlantic coastal foraging grounds. These conclusions must be interpreted with caution however, as they may be representing a shared common haplotype and lack of representative sampling at Eastern Atlantic rookeries rather than an actual presence of Mediterranean DPS turtles in US Atlantic coastal waters. A re-analysis of the data by the Atlantic loggerhead Turtle Expert Working Group has found that it is unlikely that U.S. fishing fleets are interacting with either the Northeast Atlantic loggerhead DPS or the Mediterranean loggerhead DPS (Peter Dutton, NMFS, Marine Turtle Genetics Program, Program Leader, personal communication, September 10, 2011). Given that the action area is a subset of the area fished by US fleets, it is reasonable to assume that based on this new analysis, no individuals from the Mediterranean DPS or Northeast Atlantic DPS would be present in the action area. Sea turtles of the South Atlantic DPS do not inhabit the action area of this consultation (Conant *et al*. 2009). As such, the remainder of this consultation will only focus on the NWA DPS, listed as threatened.

Distribution and Life History

Ehrhart *et al.* (2003) provided a summary of the literature identifying known nesting habitats and foraging areas for loggerheads within the Atlantic Ocean. Detailed information is also provided in the 5-year status review for loggerheads (NMFS and USFWS 2007a), the TEWG report (2009), and the final revised recovery plan for loggerheads in the Northwest Atlantic Ocean (NMFS and USFWS 2008).

In the western Atlantic, waters as far north as 41° N to 42° N latitude are used for foraging by juveniles, as well as adults (Shoop 1987; Shoop and Kenney 1992; Ehrhart *et al.* 2003; Mitchell *et al.* 2003). In U.S. Atlantic waters, loggerheads commonly occur throughout the inner continental shelf from Florida to Cape Cod, Massachusetts and in the Gulf of Mexico from Florida to Texas, although their presence varies with the seasons due to changes in water temperature (Shoop and Kenney 1992; Epperly *et al.* 1995a, 1995b; Braun and Epperly 1996; Braun-McNeill *et al.* 2008; Mitchell *et al.* 2003). Loggerheads have been observed in waters with surface temperatures of 7°C to 30°C, but water temperatures ≥11°C are most favorable (Shoop and Kenney 1992; Epperly *et al.* 1995b). The presence of loggerhead sea turtles in U.S. Atlantic waters is also influenced by water depth. Aerial surveys of continental shelf waters north of Cape Hatteras, North Carolina indicated that loggerhead sea turtles were most commonly sighted in waters with bottom depths ranging from 22 m to 49 m deep (Shoop and Kenney 1992). However, more recent survey and satellite tracking data support that they occur in waters from the beach to beyond the continental shelf (Mitchell *et al.* 2003; Braun-McNeill and Epperly 2004; Mansfield 2006; Blumenthal *et al.* 2006; Hawkes *et al.* 2006; McClellan and Read 2007; Mansfield et al. 2009).

Loggerhead sea turtles occur year round in ocean waters off North Carolina, South Carolina, Georgia, and Florida. In these areas of the South Atlantic Bight, water temperature is influenced by the proximity of the Gulf Stream. As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the Southeast United States (*e.g.*, Pamlico and Core Sounds) and also move up the U.S. Atlantic coast (Epperly *et al.* 1995a, 1995b, 1995c; Braun-McNeill and Epperly 2004), occurring in Virginia foraging areas as early as April/May and on the most northern foraging grounds in the Gulf of Maine in June (Shoop and Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by mid-September but some turtles may remain in Mid-Atlantic and Northeast areas until late fall. By December, loggerheads have migrated from inshore and more northern coastal waters to waters offshore of North Carolina, particularly off of Cape Hatteras, and waters further south where the influence of the Gulf Stream provides temperatures favorable to sea turtles (Shoop and Kenney 1992; Epperly *et al.* 1995b).

Recent studies have established that the loggerhead's life history is more complex than previously believed. Rather than making discrete developmental shifts from oceanic to neritic environments, research is showing that both adults and (presumed) neritic stage juveniles continue to use the oceanic environment and will move back and forth between the two habitats (Witzell 2002; Blumenthal *et al.* 2006; Hawkes *et al.* 2006; McClellan and Read 2007; Mansfield *et al*. 2009). One of the studies tracked the movements of adult post-nesting females and found that differences in habitat use were related to body size with larger adults staying in coastal waters and smaller adults traveling to oceanic waters (Hawkes *et al.* 2006). A tracking study of large juveniles found that the habitat preferences of this life stage were also diverse with some remaining in neritic waters and others moving off into oceanic waters (McClellan and Read 2007). However, unlike the Hawkes *et al.* (2006) study, there was no significant difference in the body size of turtles that remained in neritic waters versus oceanic waters (McClellan and Read 2007).

Pelagic and benthic juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988; NMFS and USFWS 2008). Sub-adult and adult loggerheads are primarily coastal dwelling and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats (NMFS and USFWS 2008).

As presented below, Table 3 from the 2008 loggerhead recovery plan (Table 4 in this Opinion) highlights the key life history parameters for loggerheads nesting in the United States.

Table 3. Typical values of life history parameters for loggerheads nesting in the U.S.

Life History Parameter	Data
Clutch size	100-126 eggs[1]
Egg incubation duration (varies depending on time of year and latitude)	42-75 days[2,3]
Pivotal temperature (incubation temperature that produces an equal number of males and females)	29.0°C[5]
Nest productivity (emerged hatchlings/total eggs) x 100 (varies depending on site specific factors)	45-70%[2,6]
Clutch frequency (number of nests/female/season)	3-5.5 nests[7]
Internesting interval (number of days between successive nests within a season)	12-15 days[8]
Juvenile (<87 cm CCL) sex ratio	65-70% female[4]
Remigration interval (number of years between successive nesting migrations)	2.5-3.7 years[9]
Nesting season	late April-early September
Hatching season	late June-early November
Age at sexual maturity	32-35 years[10]
Life span	>57 years[11]

1 Dodd 1988.
2 Dodd and Mackinnon (1999, 2000, 2001, 2002, 2003, 2004).
3 Blair Witherington, FFWCC, personal communication, 2006 (information based on nests monitored throughout Florida beaches in 2005, n=865).
4 National Marine Fisheries Service (2001); Allen Foley, FFWCC, personal communication, 2005.
5 Mrosovsky (1988).
6 Blair Witherington, FFWCC, personal communication, 2006 (information based on nests monitored throughout Florida beaches in 2005, n=1,680).
7 Murphy and Hopkins (1984); Frazer and Richardson (1985); Ehrhart, unpublished data; Hawkes *et al.* 2005; Scott 2006; Tony Tucker, Mote Marine Laboratory, personal communication, 2008.
8 Caldwell (1962), Dodd (1988).
9 Richardson *et al.* (1978); Bjorndal *et al.* (1983); Ehrhart, unpublished data.
10 Melissa Snover, NMFS, personal communication, 2005; see Table A1-6.
11 Dahlen *et al.* (2000).

Table 4. Typical values of life history parameters for loggerheads nesting in the U.S.

Population Dynamics and Status

By far, the majority of Atlantic nesting occurs on beaches of the southeastern United States (NMFS and USFWS 2007a). For the past decade or so, the scientific literature has recognized five distinct nesting groups, or subpopulations, of loggerhead sea turtles in the Northwest Atlantic, divided geographically as follows: (1) a northern group of nesting females that nest from North Carolina to northeast Florida at about 29° N latitude; (2) a south Florida group of nesting females that nest from 29° N latitude on the east coast to Sarasota on the west coast; (3) a Florida Panhandle group of nesting females that nest around Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán group of nesting females that nest on beaches of the eastern Yucatán Peninsula, Mexico; and (5) a Dry Tortugas group that nests on beaches of the islands of the Dry Tortugas, near Key West, Florida and on Cal Sal Bank (TEWG 2009). Genetic analyses of mitochondrial DNA, which a sea turtle inherits from its mother, indicate that there are genetic differences between loggerheads that nest at and originate from the beaches used by each of the five identified nesting groups of females (TEWG 2009). However, analyses of microsatellite loci from nuclear DNA, which represents the genetic contribution from both parents, indicates little to no genetic differences between loggerheads originating from nesting beaches of the five Northwest Atlantic nesting groups (Pearce and Bowen 2001; Bowen 2003; Bowen *et al.* 2005; Shamblin 2007). These results suggest that female loggerheads have site fidelity to nesting beaches within a particular area, while males provide an avenue of gene flow between nesting groups by mating with females that originate from different nesting groups (Bowen 2003; Bowen *et al.* 2005). The extent of such gene flow, however, is unclear (Shamblin 2007).

The lack of genetic structure makes it difficult to designate specific boundaries for the nesting subpopulations based on genetic differences alone. Therefore, the Loggerhead Recovery Team recently used a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to reassess the designation of these subpopulations to identify recovery units in the 2008 recovery plan.

In the 2008 recovery plan, the Loggerhead Recovery Team designated five recovery units for the Northwest Atlantic population of loggerhead sea turtles based on the aforementioned nesting groups and inclusive of a few other nesting areas not mentioned above. The first four of these recovery units represent nesting assemblages located in the Southeast United States. The fifth recovery unit is composed of all other nesting assemblages of loggerheads within the Greater Caribbean, outside the United States, but which occur within U.S. waters during some portion of their lives. The five recovery units representing nesting assemblages are: (1) the Northern Recovery Unit (NRU: Florida/Georgia border through southern Virginia), (2) the Peninsular Florida Recovery Unit (PFRU: Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (DTRU: islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (NGMRU: Franklin County, Florida through Texas), and (5) the Greater Caribbean Recovery Unit (GCRU: Mexico through French Guiana, Bahamas, Lesser Antilles, and Greater Antilles).

The Recovery Team evaluated the status and trends of the Northwest Atlantic loggerhead population for each of the five recovery units, using nesting data available as of October 2008 (NMFS and USFWS 2008). The level and consistency of nesting coverage varies among recovery units, with coverage in Florida generally being the most consistent and thorough over time. Since 1989, nest count surveys in Florida have occurred in the form of statewide surveys (a near complete census of entire Florida nesting) and index beach surveys (Witherington *et al.* 2009). Index beaches were established to standardize data collection methods and maintain a constant level of effort on key nesting beaches over time.

NMFS and USFWS (2008), Witherington *et al*. (2009), and TEWG (2009) analyzed the status of the nesting assemblages within the NWA DPS using standardized data collected over periods ranging from 10-23 years. These analyses used different analytical approaches, but found the same finding that there had been a significant, overall nesting decline within the NWA DPS. However, with the addition of nesting data from 2008-2010, the trend line changes showing a very slight negative trend, but the rate of decline is not statistically different from zero (76 FR 58868, September 22, 2011). The nesting data presented in the Recovery Plan (through 2008) is described below, with updated trend information through 2010 for two recovery units.

From the beginning of standardized index surveys in 1989 until 1998, the PFRU, the largest nesting assemblage in the Northwest Atlantic by an order of magnitude, had a significant increase in the number of nests. However, from 1998 through 2008, there was a 41% decrease in annual nest counts from index beaches, which represent an average of 70% of the statewide nesting activity (NMFS and USFWS 2008). From 1989-2008, the PFRU had an overall declining nesting trend of 26% (95% CI: -42% to -5%; NMFS and USFWS 2008). With the addition of nesting data through 2010, the nesting trend for the PFRU does not show a nesting decline statistically different from zero (76 FR 58868, September 22, 2011).

The NRU, the second largest nesting assemblage of loggerheads in the United States, has been declining at a rate of 1.3% annually since 1983 (NMFS and USFWS 2008). The NRU dataset included 11 beaches with an uninterrupted time series of coverage of at least 20 years; these beaches represent approximately 27% of NRU nesting (in 2008). Through 2008, there was strong statistical data to suggest the NRU has experienced a long-term decline, but with the inclusion of nesting data through 2010, nesting for the NRU is showing possible signs of stabilizing (76 FR 58868, September 22, 2011).

Evaluation of long-term nesting trends for the NGMRU is difficult because of changed and expanded beach coverage. However, the NGMRU has shown a significant declining trend of 4.7% annually since index nesting beach surveys were initiated in 1997 (NMFS and USFWS 2008). The trend was analyzed using nesting data available as of October 2008.

No statistical trends in nesting abundance can be determined for the DTRU because of the lack of long-term data. Similarly, statistically valid analyses of long-term nesting trends for the entire GCRU are not available because there are few long-term standardized nesting surveys representative of the region. Additionally, changing survey effort at monitored beaches and scattered and low-level nesting by loggerheads at many locations currently precludes comprehensive analyses (NMFS and USFWS 2008).

Sea turtle census nesting surveys are important in that they provide information on the relative abundance of nesting each year, and the contribution of each nesting group to total nesting of the species. Nest counts can also be used to estimate the number of reproductively mature females nesting annually. The 2008 recovery plan compiled information on mean number of loggerhead nests and the approximated counts of nesting females per year for four of the five identified recovery units (*i.e.*, nesting groups). They are: (1) for the NRU, a mean of 5,215 loggerhead nests per year (from 1989-2008) with approximately 1,272 females nesting per year; (2) for the PFRU, a mean of 64,513 nests per year (from 1989-2007) with approximately 15,735 females nesting per year; (3) for the DTRU, a mean of 246 nests per year (from 1995-2004, excluding 2002) with approximately 60 females nesting per year; and (4) for the NGMRU, a mean of 906 nests per year (from 1995-2007) with approximately 221 females nesting per year. For the GCRU, the only estimate available for the number of loggerhead nests per year is from Quintana Roo, Yucatán, Mexico, where a range of 903-2,331 nests per year was estimated from 1987-2001 (NMFS and USFWS 2007a). There are no annual nest estimates available for the Yucatán since 2001 or for any other regions in the GCRU, nor are there any estimates of the number of nesting females per year for any nesting assemblage in this recovery unit. Note that the above values for average nesting females per year were based upon 4.1 nests per female per Murphy and Hopkins (1984).

Genetic studies of juvenile and a few adult loggerhead sea turtles collected from Northwest Atlantic foraging areas (beach strandings, a power plant in Florida, and North Carolina fisheries) show that the loggerheads that occupy East Coast U.S. waters originate from these Northwest Atlantic nesting groups; primarily from the nearby nesting beaches of southern Florida, as well as the northern Florida to North Carolina beaches, and finally from the beaches of the Yucatán Peninsula, Mexico (Rankin-Baransky *et al*. 2001; Witzell *et al*. 2002; Bass *et al.* 2004; Bowen *et al*. 2004). The contribution of these three nesting assemblages varies somewhat among the foraging habitats and age classes surveyed along the east coast. The distribution is not random and bears a significant relationship to the proximity and size of adjacent nesting colonies (Bowen *et al*. 2004). Bass *et al*. (2004) attribute the variety in the proportions of sea turtles from loggerhead turtle nesting assemblages documented in different east coast foraging habitats to a complex interplay of currents and the relative size and proximity of nesting beaches.

Unlike nesting surveys, in-water studies of sea turtles typically sample both sexes and multiple age classes. In-water studies have been conducted in some areas of the Northwest Atlantic and provide data by which to assess the relative abundance of loggerhead sea turtles and changes in abundance over time (Maier *et al.* 2004; Morreale *et al.* 2005; Mansfield 2006; Ehrhart *et al.* 2007; Epperly *et al.* 2007). The TEWG (2009) used raw data from six in-water study sites to conduct trend analyses. They identified an increasing trend in the abundance of loggerheads from three of the four sites located in the Southeast United States, one site showed no discernible trend, and the two sites located in the northeast United States showed a decreasing trend in abundance of loggerheads. The 2008 loggerhead recovery plan also includes a full discussion of in-water population studies for which trend data have been reported, and a brief summary will be provided here.

Maier *et al.* (2004) used fishery-independent trawl data to establish a regional index of loggerhead abundance for the southeast coast of the United States. (Winyah Bay, South Carolina to St. Augustine, Florida) during the period 2000-2003. A comparison of loggerhead catch data from this study with historical values suggested that in-water populations of loggerhead sea turtles along the southeast U.S. coast appear to be larger, possibly an order of magnitude higher than they were 25 years ago, but the authors caution a direct comparison between the two studies given differences in sampling methodology (Maier *et al.* 2004). A comparison of catch rates for sea turtles in pound net gear fished in the Pamlico-Albemarle Estuarine Complex of North Carolina between the years 1995-1997 and 2001-2003 found a significant increase in catch rates for loggerhead sea turtles for the latter period (Epperly *et al.* 2007). A long-term, on-going study of loggerhead abundance in the Indian River Lagoon System of Florida found a significant increase in the relative abundance of loggerheads over the last 4 years of the study (Ehrhart *et al.* 2007). However, there was no discernible trend in loggerhead abundance during the 24-year time period of the study (1982-2006) (Ehrhart *et al.* 2007). At St. Lucie Power Plant, data collected from 1977-2004 show an increasing trend of loggerheads at the power plant intake structures (FPL and Quantum Resources 2005).

In contrast to these studies, Morreale *et al.* (2005) observed a decline in the percentage and relative numbers of loggerhead sea turtles incidentally captured in pound net gear fished around Long Island, New York during the period 2002-2004 in comparison to the period 1987-1992, with only two loggerheads (of a total 54 turtles) observed captured in pound net gear during the period 2002-2004. This is in contrast to the previous decade's study where numbers of individual loggerheads ranged from 11 to 28 per year (Morreale *et al.* 2005). No additional loggerheads were reported captured in pound net gear in New York through 2007, although two were found cold-stunned on Long Island bay beaches in the fall of 2007 (Memo to the File, L. Lankshear, December 2007). Potential explanations for this decline include major shifts in loggerhead foraging areas and/or increased mortality in pelagic or early benthic stage/age classes (Morreale *et al.* 2005). Using aerial surveys, Mansfield (2006) also found a decline in the densities of loggerhead sea turtles in Chesapeake Bay over the period 2001-2004 compared to aerial survey data collected in the 1980s. Significantly fewer loggerheads ($p<0.05$) were observed in both the spring (May-June) and the summer (July-August) of 2001-2004 compared to those observed during aerial surveys in the 1980s (Mansfield 2006). A comparison of median densities from the 1980s to the 2000s suggested that there had been a 63.2% reduction in densities during the spring residency period and a 74.9% reduction in densities during the summer residency period (Mansfield 2006). The decline in observed loggerhead populations in Chesapeake Bay may be related to a significant decline in prey, namely horseshoe crabs and blue crabs, with loggerheads redistributing outside of Bay waters (NMFS and USFWS 2008).

As with other turtle species, population estimates for loggerhead sea turtles are difficult to determine. This is largely because of loggerheads' life history characteristics. However, a recent loggerhead assessment using a demographic matrix model estimated that the loggerhead adult female population in the western North Atlantic ranges from 16,847 to 89,649, with a median size of 30,050 (NMFS SEFSC 2009). The model results for population trajectory suggest that the population is most likely declining, but this result was very sensitive to the choice of the position of the parameters within their range and hypothesized distributions. The pelagic stage survival parameter had the largest effect on the model results. As a result of the large uncertainty in our knowledge of loggerhead life history, at this point predicting the future populations or population trajectories of loggerhead sea turtles with precision is very uncertain. It should also be noted that additional analyses are underway which will incorporate any newly available information.

As part of the Atlantic Marine Assessment Program for Protected Species (AMAPPS), line transect aerial abundance surveys and turtle telemetry studies were conducted along the Atlantic coast in the summer of 2010. AMAPPS is a multi-agency initiative to assess marine mammal, sea turtle, and seabird abundance and distribution in the Atlantic. Aerial surveys were conducted from Cape Canaveral, Florida to the Gulf of St. Lawrence, Canada. Satellite tags on juvenile loggerheads were deployed in two locations – off the coasts of northern Florida to South Carolina (n=30) and off the New Jersey and Delaware coasts (n=14). As presented in NMFS NEFSC (2011), the 2010 survey found a preliminary total surface abundance estimate within the entire study area of about 60,000 loggerheads (CV=0.13) or 85,000 if a portion of unidentified hard-shelled sea turtles were included (CV=0.10). Surfacing times were generated from the satellite tag data collected during the aerial survey period, resulting in a 7% (5%-11% inter-quartile range) median surface time in the South Atlantic area and a 67% (57%-77% inter-quartile range) median surface time to the north. The calculated preliminary regional abundance estimate is about 588,000 loggerheads along the U.S. Atlantic coast, with an inter-quartile range of 382,000-817,000 (NMFS NEFSC 2011). The estimate increases to approximately 801,000 (inter-quartile range of 521,000-1,111,000) when based on known loggerheads and a portion of unidentified turtle sightings. The density of loggerheads was generally lower in the north than the south; based on number of turtle groups detected, 64% were seen south of Cape Hatteras, North Carolina, 30% in the southern Mid-Atlantic Bight, and 6% in the northern Mid-Atlantic Bight. Although they have been seen farther north in previous studies (*e.g.*, Shoop and Kenney 1992), no loggerheads were observed during the aerial surveys conducted in the summer of 2010 in the more northern zone encompassing Georges Bank, Cape Cod Bay, and the Gulf of Maine. These estimates of loggerhead abundance over the U.S. Atlantic continental shelf are considered very preliminary. A more thorough analysis will be completed pending the results of further studies related to improving estimates of regional and seasonal variation in loggerhead surface time (by increasing the sample size and geographical area of tagging) and other information needed to improve the biases inherent in aerial surveys of sea turtles (*e.g.*, research on depth of detection and species misidentification rate). This survey effort represents the most comprehensive assessment of sea turtle abundance and distribution in many years. Additional aerial surveys and research to improve the abundance estimates are anticipated in 2011-2014, depending on available funds.

Threats

The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the neritic environment, and in the oceanic environment. The 5-year status review and 2008 recovery plan provide a summary of natural as well as anthropogenic threats to loggerhead sea turtles (NMFS and USFWS 2007a, 2008). Amongst those of natural origin, hurricanes are known to be destructive to sea turtle nests. Sand accretion, rainfall, and wave action that result from these storms can appreciably reduce hatchling success. Other sources of natural mortality include cold-stunning, biotoxin exposure, and native species predation.

Anthropogenic factors that impact hatchlings and adult females on land, or the success of nesting and hatching include: beach erosion, beach armoring, and nourishment; artificial lighting; beach cleaning; beach pollution; increased human presence; recreational beach equipment; vehicular and pedestrian traffic; coastal development/construction; exotic dune and beach vegetation; removal of native vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs, and an increased presence of native species (*e.g.*, raccoons, armadillos, and opossums), which raid nests and feed on turtle eggs (NMFS and USFWS 2007a, 2008). Although sea turtle nesting beaches are protected along large expanses of the Northwest Atlantic coast (in areas like Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density East Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerheads are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation; marine pollution; underwater explosions; hopper dredging; offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching; and fishery interactions.

A 1990 National Research Council (NRC) report concluded that for juveniles, subadults, and breeding adults in coastal waters, the most important source of human caused mortality in U.S. Atlantic waters was fishery interactions. The sizes and reproductive values of sea turtles taken by fisheries vary significantly, depending on the location and season of the fishery, and size-selectivity resulting from gear characteristics. Therefore, it is possible for fisheries that interact with fewer, more reproductively valuable turtles to have a greater detrimental effect on the population than one that takes greater numbers of less reproductively valuable turtles (Wallace *et al*. 2008). The Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant *et al*. 2009). Attaining a more thorough understanding of the characteristics, as well as the quantity of sea turtle bycatch across all fisheries is of great importance.

Finkbeiner *et al*. (2011) compiled cumulative sea turtle bycatch information in U.S. fisheries from 1990 through 2007, before and after implementation of bycatch mitigation measures. Information was obtained from peer reviewed publications and NMFS documents (e.g., Biological Opinions and bycatch reports). In the Atlantic, a mean estimate of 137,700 bycatch interactions, of which 4,500 were mortalities, occurred annually (since implementation of bycatch mitigation measures). Kemp’s ridleys interacted with fisheries most frequently, with the highest level of mean annual mortality (2,700), followed by loggerheads (1,400), greens (300), and leatherbacks (40). The Southeast/Gulf of Mexico shrimp trawl fishery was responsible for the vast majority of U.S. interactions (up to 98%) and mortalities (more than 80%). While this provides an initial cumulative bycatch assessment, there are a number of caveats that should be considered when interpreting this information, such as sampling inconsistencies and limitations.

Of the many fisheries known to adversely affect loggerheads, the U.S. South Atlantic and Gulf of Mexico shrimp fisheries were considered to pose the greatest threat of mortality to neritic juvenile and adult age classes of loggerheads (NRC 1990, Finkbeiner *et al*. 2011). Significant changes to the South Atlantic and Gulf of Mexico shrimp fisheries have occurred since 1990, and the effects of these shrimp fisheries on ESA-listed species, including loggerhead sea turtles, have been assessed several times through section 7 consultation. There is also a lengthy regulatory history with regard to the use of Turtle Excluder Devices (TEDs) in the U.S. South Atlantic and Gulf of Mexico shrimp fisheries (Epperly and Teas 2002; NMFS 2002a; Lewison *et al.* 2003). A 2002 section 7 consultation on the U.S. South Atlantic and Gulf of Mexico shrimp fisheries estimated the total annual level of take for loggerhead sea turtles to be 163,160 interactions (the total number of turtles that enter a shrimp trawl, which may then escape through the TED or fail to escape and be captured) with 3,948 of those takes being lethal (NMFS 2002a).

In addition to improvements in TED designs and TED enforcement, interactions between loggerheads and the shrimp fishery have also been declining because of reductions in fishing effort unrelated to fisheries management actions. The 2002 South Atlantic and GOM Shrimp Opinion (NMFS 2002a) take estimates are based in part on fishery effort levels. In recent years, low shrimp prices, rising fuel costs, competition with imported products, and the impacts of recent hurricanes in the Gulf of Mexico have all impacted the shrimp fleets; in some cases reducing fishing effort by as much as 50% for offshore waters of the Gulf of Mexico (GMFMC 2007). As a result, loggerhead interactions and mortalities in the Gulf of Mexico have been substantially less than projected in the 2002 Opinion. Currently, the estimated annual number of interactions between loggerheads and shrimp trawls in the Gulf of Mexico shrimp fishery is 23,336, with 647 (2.8%) of those interactions resulting in mortality (Memo from Dr. B. Ponwith, Southeast Fisheries Science Center to Dr. R. Crabtree, Southeast Region, PRD, December 2008). In August 2010, NMFS reinitiated section 7 consultation on southeastern state and federal shrimp fisheries based on a high level of strandings, elevated nearshore sea turtle abundance as measured by trawl catch per unit of effort, and lack of compliance with TED requirements. The 2012 section 7 consultation on the shrimp fishery was unable to estimate the current total annual level of take for loggerheads. Instead, it qualitatively estimated that the shrimp fishery, as currently operating, would result in at least thousands and possibly tens of thousands of interactions annually, of which at least hundreds and possibly thousands are expected to be lethal (NMFS 2012a).

Loggerhead sea turtles are also known to interact with non-shrimp trawl, gillnet, longline, dredge, pound net, pot/trap, and hook and line fisheries. The reduction of sea turtle captures in fishing operations is identified in recovery plans and 5-year status reviews as a priority for the recovery of all sea turtle species. In the threats analysis of the loggerhead recovery plan, trawl bycatch is identified as the greatest source of mortality. While loggerhead bycatch in U.S. Mid-Atlantic bottom otter trawl gear was previously estimated for the period 1996-2004 (Murray 2006, 2008), a recent bycatch analysis estimated the number of loggerhead sea turtle interactions with U.S. Mid-Atlantic bottom trawl gear from 2005-2008 (Warden 2011a). Northeast Fisheries Observer Program data from 1994-2008 were used to develop a model of interaction rates and those predicted rates were applied to 2005-2008 commercial fishing data to estimate the number of interactions for the trawl fleet. The number of predicted average annual loggerhead interactions for 2005-2008 was 292 (CV=0.13, 95% CI=221-369), with an additional 61 loggerheads (CV=0.17, 95% CI=41-83) interacting with trawls but being released through a TED. Of the 292 average annual observable loggerhead interactions, approximately 44 of those were adult equivalents. Warden (2011b) found that latitude, depth and SST were associated with the interaction rate, with the rates being highest south of 37°N latitude in waters < 50 m deep and SST > 15°C. This estimate is a decrease from the average annual loggerhead bycatch in bottom otter trawls during 1996-2004, estimated to be 616 sea turtles (CV=0.23, 95% CI over the 9-year period: 367-890) (Murray 2006, 2008).

There have been several published estimates of the number of loggerheads taken annually as a result of the dredge fishery for Atlantic sea scallops, ranging from a low of zero in 2005 (Murray 2007) to a high of 749 in 2003 (Murray 2004). Murray (2011) recently re-evaluated loggerhead sea turtle interactions in scallop dredge gear from 2001-2008. In that paper, the average number of annual observable interactions of hard-shelled sea turtles in the Mid-Atlantic scallop dredge fishery prior to the implementation of chain mats (January 1, 2001 through September 25, 2006) was estimated to be 288 turtles (CV = 0.14, 95% CI: 209-363) [equivalent to 49 adults], 218 of which were loggerheads [equivalent to 37 adults]. After the implementation of chain mats, the average annual number of observable interactions was estimated to be 20 hard-shelled sea turtles (CV = 0.48, 95% CI: 3-42), 19 of which were loggerheads. If the rate of observable interactions from dredges without chain mats had been applied to trips with chain mats, the estimated number of observable and inferred interactions of hard-shelled sea turtles after chain mats were implemented would have been 125 turtles per year (CV = 0.15, 95% CI: 88-163) [equivalent to 22 adults], 95 of which were loggerheads [equivalent to 16 adults]. Interaction rates of hard-shelled turtles were correlated with sea surface temperature, depth, and use of a chain mat. Results from this recent analysis suggest that chain mats and fishing effort reductions have contributed to the decline in estimated loggerhead sea turtle interactions with scallop dredge gear after 2006 (Murray 2011).

An estimate of the number of loggerheads taken annually in U.S. Mid-Atlantic gillnet fisheries has also recently been published (Murray 2009a, b). From 1995-2006, the annual bycatch of loggerheads in U.S. Mid-Atlantic gillnet gear was estimated to average 350 turtles (CV=0.20, 95% CI over the 12-year period: 234 to 504). Bycatch rates were correlated with latitude, sea surface temperature, and mesh size. The highest predicted bycatch rates occurred in warm waters of the southern Mid-Atlantic in large-mesh (>7 inch/17.8 cm) gillnets (Murray 2009a).

The U.S. tuna and swordfish longline fisheries that are managed under the Highly Migratory Species (HMS) FMP are estimated to capture 1,905 loggerheads (no more than 339 mortalities) for each 3-year period starting in 2007 (NMFS 2004a). NMFS has mandated gear changes for the HMS fishery to reduce sea turtle bycatch and the likelihood of death from those incidental takes that would still occur (Garrison and Stokes 2010). In 2010, there were 40 observed interactions between loggerhead sea turtles and longline gear used in the HMS fishery (Garrison and Stokes 2011a, 2011b). All of the loggerheads were released alive, with the vast majority released with all gear removed. While 2010 total estimates are not yet available, in 2009, 242.9 (95% CI: 167.9-351.2) loggerhead sea turtles are estimated to have been taken in the longline fisheries managed under the HMS FMP based on the observed takes (Garrison and Stokes 2010). The 2009 estimate is considerably lower than those in 2006 and 2007 and is consistent with historical averages since 2001 (Garrison and Stokes 2010). This fishery represents just one of several longline fisheries operating in the Atlantic Ocean. Lewison *et al.* (2004) estimated that 150,000-200,000 loggerheads were taken in all Atlantic longline fisheries in 2000 (including the

U.S. Atlantic tuna and swordfish longline fisheries as well as others).

Documented takes also occur in other fishery gear types and by non-fishery mortality sources (*e.g.*, hopper dredges, power plants, vessel collisions), although quantitative/qualitative estimates are only available for activities on which NMFS has consulted (See sections 5 below). Past and future impacts of global climate change are considered in Section 6.0 below.

Summary of Status for Loggerhead Sea Turtles

Loggerheads continue to be affected by many factors occurring on nesting beaches and in the water. These include poaching, habitat loss, and nesting predation that affects eggs, hatchlings, and nesting females on land, as well as fishery interactions, vessel interactions, marine pollution, and non-fishery (*e.g.*, dredging) operations affecting all sexes and age classes in the water (NRC 1990; NMFS and USFWS 2007a, 2008). As a result, loggerheads still face many of the original threats that were the cause of their listing under the ESA. Of the nine DPSs defined in the NMFS and USFWS final rule (75 FR 12598), only the NWA DPS is considered in this Opinion.

NMFS convened a new Loggerhead Turtle Expert Working Group (TEWG) to review all available information on Atlantic loggerheads in order to evaluate the status of this species in the Atlantic. A final report from the Loggerhead TEWG was published in July 2009. In this report, the TEWG indicated that it could not determine whether the decreasing annual numbers of nests among the Northwest Atlantic loggerhead subpopulations were due to stochastic processes resulting in fewer nests, a decreasing average reproductive output of adult females, decreasing numbers of adult females, or a combination of these factors. Many factors are responsible for past or present loggerhead mortality that could impact current nest numbers; however, no single mortality factor stands out as a likely primary factor. It is likely that several factors compound to create the current decline, including incidental capture (in fisheries, power plant intakes, and dredging operations), lower adult female survival rates, increases in the proportion of first-time nesters, continued directed harvest, and increases in mortality due to disease. Regardless, the TEWG stated that "it is clear that the current levels of hatchling output will result in depressed recruitment to subsequent life stages over the coming decades" (TEWG 2009). However, the report does not provide information on the rate or amount of expected decrease in recruitment but goes on to state that the ability to assess the current status of loggerhead subpopulations is limited due to a lack of fundamental life history information and specific census and mortality data.

While several documents reported the decline in nesting numbers in the NWA DPS (NMFS and USFWS 2008, TEWG 2009), when nest counts through 2012 are analyzed, researchers found no demonstrable trend, indicating a reversal of the post-1998 decline (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Loggerhead nesting has been on the rise since 2008, and Van Houton and Halley (2011) suggest that nesting in Florida, which contains by far the largest loggerhead rookery in the DPS, could substantially increase over the next few decades.

4.1.2 Kemp's ridley sea turtles

Distribution and Life History

The Kemp's ridley is one of the least abundant of the world's sea turtle species. In contrast to loggerhead, leatherback, and green sea turtles, which are found in multiple oceans of the world, Kemp's ridleys typically occur only in the Gulf of Mexico and the northwestern Atlantic Ocean (NMFS et al. 2011).

Kemp's ridleys mature at 10-17 years (Caillouet *et al.* 1995; Schmid and Witzell 1997; Snover *et al.* 2007; NMFS and USFWS 2007c). Nesting occurs from April through July each year with hatchlings emerging after 45-58 days (NMFS *et al*. 2011). Females lay an average of 2.5 clutches within a season (TEWG 1998, 2000) and the mean remigration interval for adult females is 2 years (Marquez *et al*. 1982; TEWG 1998, 2000).

Once they leave the nesting beach, hatchlings presumably enter the Gulf of Mexico where they feed on available S*argassum* and associated infauna or other epipelagic species (NMFS et al. 2011). The presence of juvenile turtles along both the U.S. Atlantic and Gulf of Mexico coasts, where they are recruited to the coastal benthic environment, indicates that post-hatchlings are distributed in both the Gulf of Mexico and Atlantic Ocean (TEWG 2000).

The location and size classes of dead turtles recovered by the STSSN suggests that benthic immature developmental areas occur along the U.S. coast and that these areas may change given resource quality and quantity (TEWG 2000). Developmental habitats are defined by several characteristics, including coastal areas sheltered from high winds and waves such as embayments and estuaries, and nearshore temperate waters shallower than 50 m (NMFS and USFWS 2007b). The suitability of these habitats depends on resource availability, with optimal environments providing rich sources of crabs and other invertebrates. Kemp's ridleys consume a variety of crab species, including *Callinectes*, *Ovalipes*, *Libinia*, and *Cancer* species. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). A wide variety of substrates have been documented to provide good foraging habitat, including seagrass beds, oyster reefs, sandy and mud bottoms, and rock outcroppings (NMFS and USFWS 2007b).

Foraging areas documented along the U.S. Atlantic coast include Charleston Harbor, Pamlico Sound (Epperly *et al.* 1995c), Chesapeake Bay (Musick and Limpus 1997), Delaware Bay (Stetzar 2002), and Long Island Sound (Morreale and Standora 1993; Morreale *et al*. 2005). For instance, in the Chesapeake Bay, Kemp's ridleys frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Upon leaving Chesapeake Bay in autumn, juvenile Kemp's ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Epperly *et al.* 1995a, 1995b; Musick and Limpus 1997).

Adult Kemp's ridleys are found in the coastal regions of the Gulf of Mexico and southeastern United States, but are typically rare in the northeastern U.S. waters of the Atlantic (TEWG

2000). Adults are primarily found in nearshore waters of 37 m or less that are rich in crabs and have a sandy or muddy bottom (NMFS and USFWS 2007b).

Population Dynamics and Status

The majority of Kemp's ridleys nest along a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963; NMFS and USFWS 2007b; NMFS *et al*. 2011). There is a limited amount of scattered nesting to the north and south of the primary nesting beach (NMFS and USFWS 2007b). Nesting often occurs in synchronized emergences termed *arribadas*. The number of recorded nests reached an estimated low of 702 nests in 1985, corresponding to fewer than 300 adult females nesting in that season (TEWG 2000; NMFS and USFWS 2007b; NMFS *et al*. 2011). Conservation efforts by Mexican and U.S. agencies have aided this species by eliminating egg harvest, protecting eggs and hatchlings, and reducing at-sea mortality through fishing regulations (TEWG 2000). Since the mid-1980s, the number of nests observed at Rancho Nuevo and nearby beaches has increased 14-16% per year (Heppell *et al.* 2005), allowing cautious optimism that the population is on its way to recovery. An estimated 5,500 females nested in the State of Tamaulipas over a 3-day period in May 2007 and over 4,000 of those nested at Rancho Nuevo (NMFS and USFWS 2007b). In 2008, 17,882 nests were documented on Mexican nesting beaches (NMFS 2011). There is limited nesting in the United States, most of which is located in South Texas. While six nests were documented in 1996, a record 195 nests were found in 2008 (NMFS 2011).

Threats

Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, predators, and oceanographic-related events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. In the last five years (2006-2010), the number of cold-stunned turtles on Cape Cod beaches averaged 115 Kemp's ridleys, 7 loggerheads, and 7 greens (NMFS unpublished data). The numbers ranged from a low in 2007 of 27 Kemp's ridleys, 5 loggerheads, and 5 greens to a high in 2010 of 213 Kemp's ridleys, 4 loggerheads, and 14 greens. Annual cold stun events vary in magnitude; the extent of episodic major cold stun events may be associated with numbers of turtles utilizing Northeast U.S. waters in a given year, oceanographic conditions, and/or the occurrence of storm events in the late fall. Although many cold-stunned turtles can survive if they are found early enough, these events represent a significant source of natural mortality for Kemp's ridleys.

Like other sea turtle species, the severe decline in the Kemp's ridley population appears to have been heavily influenced by a combination of exploitation of eggs and impacts from fishery interactions. From the 1940s through the early 1960s, nests from Ranch Nuevo were heavily exploited, but beach protection in 1967 helped to curtail this activity (NMFS *et al*. 2011). Following World War II, there was a substantial increase in the number of trawl vessels, particularly shrimp trawlers, in the Gulf of Mexico where adult Kemp's ridley sea turtles occur. Information from fisheries observers helped to demonstrate the high number of turtles taken in these shrimp trawls (USFWS and NMFS 1992). Subsequently, NMFS has worked with the industry to reduce sea turtle takes in shrimp trawls and other trawl fisheries, including the development and use of turtle excluder devices (TEDs). As described above, there is lengthy regulatory history with regard to the use of TEDs in the U.S. South Atlantic and Gulf of Mexico shrimp fisheries (NMFS 2002b; Epperly 2003; Lewison *et al.* 2003). The 2002 Biological Opinion on shrimp trawling in the southeastern United States concluded that 155,503 Kemp's ridley sea turtles would be taken annually in the fishery with 4,208 of the takes resulting in mortality (NMFS 2002b).

Although modifications to shrimp trawls have helped to reduce mortality of Kemp's ridleys, a recent assessment found that the Southeast/Gulf of Mexico shrimp trawl fishery remained responsible for the vast majority of U.S. fishery interactions (up to 98%) and mortalities (more than 80%). Finkbeiner *et al*. (2011) compiled cumulative sea turtle bycatch information in U.S. fisheries from 1990 through 2007, before and after implementation of bycatch mitigation measures. Information was obtained from peer reviewed publications and NMFS documents (e.g., Biological Opinions and bycatch reports). In the Atlantic, a mean estimate of 137,700 bycatch interactions, of which 4,500 were mortalities, occurred annually (since implementation of bycatch mitigation measures). Kemp's ridleys interacted with fisheries most frequently, with the highest level of mean annual mortality (2,700), followed by loggerheads (1,400), greens (300), and leatherbacks (40). While this provides an initial cumulative bycatch assessment, there are a number of caveats that should be considered when interpreting this information, such as sampling inconsistencies and limitations.

This species is also affected by other sources of anthropogenic impact (fishery and non-fishery related), similar to those discussed above. Three Kemp's ridley captures in Mid-Atlantic trawl fisheries were documented by NMFS observers between 1994 and 2008 (Warden and Bisack 2010), and eight Kemp's ridleys were documented by NMFS observers in mid-Atlantic sink gillnet fisheries between 1995 and 2006 (Murray 2009a). Additionally, in the spring of 2000, a total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 275 loggerhead carcasses were found. The cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected by NMFS to have been from a large-mesh gillnet fishery for monkfish and dogfish operating offshore in the preceding weeks (67 FR 71895, December 3, 2002). The five Kemp's ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction, since it is unlikely that all of the carcasses washed ashore. The NMFS Northeast Fisheries Science Center also documented 14 Kemp's ridleys entangled in or impinged on Virginia pound net leaders from 2002-2005. Note that bycatch estimates for Kemp's ridleys in various fishing gear types (*e.g.*, trawl, gillnet, dredge) are not available at this time, largely due to the low number of observed interactions precluding a robust estimate. Kemp's ridley interactions in non-fisheries have also been observed; for example, the Oyster Creek Nuclear Generating Station in Barnegat Bay, New Jersey, recorded a total of 27 Kemp's ridleys (15 of which were found alive) impinged or captured on their intake screens from 1992-2006 (NMFS 2006).

Summary of Status for Kemp's Ridley Sea Turtles

The majority of Kemp's ridleys nest along a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963; NMFS and USFWS 2007b; NMFS *et al*. 2011). The number of nesting females in the Kemp's ridley population declined dramatically from the late 1940s through the mid-1980s, with an estimated 40,000 nesting females in a single *arribada* in 1947 and fewer than 300 nesting females in the entire 1985 nesting season (TEWG 2000; NMFS *et al*. 2011). However, the total annual number of nests at Rancho Nuevo gradually began to increase in the 1990s (NMFS and USFWS 2007b). Based on the number of nests laid in 2006 and the remigration interval for Kemp's ridley sea turtles (1.8-2 years), there were an estimated 7,000-8,000 adult female Kemp's ridley sea turtles in 2006 (NMFS and USFWS 2007b). The number of adult males in the population is unknown, but sex ratios of hatchlings and immature Kemp's ridleys suggest that the population is female-biased, suggesting that the number of adult males is less than the number of adult females (NMFS and USFWS 2007b). While there is cautious optimism for recovery, events such as the Deepwater Horizon oil release, and stranding events associated increased skimmer trawl use and poor TED compliance in the northern Gulf of Mexico may dampen recent population growth.

As with the other sea turtle species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality. Based on their 5-year status review of the species, NMFS and USFWS (2007b) determined that Kemp's ridley sea turtles should not be reclassified as threatened under the ESA. A revised bi-national recovery plan was published for public comment in 2010, and in September 2011, NMFS, USFWS, and the Services and the Secretary of Environment and Natural Resources, Mexico (SEMARNAT) released the second revision to the Kemp's ridley recovery plan.

Based on this and the current best available information, we believe that the Kemp's ridley sea turtle population is currently stable; as protective measures for sea turtles are currently in place and continue to be implemented, we expect this trend to continue or over the next 2 years. This stable trend is based solely on information we have on nesting trends. The number of sea turtles comprising the neritic and oceanic life stages of the population is currently unknown. As a result, the status and future trend of the population as a whole remains unclear. Therefore, until information and data become available on the numbers of individuals comprising the neritic and oceanic life stages, nesting trends represent the best available information and serve as the best representative of the population's trend.

4.1.3 Leatherback sea turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, including the Atlantic, Pacific, and Indian Oceans, and the Mediterranean Sea (Ernst and Barbour 1972). Leatherbacks are the largest living turtles and range farther than any other sea turtle species. Their large size and tolerance of relatively low water temperatures allows them to occur in boreal waters such as those off Labrador and in the Barents Sea (NMFS and USFWS 1995).

In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). By 1995, this global population of adult females was estimated to have declined to 34,500 (Spotila *et al.* 1996). The most recent population size estimate for the North Atlantic alone is a range of 34,000-94,000 adult leatherbacks (TEWG 2007). Thus, there is substantial uncertainty with respect to global population estimates of leatherback sea turtles.

Pacific Ocean

Leatherback nesting has been declining at all major Pacific basin nesting beaches for the last two decades (Spotila *et al.* 1996, 2000; NMFS and USFWS 1998a, 2007b; Sarti *et al.* 2000). In the western Pacific, major nesting beaches occur in Papua New Guinea, Indonesia, Solomon Islands, and Vanuatu, with an approximate 2,700-4,500 total breeding females, estimated from nest counts (Dutton *et al.* 2007). While there appears to be overall long term population decline, the Indonesian nesting aggregation at Jamursba-Medi is currently stable (since 1999), although there is evidence to suggest a significant and continued decline in leatherback nesting in Papua New Guinea and Solomon Islands over the past 30 years (NMFS 2011). Leatherback sea turtles disappeared from India before 1930, have been virtually extinct in Sri Lanka since 1994, and appear to be approaching extinction in Malaysia (Spotila *et al.* 2000). In Fiji, Thailand, and Australia, leatherback sea turtles have only been known to nest in low densities and scattered sites.

The largest, extant leatherback nesting group in the Indo-Pacific lies on the North Vogelkop coast of West Papua, Indonesia, with 3,000-5,000 nests reported annually in the 1990s (Suárez *et al.* 2000). However, in 1999, local villagers started reporting dramatic declines in sea turtles near their villages (Suárez 1999). Declines in nesting groups have been reported throughout the western Pacific region where observers report that nesting groups are well below abundance levels that were observed several decades ago (*e.g.*, Suárez 1999).

Leatherback sea turtles in the western Pacific are threatened by poaching of eggs, killing of nesting females, human encroachment on nesting beaches, incidental capture in fishing gear, beach erosion, and egg predation by animals.

In the eastern Pacific Ocean, major leatherback nesting beaches are located in Mexico and Costa Rica, where nest numbers have been declining. According to reports from the late 1970s and early 1980s, beaches located on the Mexican Pacific coasts of Michoacán, Guerrero, and Oaxaca sustained a large portion, perhaps 50%, of all global nesting by leatherbacks (Sarti *et al.* 1996). A dramatic decline has been seen on nesting beaches in Pacific Mexico, where aerial survey data was used to estimate that tens of thousands of leatherback nests were laid on the beaches in the 1980s (Pritchard 1982), but a total of only 120 nests on the four primary index beaches (combined) were counted in the 2003-2004 season (Sarti Martinez *et al.* 2007). Since the early 1980s, the Mexican Pacific population of adult female leatherback turtles has declined to slightly more than 200 during 1998-1999 and 1999-2000 (Sarti *et al.* 2000). Spotila *et al.* (2000) reported the decline of the leatherback nesting at Playa Grande, Costa Rica, which had been the fourth largest nesting group in the world and the most important nesting beach in the Pacific. Between 1988 and 1999, the nesting group declined from 1,367 to 117 female leatherback sea turtles. Based on their models, Spotila *et al.* (2000) estimated that the group could fall to less than 50 females by 2003-2004. Another, more recent, analysis of the Costa Rican nesting beaches indicates a decline in nesting during 15 years of monitoring (1989-2004) with approximately 1,504 females nesting in 1988-1989 to an average of 188 females nesting in 2000-2001 and 2003-2004 (NMFS and USFWS 2007d), indicating that the reductions in nesting females were not as extreme as the reductions predicted by Spotila *et al*. (2000).

On September 26, 2007, NMFS received a petition to revise the critical habitat designation for leatherback sea turtles to include waters along the U.S. West Coast. On December 28, 2007, NMFS published a positive 90-day finding on the petition and convened a critical habitat review team. On January 26, 2012, NMFS published a final rule to revise the critical habitat designation to include three particular areas of marine habitat. The designation includes approximately 16,910 square miles along the California coast from Point Arena to Point Arguello east of the 3,000 meter depth contour, and 25,004 square miles from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 meter depth contour. The areas comprise approximately 41,914 square miles of marine habitat and include waters from the ocean surface down to a maximum depth of 262 feet. The designated critical habitat areas contain the physical or biological feature essential to the conservation of the species that may require special management conservation or protection. In particular, the team identified one Primary Constituent Element: the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae, of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

Leatherbacks in the eastern Pacific face a number of threats to their survival. For example, commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean; and California/Oregon drift gillnet fisheries are known to capture, injure, or kill leatherbacks in the eastern Pacific Ocean. Given the declines in leatherback nesting in the Pacific, some researchers have concluded that the leatherback is on the verge of extinction in the Pacific Ocean (*e.g.,* Spotila *et al.* 1996, 2000).

Indian Ocean

Leatherbacks nest in several areas around the Indian Ocean. These sites include Tongaland, South Africa (Pritchard 2002) and the Andaman and Nicobar Islands (Andrews *et al.* 2002). Intensive survey and tagging work in 2001 provided new information on the level of nesting in the Andaman and Nicobar Islands (Andrews *et al.* 2002). Based on the survey and tagging work, it was estimated that 400-500 female leatherbacks nest annually on Great Nicobar Island (Andrews *et al.* 2002). The number of nesting females using the Andaman and Nicobar Islands combined was estimated around 1,000 (Andrews and Shanker 2002). Some nesting also occurs along the coast of Sri Lanka, although in much smaller numbers than in the past (Pritchard 2002).

Mediterranean Sea

Casale *et al.* (2003) reviewed the distribution of leatherback sea turtles in the Mediterranean. Among the 411 individual records of leatherback sightings in the Mediterranean, there were no nesting records. Nesting in the Mediterranean is believed to be extremely rare if it occurs at all. Leatherbacks found in Mediterranean waters originate from the Atlantic Ocean (P. Dutton, NMFS, unpublished data).

Atlantic Ocean

Distribution and Life History

Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between northern temperate and tropical waters (NMFS and USFWS 1992). Leatherbacks are frequently thought of as a pelagic species that feed on jellyfish (*e.g.*, *Stomolophus, Chryaora*, and *Aurelia* species) and tunicates (*e.g.*, salps, pyrosomas) (Rebel 1974; Davenport and Balazs 1991). However, leatherbacks are also known to use coastal waters of the U.S. continental shelf (James *et al.* 2005a; Eckert *et al.* 2006; Murphy *et al.* 2006), as well as the European continental shelf on a seasonal basis (Witt *et al.* 2007).

Tagging and satellite telemetry data indicate that leatherbacks from the western North Atlantic nesting beaches use the entire North Atlantic Ocean (TEWG 2007). For example, leatherbacks tagged at nesting beaches in Costa Rica have been found in Texas, Florida, South Carolina, Delaware, and New York (STSSN database). Leatherback sea turtles tagged in Puerto Rico, Trinidad, and the Virgin Islands have also been subsequently found on U.S. beaches of southern, Mid-Atlantic, and northern states (STSSN database). Leatherbacks from the South Atlantic nesting assemblages (West Africa, South Africa, and Brazil) have not been re-sighted in the western North Atlantic (TEWG 2007).

The CETAP aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia conducted between 1978 and 1982 showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in water depths ranging from 1 to 4,151 m, but 84.4% of sightings were in waters less than 180 m (Shoop and Kenney 1992). Leatherbacks were sighted in waters within a sea surface temperature range similar to that observed for loggerheads; from 7°-27.2°C (Shoop and Kenney 1992). However, leatherbacks appear to have a greater tolerance for colder waters in comparison to loggerhead sea turtles since more leatherbacks were found at the lower temperatures (Shoop and Kenney 1992). Studies of satellite tagged leatherbacks suggest that they spend 10%-41% of their time at the surface, depending on the phase of their migratory cycle (James *et al.* 2005b). The greatest amount of surface time (up to 41%) was recorded when leatherbacks occurred in continental shelf and slope waters north of 38°N (James *et al.* 2005b).

In 1979, the waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands were designated as critical habitat for the leatherback sea turtle. On February 2, 2010, NMFS received a petition to revise the critical habitat designation for leatherback sea turtles to include waters adjacent to a major nesting beach in Puerto Rico. NMFS published a 90-day finding on the petition on July 16, 2010, which found that the petition did not present substantial scientific information indicating that the petitioned revision was warranted. The original petitioners submitted a second petition on November 2, 2010 to revise the critical habitat designation to again include waters adjacent to a major nesting beach in Puerto Rico, including additional information on the usage of the waters. NMFS determined on May 5, 2011, that a revision to critical habitat off Puerto Rico may be warranted, and an analysis is underway. Note that on August 4, 2011, FWS issued a determination that revision to critical habitat along Puerto Rico should be made and will be addressed during the future planned status review.

Leatherbacks are a long lived species (>30 years). They were originally believed to mature at a younger age than loggerhead sea turtles, with a previous estimated age at sexual maturity of about 13-14 years for females with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NMFS SEFSC 2001). However, new sophisticated analyses suggest that leatherbacks in the Northwest Atlantic may reach maturity at 24.5-29 years of age (Avens *et al.* 2009). In the United States and Caribbean, female leatherbacks nest from March through July. In the Atlantic, most nesting females average between 150-160 cm curved carapace length (CCL), although smaller (<145 cm CCL) and larger nesters are observed (Stewart *et al*. 2007, TEWG 2007). They nest frequently (up to seven nests per year) during a nesting season and nest about every 2-3 years. They produce 100 eggs or more in each clutch and can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Therefore, the actual proportion of eggs that can result in hatchlings is less than the total number of eggs produced per season. As is the case with other sea turtle species, leatherback hatchlings enter the water soon after hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm CCL, Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm CCL.

Population Dynamics and Status

As described earlier, sea turtle nesting survey data is important in that it provides information on the relative abundance of nesting, and the contribution of each population/subpopulation to total nesting of the species. Nest counts can also be used to estimate the number of reproductively mature females nesting annually, and as an indicator of the trend in the number of nesting females in the nesting group. The 5-year review for leatherback sea turtles (NMFS and USFWS 2009 compiled the most recent information on mean number of leatherback nests per year for each of the seven leatherback populations or groups of populations that were identified by the Leatherback TEWG as occurring within the Atlantic. These are: Florida, North Caribbean, Western Caribbean, Southern Caribbean, West Africa, South Africa, and Brazil (TEWG 2007).

In the United States, the Florida Statewide Nesting Beach Survey program has documented an increase in leatherback nesting numbers from 98 nests in 1988 to between 800 and 900 nests in the early 2000s (NMFS and USFWS 2007d). Stewart *et al*. (2011) evaluated nest counts from 68 Florida beaches over 30 years (1979-2008) and found that nesting increased at all beaches with trends ranging from 3.1%-16.3% per year, with an overall increase of 10.2% per year. An analysis of Florida's index nesting beach sites from 1989-2006 shows a substantial increase in leatherback nesting in Florida during this time, with an annual growth rate of approximately 1.17 (TEWG 2007). The TEWG reports an increasing or stable nesting trend for all of the seven populations or groups of populations with the exception of the Western Caribbean and West Africa. The leatherback rookery along the northern coast of South America in French Guiana and Suriname supports the majority of leatherback nesting in the western Atlantic (TEWG 2007), and represents more than half of total nesting by leatherback sea turtles worldwide (Hilterman and Goverse 2004). Nest numbers in Suriname have shown an increase and the long-term trend for the Suriname and French Guiana nesting group seems to show an increase (Hilterman and

Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). The TEWG (2007) report indicates that using nest numbers from 1967-2005, a positive population growth rate was found over the 39-year period for French Guinea and Suriname, with a 95% probability that the population was growing. Given the magnitude of leatherback nesting in this area compared to other nest sites, negative impacts in leatherback sea turtles in this area could have profound impacts on the entire species.

The CETAP aerial survey conducted from 1978-1982 estimated the summer leatherback population for the northeastern United States at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina) (Shoop and Kenney 1992). However, the estimate was based on turtles visible at the surface and does not include those that were below the surface out of view. Therefore, it likely underestimated the leatherback population for the northeastern United States at the time of the survey. Estimates of leatherback abundance of 1,052 turtles (C.V. = 0.38) and 1,174 turtles (C.V. = 0.52) were obtained from surveys conducted from Virginia to the Gulf of St. Lawrence in 1995 and 1998, respectively (Palka 2000). However, since these estimates were also based on sightings of leatherbacks at the surface, the author considered the estimates to be negatively biased and the true abundance of leatherbacks may be 4.27 times higher (Palka 2000).

Threats

The 5-year status review (NMFS and USFWS 2007d) and TEWG (2009) report provide summaries of natural as well as anthropogenic threats to leatherback sea turtles. Of the Atlantic sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear, trap/pot gear in particular. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), their diving and foraging behavior, their distributional overlap with the gear, their possible attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in longline fisheries. Leatherbacks entangled in fishing gear generally have a reduced ability to feed, dive, surface to breathe, or perform any other behavior essential to survival (Balazs 1985). In addition to drowning from forced submergence, they may be more susceptible to boat strikes if forced to remain at the surface, and entangling lines can constrict blood flow resulting in tissue necrosis. The long-term impacts of entanglement on leatherback health remain unclear. Innis *et al*. (2010) conducted a health evaluation of leatherback sea turtles during direct capture (n=12) and disentanglement (n=7). They found no significant difference in many of the measured health parameters between entangled and directly captured turtles. However, blood parameters, including but not limited to sodium, chloride, and blood urea nitrogen, for entangled turtles showed several key differences that were most likely due to reduced foraging and associated seawater ingestion, as well as a general stress response.

Finkbeiner *et al*. (2011) compiled cumulative sea turtle bycatch information in U.S. fisheries from 1990 through 2007, before and after implementation of bycatch mitigation measures. Information was obtained from peer reviewed publications and NMFS documents (e.g., Biological Opinions and bycatch reports). In the Atlantic, a mean estimate of 137,700 bycatch interactions, of which 4,500 were mortalities, occurred annually (since implementation of bycatch mitigation measures). Kemp's ridleys interacted with fisheries most frequently, with the highest level of mean annual mortality (2,700), followed by loggerheads (1,400), greens (300), and leatherbacks (40). The Southeast/Gulf of Mexico shrimp trawl fishery was responsible for the vast majority of U.S. interactions (up to 98%) and mortalities (more than 80%). While this provides an initial cumulative bycatch assessment, there are a number of caveats that should be considered when interpreting this information, such as sampling inconsistencies and limitations.

Leatherbacks have been documented interacting with longline, trap/pot, trawl, and gillnet fishing gear. For instance, an estimated 6,363 leatherback sea turtles were documented as caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999 (NMFS SEFSC 2001). Currently, the U.S. tuna and swordfish longline fisheries managed under the HMS FMP are estimated to capture 1,764 leatherbacks (no more than 252 mortalities) for each 3-year period starting in 2007 (NMFS 2004a). In 2010, there were 26 observed interactions between leatherback sea turtles and longline gear used in the HMS fishery (Garrison and Stokes 2011a, 2011b). All leatherbacks were released alive, with all gear removed for the majority of captures. While 2010 total estimates are not yet available, in 2009, 285.8 (95% CI: 209.6-389.7) leatherback sea turtles are estimated to have been taken in the longline fisheries managed under the HMS FMP based on the observed takes (Garrison and Stokes 2010). The 2009 estimate continues a downward trend since 2007 and remains well below the average prior to implementation of gear regulations (Garrison and Stokes 2010). Since the U.S. fleet accounts for only 5%-8% of the longline hooks fished in the Atlantic Ocean, adding up the under-represented observed takes of the other 23 countries actively fishing in the area would likely result in annual take estimates of thousands of leatherbacks over different life stages (NMFS SEFSC 2001). Lewison *et al.* (2004) estimated that 30,000-60,000 leatherbacks were taken in all Atlantic longline fisheries in 2000 (including the U.S. Atlantic tuna and swordfish longline fisheries, as well as others).

Leatherbacks are susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine (Dwyer *et al.* 2002). Additional leatherbacks stranded wrapped in line of unknown origin or with evidence of a past entanglement (Dwyer *et al.* 2002). More recently, from 2002 to 2010, NMFS received 137 reports of sea turtles entangled in vertical lines from Maine to Virginia, with 128 events confirmed (verified by photo documentation or response by a trained responder; NMFS 2008a). Of the 128 confirmed events during this period, 117 events involved leatherbacks. NMFS identified the gear type and fishery for 72 of the 117 confirmed events, which included lobster (42[2]), whelk/conch (15), black sea bass (10), crab (2), and research pot gear (1). A review of leatherback mortality documented by the STSSN in Massachusetts suggests that vessel strikes and entanglement in fixed gear (primarily lobster pots and whelk pots) are the principal sources of this mortality (Dwyer *et al.* 2002).

Leatherback interactions with the U.S. South Atlantic and Gulf of Mexico shrimp fisheries are also known to occur (NMFS 2002b). Leatherbacks are likely to encounter shrimp trawls working in the coastal waters off the U.S. Atlantic coast (from Cape Canaveral, Florida through North Carolina) as they make their annual spring migration north. For many years, TEDs that

[2] One case involved both lobster and whelk/conch gear.

were required for use in the U.S. South Atlantic and Gulf of Mexico shrimp fisheries were less effective for leatherbacks as compared to the smaller, hard-shelled turtle species, because the TED openings were too small to allow leatherbacks to escape. To address this problem, NMFS issued a final rule on February 21, 2003, to amend the TED regulations (68 FR 8456, February 21, 2003). Modifications to the design of TEDs are now required in order to exclude leatherbacks as well as large benthic immature and sexually mature loggerhead and green sea turtles. Given those modifications, Epperly *et al*. (2002) anticipated an average of 80 leatherback mortalities a year in shrimp gear interactions, dropping to an estimate of 26 leatherback mortalities in 2009 due to effort reduction in the Southeast shrimp fishery (Memo from Dr. B. Ponwith, SEFSC, to Dr. R. Crabtree, SERO, January 5, 2011).

Other trawl fisheries are also known to interact with leatherback sea turtles although on a much smaller scale. In October 2001, for example, a NMFS fisheries observer documented the take of a leatherback in a bottom otter trawl fishing for *Loligo* squid off of Delaware. TEDs are not currently required in this fishery. In November 2007, fisheries observers reported the capture of a leatherback sea turtle in bottom otter trawl gear fishing for summer flounder.

Gillnet fisheries operating in the waters of the Mid-Atlantic states are also known to capture, injure, and/or kill leatherbacks when these fisheries and leatherbacks co-occur. Data collected by the NEFSC Fisheries Observer Program from 1994-1998 (excluding 1997) indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54%-92%. In North Carolina, six additional leatherbacks were reported captured in gillnet sets in the spring (NMFS SEFSC 2001). In addition to these, in September 1995, two dead leatherbacks were removed from an 11-inch (28.2-cm) monofilament shark gillnet set in the nearshore waters off of Cape Hatteras (STSSN unpublished data reported in NMFS SEFSC 2001). Lastly, Murray (2009a) reports five observed leatherback captures in Mid-Atlantic sink gillnet fisheries between 1994 and 2008.

Fishing gear interactions can occur throughout the range of leatherbacks. Entanglements occur in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear including salmon net, herring net, gillnet, trawl line, and crab pot line. Leatherbacks are known to drown in fish nets set in coastal waters of Sao Tome, West Africa (Castroviejo *et al.* 1994; Graff 1995). Gillnets are one of the suspected causes for the decline in the leatherback sea turtle population in French Guiana (Chevalier *et al.* 1999), and gillnets targeting green and hawksbill sea turtles in the waters of coastal Nicaragua also incidentally catch leatherback sea turtles (Lagueux *et al.*1998). Observers on shrimp trawlers operating in the northeastern region of Venezuela documented the capture of six leatherbacks from 13,600 trawls (Marcano and Alio-M. 2000). An estimated 1,000 mature female leatherback sea turtles are caught annually in fishing nets off of Trinidad and Tobago with mortality estimated to be between 50%-95% (Eckert and Lien 1999). Many of the sea turtles do not die as a result of drowning, but rather because the fishermen cut them out of their nets (NMFS SEFSC 2001).

Leatherbacks may be more susceptible to marine debris ingestion than other sea turtle species due to the tendency of floating debris to concentrate in convergence zones that juveniles and adults use for feeding (Shoop and Kenney 1992; Lutcavage *et al.* 1997). Investigations of the necropsy results of leatherback sea turtles revealed that a substantial percentage (34% of the 408 leatherback necropsies' recorded between 1985 and 2007) reported plastic within the turtles' stomach contents, and in some cases (8.7% of those cases in which plastic was reported), blockage of the gut was found in a manner that may have caused the mortality (Mrosovsky *et al*. 2009). An increase in reports of plastic ingestion was evident in leatherback necropsies conducted after the late 1960s (Mrosovsky *et al.* 2009). Along the coast of Peru, intestinal contents of 19 of 140 (13%) leatherback carcasses were found to contain plastic bags and film (Fritts 1982). The presence of plastic debris in the digestive tract suggests that leatherbacks might not be able to distinguish between prey items (*e.g*., jellyfish) and plastic debris (Mrosovsky 1981). Balazs (1985) speculated that plastic objects may resemble food items by their shape, color, size, or even movements as they drift about, and induce a feeding response in leatherbacks.

Summary of Status for Leatherback Sea Turtles

In the Pacific Ocean, the abundance of leatherback sea turtles on nesting beaches has declined dramatically over the past 10 to 20 years. Nesting groups throughout the eastern and western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (for example, egg poaching) (NMFS and USFWS 2007d). No reliable long term trend data for the Indian Ocean populations are currently available. While leatherbacks are known to occur in the Mediterranean Sea, nesting in this region is not known to occur (NMFS and USFWS 2007d).

Nest counts in many areas of the Atlantic Ocean show increasing trends, including for beaches in Suriname and French Guiana which support the majority of leatherback nesting (NMFS and USFWS 2007d). The species as a whole continues to face numerous threats in nesting and marine habitats. As with the other sea turtle species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like pollution and habitat destruction account for an unknown level of other mortality. The long term recovery potential of this species may be further threatened by observed low genetic diversity, even in the largest nesting groups like French Guiana and Suriname (NMFS and USFWS 2007d).

Based on its 5-year status review of the species, NMFS and USFWS (2007d) determined that endangered leatherback sea turtles should not be delisted or reclassified. However, it was also determined that an analysis and review of the species should be conducted in the future to determine whether DPSs should be identified (NMFS and USFWS 2007d).

Based on this and the current best available information, we believe that the leatherback sea turtle population is currently stable; as protective measures for sea turtles are currently in place and continue to be implemented, we expect this trend to continue or over the next 2 years. This stable trend is based solely on information we have on nesting trends. The number of sea turtles comprising the neritic and oceanic life stages of the population is currently unknown. As a result, the status and future trend of the population as a whole remains unclear. Therefore, until information and data become available on the numbers of individuals comprising the neritic and oceanic life stages, nesting trends represent the best available information and serve as the best representative of the population's trend.

4.1.4 Green sea turtles

Green sea turtles are distributed circumglobally, and can be found in the Pacific, Indian, and Atlantic Oceans as well as the Mediterranean Sea (NMFS and USFWS 1991, 2007c; Seminoff 2004). In 1978, the Atlantic population of the green sea turtle was listed as threatened under the ESA, except for the breeding populations in Florida and on the Pacific coast of Mexico, which were listed as endangered. As it is difficult to differentiate between breeding populations away from the nesting beaches, all green sea turtles in the water are considered endangered.

Pacific Ocean

Green sea turtles occur in the western, central, and eastern Pacific. Foraging areas are also found throughout the Pacific and along the southwestern U.S. coast (NMFS and USFWS 1998b). In the western Pacific, major nesting rookeries at four sites including Heron Island (Australia), Raine Island (Australia), Guam, and Japan were evaluated and determined to be increasing in abundance, with the exception of Guam which appears stable (NMFS and USFWS 2007c). In the central Pacific, nesting occurs on French Frigate Shoals, Hawaii, which has also been reported as increasing with a mean of 400 nesting females annually from 2002-2006 (NMFS and USFWS 2007c). The main nesting sites for the green sea turtle in the eastern Pacific are located in Michoacan, Mexico and in the Galapagos Islands, Ecuador (NMFS and USFWS 2007c). The number of nesting females per year exceeds 1,000 females at each site (NMFS and USFWS 2007c). However, historically, greater than 20,000 females per year are believed to have nested in Michoacan alone (Cliffton *et al.* 1982; NMFS and USFWS 2007c). The Pacific Mexico green turtle nesting population (also called the black turtle) is considered endangered.

Historically, green sea turtles were used in many areas of the Pacific for food. They were also commercially exploited, which, coupled with habitat degradation, led to their decline in the Pacific (NMFS and USFWS 1998b). Green sea turtles in the Pacific continue to be affected by poaching, habitat loss or degradation, fishing gear interactions, and fibropapillomatosis, which is a viral disease that causes tumors in affected turtles (NMFS and USFWS 1998b; NMFS 2004).

Indian Ocean

There are numerous nesting sites for green sea turtles in the Indian Ocean. One of the largest nesting sites for green sea turtles worldwide occurs on the beaches of Oman where an estimated 20,000 green sea turtles nest annually (Hirth 1997; Ferreira *et al.* 2003). Based on a review of the 32 Index Sites used to monitor green sea turtle nesting worldwide, Seminoff (2004) concluded that declines in green sea turtle nesting were evident for many of the Indian Ocean Index Sites. While several of these had not demonstrated further declines in the more recent past, only the Comoros Island Index Site in the western Indian Ocean showed evidence of increased nesting (Seminoff 2004).

Mediterranean Sea

There are four nesting concentrations of green sea turtles in the Mediterranean from which data are available – Turkey, Cyprus, Israel, and Syria. Currently, approximately 300-400 females nest each year, about two-thirds of which nest in Turkey and one-third in Cyprus. Although green sea turtles are depleted from historic levels in the Mediterranean Sea (Kasparek *et al.* 2001), nesting data gathered since the early 1990s in Turkey, Cyprus, and Israel show no apparent trend in any direction. However, a declining trend is apparent along the coast of Palestine/Israel, where 300-350 nests were deposited each year in the 1950s (Sella 1982) compared to a mean of 6 nests per year from 1993-2004 (Kuller 1999; Y. Levy, Israeli Sea Turtle Rescue Center, unpublished data). A recent discovery of green sea turtle nesting in Syria adds roughly 100 nests per year to green sea turtle nesting activity in the Mediterranean (Rees *et al.* 2005). That such a major nesting concentration could have gone unnoticed until recently (the Syria coast was surveyed in 1991, but nesting activity was attributed to loggerheads) bodes well for the ongoing speculation that the unsurveyed coast of Libya may also host substantial nesting.

Atlantic Ocean

Distribution and Life History

As has occurred in other oceans of its range, green sea turtles were once the target of directed fisheries in the United States and throughout the Caribbean. In 1890, over one million pounds of green sea turtles were taken in a directed fishery in the Gulf of Mexico (Doughty 1984). Declines in the turtle fishery throughout the Gulf of Mexico were evident by 1902 (Doughty 1984).

In the western Atlantic, large juvenile and adult green sea turtles are largely herbivorous, occurring in habitats containing benthic algae and seagrasses from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz 1999). Green sea turtles occur seasonally in Mid-Atlantic and Northeast waters such as Chesapeake Bay and Long Island Sound (Musick and Limpus 1997; Morreale and Standora 1998; Morreale *et al.* 2005), which serve as foraging and developmental habitats.

Some of the principal feeding areas in the western Atlantic Ocean include the upper west coast of Florida, the Florida Keys, and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). The waters surrounding the island of Culebra, Puerto Rico, and its outlying keys are designated critical habitat for the green sea turtle.

Age at maturity for green sea turtles is estimated to be 20-50 years (Balazs 1982; Frazer and Ehrhart 1985; Seminoff 2004). As is the case with the other sea turtle species described above, adult females may nest multiple times in a season (average 3 nests/season with approximately 100 eggs/nest) and typically do not nest in successive years (NMFS and USFWS 1991b; Hirth 1997).

Population Dynamics and Status

Like other sea turtle species, nest count information for green sea turtles provides information on the relative abundance of nesting, and the contribution of each nesting group to total nesting of the species. Nest counts can also be used to estimate the number of reproductively mature females nesting annually. The 5-year status review for the species identified eight geographic areas considered to be primary sites for threatened green sea turtle nesting in the Atlantic/Caribbean, and reviewed the trend in nest count data for each (NMFS and USFWS 2007c). These include: (1) Yucatán Peninsula, Mexico, (2) Tortuguero, Costa Rica, (3) Aves Island, Venezuela, (4) Galibi Reserve, Suriname, (5) Isla Trindade, Brazil, (6) Ascension Island, United Kingdom, (7) Bioko Island, Equatorial Guinea, and (8) Bijagos Archipelago, Guinea-Bissau (NMFS and USFWS 2007d). Nesting at all of these sites is considered to be stable or increasing with the exception of Bioko Island, which may be declining. However, the lack of sufficient data precludes a meaningful trend assessment for this site (NMFS and USFWS 2007c).

Seminoff (2004) reviewed green sea turtle nesting data for eight sites in the western, eastern, and central Atlantic, including all of the above threatened nesting sites with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. He concluded that all sites in the central and western Atlantic showed increased nesting with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic Ocean. However, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007c).

By far, the most important nesting concentration for green sea turtles in the western Atlantic is in Tortuguero, Costa Rica (NMFS and USFWS 2007c). Nesting in the area has increased considerably since the 1970s and nest count data from 1999-2003 suggest nesting by 17,402-37,290 females per year (NMFS and USFWS 2007c). The number of females nesting per year on beaches in the Yucatán, at Aves Island, Galibi Reserve, and Isla Trindade number in the hundreds to low thousands, depending on the site (NMFS and USFWS 2007c).

The status of the endangered Florida breeding population was also evaluated in the 5-year review (NMFS and USFWS 2007d). The pattern of green sea turtle nesting shows biennial peaks in abundance, with a generally positive trend since establishment of the Florida index beach surveys in 1989. This trend is perhaps due to increased protective legislation throughout the Caribbean (Meylan *et al.* 1995), as well as protections in Florida and throughout the United States (NMFS and USFWS 2007c).

The statewide Florida surveys (2000-2006) have shown that a mean of approximately 5,600 nests are laid annually in Florida, with a low of 581 in 2001 to a high of 9,644 in 2005 (NMFS and USFWS 2007c). Most nesting occurs along the east coast of Florida, but occasional nesting has been documented along the Gulf coast of Florida, at Southwest Florida beaches, as well as the beaches in the Florida Panhandle (Meylan *et al.* 1995). More recently, green sea turtle nesting occurred on Bald Head Island, North Carolina (just east of the mouth of the Cape Fear River), Onslow Island, and Cape Hatteras National Seashore. One green sea turtle nested on a beach in Delaware in 2011, although its occurrence was considered very rare.

Threats

Green sea turtles face many of the same natural threats as loggerhead and Kemp's ridley sea turtles. In addition, green sea turtles appear to be particularly susceptible to fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtle's body. Juveniles appear to be most affected in that they have the highest incidence of disease and the most extensive lesions, whereas lesions in nesting adults are rare. Also, green sea turtles frequenting nearshore waters, areas adjacent to large human populations, and areas with low water turnover, such as lagoons, have a higher incidence of the disease than individuals in deeper, more remote waters. The occurrence of fibropapilloma tumors may result in impaired foraging, breathing, or swimming ability, leading potentially to death (George 1997).

As with the other sea turtle species, incidental fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches. Witherington *et al*. (2009) observes that because green sea turtles spend a shorter time in oceanic waters and as older juveniles occur on shallow seagrass pastures (where benthic trawling is unlikely), they avoid high mortalities in pelagic longline and benthic trawl fisheries. Although the relatively low number of observed green sea turtle captures makes it difficult to estimate bycatch rates and annual take levels, green sea turtles have been observed captured in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and mid-Atlantic trawl and gillnet fisheries. Murray (2009a) also lists five observed captures of green turtle in Mid-Atlantic sink gillnet gear between 1995 and 2006.

Finkbeiner *et al*. (2011) compiled cumulative sea turtle bycatch information in U.S. fisheries from 1990 through 2007, before and after implementation of bycatch mitigation measures. Information was obtained from peer reviewed publications and NMFS documents (e.g., Biological Opinions and bycatch reports). In the Atlantic, a mean estimate of 137,700 bycatch interactions, of which 4,500 were mortalities, occurred annually (since implementation of bycatch mitigation measures). Kemp's ridleys interacted with fisheries most frequently, with the highest level of mean annual mortality (2,700), followed by loggerheads (1,400), greens (300), and leatherbacks (40). The Southeast/Gulf of Mexico shrimp trawl fishery was responsible for the vast majority of U.S. interactions (up to 98%) and mortalities (more than 80%). While this provides an initial cumulative bycatch assessment, there are a number of caveats that should be considered when interpreting this information, such as sampling inconsistencies and limitations.

Other activities like channel dredging, marine debris, pollution, vessel strikes, power plant impingement, and habitat destruction account for an unquantifiable level of other mortality. Stranding reports indicate that between 200-400 green sea turtles strand annually along the eastern U.S. coast from a variety of causes most of which are unknown (STSSN database).

As highly migratory, wide-ranging organisms that are biologically tied to temperature regimes, green sea turtles are vulnerable to effects of climate change in aspects of their physiology and behavior (Van Houtan 2011). Analysis on potential effects of climate change on green sea turtles in the action area is included below in section 7.0.

Summary of Status of Green Sea Turtles

A review of 32 Index Sites[3] distributed globally revealed a 48-67% decline in the number of mature females nesting annually over the last three generations[4] (Seminoff 2004). An evaluation of green sea turtle nesting sites was also conducted as part of the 5-year status review of the species (NMFS and USFWS 2007c). Of the 23 threatened nesting groups assessed in that report for which nesting abundance trends could be determined, ten were considered to be increasing, nine were considered stable, and four were considered to be decreasing (NMFS and USFWS 2007d). Nesting groups were considered to be doing relatively well (the number of sites with increasing nesting were greater than the number of sites with decreasing nesting) in the Pacific, western Atlantic, and central Atlantic (NMFS and USFWS 2007c). However, nesting populations were determined to be doing relatively poorly in Southeast Asia, eastern Indian Ocean, and perhaps the Mediterranean. Overall, based on mean annual reproductive effort, the report estimated that 108,761 to 150,521 females nest each year among the 46 threatened and endangered nesting sites included in the evaluation (NMFS and USFWS 2007c). However, given the late age to maturity for green sea turtles, caution is urged regarding the status for any of the nesting groups since no area has a dataset spanning a full green sea turtle generation (NMFS and USFWS 2007c).

Seminoff (2004) and NMFS and USFWS (2007c) made comparable conclusions with regard to nesting for four nesting sites in the western Atlantic that indicate sea turtle abundance is increasing in the Atlantic Ocean. Each also concluded that nesting at Tortuguero, Costa Rica represented the most important nesting area for green sea turtles in the western Atlantic and that nesting had increased markedly since the 1970s (Seminoff 2004; NMFS and USFWS 2007c).

However, the 5-year review also noted that the Tortuguero nesting stock continued to be affected by ongoing directed take at their primary foraging area in Nicaragua (NMFS and USFWS 2007c). The endangered breeding population in Florida appears to be increasing based upon index nesting data from 1989-2010 (NMFS 2011).

As with the other sea turtle species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like hopper dredging, pollution, and habitat destruction account for an unknown level of other mortality. Based on its 5-year status review of the species, NMFS and USFWS (2007c) determined that the listing classification for green sea turtles should not be changed. However, it was also determined that an analysis and review of the species should be conducted in the future to determine whether DPSs should be identified (NMFS and USFWS 2007c).

Based on this and the current best available information, we believe that the green sea turtle population is currently stable; as protective measures for sea turtles are currently in place and continue to be implemented, we expect this trend to continue or over the next 2 years. This stable

[3] The 32 Index Sites include all of the major known nesting areas as well as many of the lesser nesting areas for which quantitative data are available.

[4] Generation times ranged from 35.5 years to 49.5 years for the assessment depending on the Index Beach site

trend is based solely on information we have on nesting trends. The number of sea turtles comprising the neritic and oceanic life stages of the population is currently unknown. As a result, the status and future trend of the population as a whole remains unclear. Therefore, until information and data become available on the numbers of individuals comprising the neritic and oceanic life stages, nesting trends represent the best available information and serve as the best representative of the population's trend.

4.2 Status of Large Whales

All of the cetacean species considered in this Opinion were once the subject of commercial whaling, which likely caused their initial decline. Commercial whaling for right whales along the U.S. Atlantic coast peaked in the 18th century, but right whales continued to be taken opportunistically along the coast and in other areas of the North Atlantic into the early 20th century (Kenney 2002). Worldwide, humpback whales were often the first species to be targeted and frequently hunted to commercial extinction (Clapham *et al.* 1999), meaning that their numbers had been reduced so low by commercial exploitation that it was no longer profitable to target the species. Wide-scale exploitation of the more offshore fin whale occurred later with the introduction of steam-powered vessels and harpoon gun technology (Perry *et al.* 1999). 1999). Fin whales were given total protection in the North Atlantic in 1987, with the exception of an aboriginal subsistence whaling hunt for Greenland (Gambell 1993, Caulfield 1993). Sei whales became the target of modern commercial whalers in the late 19th and early 20th centuries after populations of other whales, including right, humpback, fin, and blue, had already been depleted. The species continued to be exploited in Iceland until 1986, even though measures to stop whaling of sei whales had been enacted in the 1970s (Perry *et al.* 1999). 1999). However, Iceland has increased its whaling activities in recent years and reported a catch of 136 whales in the 1988/89 and 1989/90 seasons (Perry *et al.* 1999), seven in 2006/07, and 273 in 2009/2010. In 2011 and 2012, Iceland temporarily suspended commercial whaling for fin whales due to decreased demand from Japan, but is expected to have resumed in 2013. Today, the greatest known threats to these cetaceans are ship strikes and gear interactions, although the number of each species affected by these activities does vary.

Information on the range-wide status of each species as it is listed under the ESA is included here to provide the reader with information on the status of each species. Additional background information on the range-wide status of these species can be found in a number of published documents, including recovery plans (NMFS 1991a, b; 2005a), the Marine Mammal Stock Assessment Reports (SAR) (*e.g.*, Waring *et al.* 2013), status reviews (*e.g.*, Conant *et al.* 2009), and other publications (*e.g.* Clapham *et al.* 1999; Perry *et al.* 1999; Best *et al.* 2001).

4.2.1 North Atlantic Right Whale

Historically, right whales have occurred in all the world's oceans from temperate to subarctic latitudes (Perry *et al.* 1999). In both southern and northern hemispheres, they are observed at low latitudes and in nearshore waters where calving takes place in the winter months, and in higher latitude foraging grounds in the summer (Clapham *et al.* 1999; Perry *et al.* 1999).

The North Atlantic right whale (*Eubalaena glacialis*) has been listed as endangered under the

ESA since 1973. Originally called the "northern right whale," it was listed as endangered under the Endangered Species Conservation Act, the precursor to the ESA in June 1970. The species is also designated as depleted under the Marine Mammal Protection Act (MMPA).

In December 2006, NMFS completed a comprehensive review of the status of right whales in the North Atlantic and North Pacific Oceans. Based on the findings from the status review, NMFS concluded that right whales in the Northern Hemisphere exist as two species: North Atlantic right whale (*Eubalaena glacialis*) and North Pacific right whale (*Eubalaena japonica*). NMFS determined that each of the species is in danger of extinction throughout its range. In 2008, based on the status review, NMFS listed the endangered northern right whale (*Eubalaena spp.*) as two separate endangered species: the North Atlantic right whale (*E. glacialis*) and North Pacific right whale (*E. japonica*) (73 FR 12024; March 6, 2008).

The International Whaling Commission (IWC) recognizes two right whale populations in the North Atlantic: a western and eastern population (IWC 1986). It is thought that the eastern population migrated along the coast from northern Europe to northwest Africa. The current distribution and migration patterns of the eastern North Atlantic right whale population, if extant, are unknown. Sighting surveys from the eastern Atlantic Ocean suggest that right whales present in this region are rare (Best *et al.*, 2001) and it is unclear whether a viable population in the eastern North Atlantic still exists (Brown 1986, NMFS 1991a). Photo-identification work has shown that some of the whales observed in the eastern Atlantic were previously identified as western Atlantic right whales (Kenney 2002). This Opinion will focus on the western North Atlantic right whale (*Eubalaena glacialis*), which occurs in the action area.

Habitat and Distribution

Western North Atlantic right whales generally occur from the southeast U.S. to Canada (*e.g.*, Bay of Fundy and Scotian Shelf) (Kenney 2002; Waring *et al.* 2013). Like other right whale species, they follow an annual pattern of migration between low latitude winter calving grounds and high latitude summer foraging grounds (Perry *et al.* 1999; Kenney 2002).

The distribution of right whales seems linked to the distribution of their principal zooplankton prey, calanoid copepods (Winn *et al.* 1986; NMFS 2005a; Baumgartner and Mate 2005; Waring *et al.* 2012). Right whales are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill *et al.* 1986; Watkins and Schevill 1982) and in the Great South Channel in May and June (Kenney *et al.* 1986; Payne *et al.* 1990; Kenney *et al.* 1995; Kenney 2001) where they have been observed feeding predominantly on copepods of the genera *Calanus* and *Pseudocalanus* (Baumgartner and Mate 2005; Waring *et al.* 2011). Right whales also frequent Stellwagen Bank and Jeffreys Ledge, as well as Canadian waters including the Bay of Fundy and Browns and Baccaro banks in the summer through fall (Mitchell *et al.* 1986; Winn *et al.* 1986; Stone *et al.* 1990). The consistency with which right whales occur in such locations is relatively high, but these studies also note high interannual variability in right whale use of some habitats. Calving is known to occur in the winter months in coastal waters off of Georgia and Florida (Kraus *et al.* 1988). Calves have also been sighted off the coast of North Carolina during winter months, suggesting the calving grounds may extend as far north as Cape Fear, NC. In the North Atlantic, it appears that not all reproductively active females return to the calving grounds each year (Kraus *et al.* 1986; Payne 1986). Patrician *et al.* (2009) analyzed photographs of a right whale calf sighted in the Great South Channel in June 2007 and determined the calf appeared too young to have been born in the known southern calving area. Although it is possible the female traveled south to New Jersey or Delaware to give birth, evidence suggests that calving in waters off the northeastern U.S. is possible.

The location of some portion of the population during the winter months remains unknown (NMFS 2005a). However, recent aerial surveys conducted under the North Atlantic Right Whale Sighting Survey (NARWSS) program have indicated that some individuals may reside in the northern Gulf of Maine during the winter. In 2008, 2009, 2010, and 2011, right whales were sighted on Jeffreys and Cashes Ledges, Stellwagen Bank, and Jordan Basin during December to February (Khan *et al.* 2009, 2010, 2011, 2012). Results from winter surveys and passive acoustic studies suggest that animals may be dispersed in several areas including Cape Cod Bay (Brown *et al.* 2002) and offshore waters of the southeastern U.S. (Waring *et al.* 2012). On multiple days in December 2008, congregations of more than 40 individual right whales were observed in the Jordan Basin area of the Gulf of Maine, leading researchers to believe this may be a wintering ground (NOAA 2008). Telemetry data have shown lengthy and somewhat distant excursions into deep water off the continental shelf (Mate *et al.* 1997) as well as extensive movements over the continental shelf during the summer foraging period (Mate *et al.* 1992; Mate *et al.* 1997; Bowman 2003; Baumgartner and Mate 2005). Knowlton *et al.* (1992) reported several long-distance movements as far north as Newfoundland, the Labrador Basin, and southeast of Greenland; in addition, resightings of photographically identified individuals have been made off Iceland, arctic Norway, and in the old Cape Farewell whaling ground east of Greenland. The Norwegian sighting (September 1999) is one of only two sightings in the 20^{th} century of a right whale in Norwegian waters, and the first since 1926. Together, these long-range matches indicate an extended range for at least some individuals and perhaps the existence of important habitat areas not presently well described. Similarly, records from the Gulf of Mexico (Moore and Clark 1963; Schmidly *et al.* 1972) represent either geographic anomalies or a more extensive historic range beyond the sole known calving and wintering ground in the southeastern United States. The frequency with which right whales occur in offshore waters in the southeastern United States remains unclear (Waring *et al.* 2012).

Abundance Estimates and Trends

An estimate of the pre-exploitation population size for the North Atlantic right whale is not available. As is the case with most wild animals, an exact count of North Atlantic right whales cannot be obtained. However, abundance can be reasonably estimated as a result of the extensive study of western North Atlantic right whale population. IWC participants from a 1999 workshop agreed to a minimum direct-count estimate of 263 right whales alive in 1996 and noted that the true population was unlikely to be much greater than this estimate (Best *et al.* 2001). Based on a census of individual whales using photo-identification techniques and an assumption of mortality for those whales not seen in seven years, a total of 299 right whales was estimated in 1998 (Kraus *et al.* 2001), and a review of the photo-ID recapture database on October 21, 2011 indicated that 425 individually recognized whales were known to be alive during 2009 (Waring *et al.* 2013). Whales catalogued by this date included 20 of the 39 calves born during that year. Adding the 19 calves not yet catalogued brings the minimum number alive in 2009 to 444. This number represents a minimum population size. The minimum number alive population index for the years 1990-2009 suggests a positive and slowly accelerating trend in population size. These data reveal a significant increase in the number of catalogued whales with a geometric mean growth rate for the period of 2.6% (Waring *et al.* 2013).

A total of 316 right whale calves were born from 1993 to 2010 (Waring *et al.* 2012). The mean calf production for this 18-year period is estimated to be 17.5/year (Waring *et al.* 2012). Calving numbers have been variable, with large differences among years, including a second largest calving season in 2000/2001 with 31 right whale births (Waring *et al.* 2012). The three calving years (97/98; 98/99; 99/00) prior to this record year provided low recruitment levels with only 11 calves born. The 2000-2010 calving seasons were remarkably better with 31, 21, 19, 17, 28, 19, 23, 23, 39, and 19 births, respectively (Waring *et al.* 2012). However, the western North Atlantic stock has also continued to experience losses of calves, juveniles, and adults.

As is the case with other mammalian species, there is an interest in monitoring the number of females in this western North Atlantic right whale population since their numbers will affect the population trend (whether declining, increasing or stable). Kraus *et al.* (2007) reported that, as of 2005, 92 reproductively-active females had been identified, and Schick *et al.* (2009) estimated 97 breeding females. From 1983 to 2005, the number of new mothers recruited to the population (with an estimated age of 10 for the age of first calving), varied from 0-11 each year with no significant increase or decline over the period (Kraus *et al.* 2007). By 2005, 16 right whales had produced at least six calves each, and four cows had at least seven calves. Two of these cows were at an age that indicated a reproductive life span of at least 31 years (Kraus *et al.* 2007). As described above, the 2000/2001-2006/2007 calving seasons had relatively high calf production and have included several first time mothers (*e.g.*, eight new mothers in 2000/2001). However, over the same time period, there have been continued losses to the western North Atlantic right whale population, including the death of mature females, as a result of anthropogenic mortality (like that described in Henry *et al.* 2011, below). Of the 12 serious injuries and mortalities in 2005-2009, at least six were adult females, three of which were carrying near-term fetuses and four of which were just starting to bear calves (Waring *et al.* 2011). Since the average lifetime calf production is 5.25 calves (Fujiwara and Caswell 2001), the deaths of these six females represent a loss of reproductive potential of as many as 32 animals. However, it is important to note that not all right whale mothers are equal with regards to calf production. Right whale #1158 had only one recorded calf over a 25-year period (Kraus *et al.* 2007). In contrast, one of the largest right whales on record, "Stumpy," as a prolific breeder, successfully rearing calves in 1980, 1987, 1990, 1993, and 1996 (Moore *et al.* 2007). Stumpy was killed in February 2004 of an apparent ship strike (NMFS 2006a). At the time of her death, she was estimated to be 30 years of age and carrying her sixth calf; the near-term fetus also died (NMFS 2006a).

Abundance estimates are an important part of assessing the status of the species. However, for section 7 purposes, the population trend (*i.e.,* whether increasing or declining) provides better information for assessing the effects of a proposed action on the species. As described in previous Opinions, data collected in the 1990s suggested that right whales were experiencing a slow but steady recovery (Knowlton *et al.* 1994). However, Caswell *et al.* (1999) used photo-identification data and modeling to estimate survival and concluded that right whale survival decreased from 1980 to 1994. Modified versions of the Caswell *et al.* (1999) model as well as several other models were reviewed at the 1999 IWC workshop (Best *et al.* 2001). Despite differences in approach, all of the models indicated a decline in right whale survival in the 1990s with female survival particularly affected (Best *et al.* 2001). In 2002, NMFS NEFSC hosted a workshop to review right whale population models to examine: (1) potential bias in the models, and (2) changes in the subpopulation trend based on new information collected in the late 1990s (Clapham *et al.* 2002). Three different models were used to explore right whale survivability and to address potential sources of bias. Although biases were identified that could negatively affect the results, all three modeling techniques resulted in the same conclusion: survival has continued to decline and seems to be affecting females disproportionately (Clapham *et al.* 2002). Increased mortalities in 2004 and 2005 were cause for serious concern (Kraus *et. al* 2005). Calculations indicate that this increased mortality rate would reduce population growth by approximately 10% per year (Kraus *et. al* 2005), in conflict with the 2.6% positive trend from 1990-2009 noted above by Waring *et al.* (2013). Despite the preceding, examination of the minimum number alive population index calculated from the individual sightings database for the years 1990-2009 suggest a positive and slowly accelerating trend in population size (Waring *et al.* 2013). These data reveal a significant increase in the number of catalogued right whales alive during this period (Waring *et al.* 2013). Recently, NMFS NEFSC developed a population viability analysis (PVA) to examine the influence of anthropogenic mortality reduction on the recovery prospects for the species (Pace, unpublished). The PVA evaluated how the populations would fare without entanglement mortalities as compared to the status quo. Only two of 1,000 projections (with the status quo simulation) ended with a smaller total population size than they started, and no projections resulted in extinction. As described above, the mean growth rate estimated in the latest stock assessment report was 2.6% (Waring *et al.* 2012).

Reproduction
Healthy reproduction is critical for the recovery of the North Atlantic right whale (Kraus *et al.* 2007). Researchers have suggested that the population has been affected by a decreased reproductive rate (Best *et al.* 2001; Kraus *et al.* 2001). Kraus *et al.* (2007) reviewed reproductive parameters for the period 1983-2005, and estimated calving intervals to have changed from 3.5 years in 1990 to more than five years between 1998-2003, and then decreased to just over three years in 2004 and 2005.

Factors that have been suggested as affecting the right whale reproductive rate include reduced genetic diversity (and/or inbreeding), contaminants, biotoxins, disease, and nutritional stress. Although it is believed that a combination of these factors is likely affecting right whales (Kraus *et al.* 2007), there is currently no evidence to support this. The dramatic reduction in the North Atlantic right whale population due to commercial whaling may have resulted in a loss of genetic diversity that could affect the ability of the current population to successfully reproduce (*i.e.*, decreased conceptions, increased abortions, and increased neonate mortality). One hypothesis is that the low level of genetic variability in this species produces a high rate of mate incompatibility and unsuccessful pregnancies (Frasier *et al.* 2007). Analyses are currently underway to assess this relationship further and to examine the influence of genetic characteristics on the potential for species recovery (Frasier *et al.* 2007). Studies by Schaeff *et al.* (1997) and Malik *et al.* (2000) indicate that western North Atlantic right whales are less genetically diverse than southern right whales. Similarly, while contaminant studies have confirmed that right whales are exposed to and accumulate contaminants, researchers could not conclude that these contaminant loads were negatively affecting right whale reproductive success since PCB and DDT concentrations were lower than those found in other affected marine mammals (Weisbrod *et al.* 2000). Another suite of contaminants (i.e. antifouling agents and flame retardants) that disrupt reproductive patterns and have been found in other marine animals, raises new concerns (Kraus *et al.* 2007). Recent data also support a hypothesis that chromium, an industrial pollutant, may be a concern for the health of the North Atlantic right whales and that inhalation may be an important exposure route (Wise *et al.* 2008).

A number of diseases could be also affecting reproduction, although tools for assessing disease factors in free-swimming large whales currently do not exist (Kraus *et al.* 2007). Once developed, such methods may allow for the evaluation of diseases on right whales. Impacts of biotoxins on marine mammals are also poorly understood, yet there is some data showing that marine algal toxins may play significant roles in mass mortalities of large whales (Rolland *et al.* 2007). Although there are no published data concerning the effects of biotoxins on right whales, researchers conclude that right whales are being exposed to measurable quantities of paralytic shellfish poisioning (PSP) toxins and domoic acid via trophic transfer from their prey upon which they feed (Durbin *et al.* 2002, Rolland *et al.* 2007).

Data on food-limitation are difficult to evaluate (Kraus *et al.* 2007). North Atlantic right whales seem to have thinner blubber than right whales from the South Atlantic (Kenney 2002; Miller *et al.* (2011). Miller *et al.* (2011) suggests that lipids in the blubber are used as energetic support for reproduction in female right whales. In the same study, blubber thickness was also compared among years of differing prey abundances. During a year of low prey abundance, right whales had significantly thinner blubber than during years of greater prey abundance. The results suggest that blubber thickness is indicative of right whale energy balance and that the marked fluctuations in the North Atlantic right whale reproduction have a nutritional component (Miller *et al.* (2011)).

Modeling work by Caswell *et al.* (1999) and Fujiwara and Caswell (2001) suggests that the North Atlantic Oscillation (NAO), a naturally occurring climatic event, affects the survival of mothers and the reproductive rate of mature females, and Clapham et al (2002) also suggests it affects calf survival. Greene *et al.* (2003) described the potential oceanographic processes linking climate variability to reproduction of North Atlantic right whales. Climate-driven changes in ocean circulation have had a significant impact on the plankton ecology of the Gulf of Maine, including effects on *Calanus finmarchicus*, a primary prey resource for right whales. Researchers found that during the 1980s, when the NAO index was predominately positive, *C. finmarchicus* abundance was also high; when a record drop occurred in the NAO index in 1996, *C. finamarchicus* abundance levels also decreased significantly. Right whale calving rates since the early 1980s seem to follow a similar pattern, where stable calving rates were noted from 1982-1992, but then two major, multi-year declines occurred from 1993 to 2001, consistent with the drops in copepod abundance. It has been hypothesized that right whale calving rates are a function of both food availability and the number of females available to reproduce (Greene *et al.* 2003; Greene and Pershing 2004). Such findings suggest that future climate change may emerge as a significant factor influencing the recovery of right whales. Some believe the effects of increased climate variability on right whale calving rates should be incorporated into future modeling studies so that it may be possible to determine how sensitive right whale population numbers are to variable climate forcing (Greene and Pershing 2004).

Anthropogenic Mortality
The potential biological removal (PBR)[5] for the Western Atlantic stock of North Atlantic right whale is 0.9 (Waring *et al.* 2013). Right whale recovery is negatively affected by anthropogenic mortality. From 2006 to 2010, right whales had the highest proportion relative to their population of reported entanglement and ship strike events of any species (Waring *et al.* 2012). Given the small population size and low annual reproductive rate of right whales, human sources of mortality may have a greater effect on population growth rate than for other large whale species (Waring *et al.* 2012). For the period 2006-2010, the annual human-caused mortality and serious injury rate for the North Atlantic right whale averaged 3.0 per year (2.4 in U.S. waters; 0.6 in Canadian waters) (Waring *et al.* 2013). Nineteen confirmed right whale mortalities were reported along the U.S. East Coast and adjacent Canadian Maritimes from 2006 to 2010 (Henry *et al.* 2012). These numbers represent the minimum values for serious injury and mortality for this period. Given the range and distribution of right whales in the North Atlantic, and the fact that positively buoyant species like right whales may become negatively buoyant if injury prohibits effective feeding for prolonged periods, it is highly unlikely that all carcasses will be observed (Moore *et. al.* 2004; Glass *et al.* 2009). Moreover, carcasses floating at sea often cannot be examined sufficiently and may generate false negatives if they are not towed to shore for further necropsy (Glass *et al.* 2009). Decomposed and/or unexamined animals represent lost data, some of which may relate to human impacts (Waring *et al.* 2012).

Considerable effort has been made to examine right whale carcasses for the cause of death (Moore *et al.* 2004). Examination is not always possible or conclusive because carcasses may be discovered floating at sea and cannot be retrieved, or may be in such an advanced stage of decomposition that a complete examination is not possible. Wave action and post-mortem predation by sharks can also damage carcasses, and preclude a thorough examination of all body parts. It should be noted that mortality and serious injury event judgments are based upon the best available data and later information may result in revisions (Henry *et al.* 2012). Of the 19 total confirmed right whale mortalities (2006-2010) described in Henry *et al.* (2012), four were confirmed to be entanglement mortalities and five were confirmed to be ship strike mortalities. Serious injury involving right whales was documented for five entanglement events and one ship strike event.

Although disentanglement is often unsuccessful or not possible for many cases, there were at least two documented cases of entanglements for which the intervention of disentanglement teams averted a likely serious injury from 2006 to 2010 (Waring *et al.* 2012). Even when entanglement or vessel collision does not cause direct mortality, it may weaken or compromise an individual so that subsequent injury or death is more likely (Waring *et. al* 2012). Some right

5 Potential biological removal is the product of minimum population size, one-half the maximum net productivity rate and a “recovery” factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population.

whales that have been entangled were later involved in ship strikes (Hamilton *et al.* 1998) suggesting that the animal may have become debilitated by the entanglement to such an extent that it was less able to avoid a ship. Similarly, skeletal fractures and/or broken jaws sustained during a vessel collision may heal, but then compromise a whale's ability to efficiently filter feed (Moore *et al.* 2007). A necropsy of right whale #2143 ("Lucky") found dead in January 2005 suggested the animal (and her near-term fetus) died after healed propeller wounds from a ship strike re-opened and became infected as a result of pregnancy (Moore *et al.* 2007, Glass *et al.* 2008). Sometimes, even with a successful disentanglement, an animal may die of injuries sustained by fishing gear (e.g. RW #3107) (Waring *et al.* 2012).

Entanglement records from 1990 to 2010 maintained by NMFS include 74 confirmed right whale entanglement events (Waring *et al.* 2012). Because whales often free themselves of gear following an entanglement event, scarification analysis of living animals may provide better indications of fisheries interactions rather than entanglement records (Waring *et al.* 2012). Data presented in Knowlton *et al.* 2008 indicate the annual rate of entanglement interaction remains at high levels. Four hundred and ninety-three individual, catalogued right whales were reviewed and 625 separate entanglement interactions were documented between 1980 and 2004. Approximately 358 out of 493 animals (72.6% of the population) were entangled at least once; 185 animals bore scars from a single entanglement, however one animal showed scars from six different entanglement events. The number of male and female right whales bearing entanglement scars was nearly equivalent (142/202 females, 71.8%; 182/224 males, 81.3%), indicating that right whales of both sexes are equally vulnerable to entanglement. However, juveniles appear to become entangled at a higher rate than expected if all age groups were equally vulnerable. For all years but one (1998), the proportion of juvenile, entangled right whales exceeded their proportion within the population. Based on photographs of catalogued animals from 1935 through 1995, Hamilton *et al.* (1998) estimated that 6.4% of the North Atlantic right whale population exhibits signs of injury from vessel strikes.

Right whales are expected to be affected by climate change; however, no significant climate change-related impacts to right whales have been observed to date. The impact of climate change on cetaceans is likely to be related to changes in sea temperatures, potential freshening of sea water due to melting ice and increased rainfall, sea level rise, the loss of polar habitats, and the potential decline of forage.

The North Atlantic right whale currently has a range of sub-polar to sub-tropical waters. An increase in water temperature would likely result in a northward shift of range, with both the northern and southern limits moving poleward. The northern limit, which may be determined by feeding habitat and the distribution of preferred prey, may shift to a greater extent than the southern limit, which requires ideal temperature and water depth for calving. This may result in an unfavorable effect on the North Atlantic right whale due to an increase in the length of migrations (MacLeod 2009) or a favorable effect by allowing them to expand their range.

The indirect effects to right whales that may be associated with sea level rise are the construction of sea-wall defenses and protective measures for coastal habitats, which may impact coastal marine species and may interfere with migration (Learmonth *et al.* 2006). The effect of sea level rise to cetaceans is likely negligible.

The direct effects of increased CO_2 concentrations, and associated decrease in pH (ocean acidification), on marine mammals are unknown (Learmonth *et al.* 2006). Marine plankton is a vital food source for many marine species. Studies have demonstrated adverse impacts from ocean acidification on the ability of free-swimming zooplankton to maintain protective shells as well as a reduction in the survival of larval marine species. A decline in marine plankton could have serious consequences for the marine food web.

Summary of Right Whale Status

In March 2008, NMFS listed the North Atlantic right whale as a separate, endangered species (*Eubalaena glacialis*) under the ESA. This decision was based on an analysis of the best scientific and commercial data available, taking into consideration current population trends and abundance, demographic risk factors affecting the continued survival of the species, and ongoing conservation efforts. NMFS determined that the North Atlantic right whale is in danger of extinction throughout its range because of: (1) overuse for commercial, recreational, scientific, or educational purposes; (2) the inadequacy of existing regulatory mechanisms; and (3) other natural and manmade factors affecting its continued existence.

Previous models estimated that the right whale population in the Atlantic numbered 300 (+/- 10%) (Best *et al.* 2001). However, an October 2011 review of the photo-ID recapture database indicated that 444 individually recognized right whales were known to be alive in 2009 (Waring *et al.* 2013). The 2000/2001-2009/2010 calving seasons had relatively high calf production (31, 21, 19, 17, 28, 19, 23, 23, 39, and 19 calves, respectively) and included additional first time mothers (*e.g.*, eight new mothers in 2000/2001) (Waring *et al.* 2009, 2012).

Over the five-year period 2006-2010, 55 confirmed events involved right whales, 33 were confirmed entanglements and 13 were confirmed ship strikes. There were 19 verified right whale mortalities, four due to entanglements, and five due to ship strikes (Henry *et al.* 2012). This represents an absolute minimum number of the right whale mortalities for this period. Given the range and distribution of right whales in the North Atlantic, it is highly unlikely that all carcasses will be observed. Scarification analysis indicates that some whales do survive encounters with ships and fishing gear. However, the long-term consequences of these interactions are unknown. Right whale recovery is negatively affected by human causes of mortality. This mortality appears to have a greater impact on the population growth rate of right whales, compared to other baleen whales in the western North Atlantic, given the small population size and low annual reproductive rate of right whales (Waring *et al.* 2012).

A variety of modeling exercises and analyses indicate that survival probability declined in the 1990s (Best *et al.* 2001), and mortalities in 2004-2005, including a number of adult females, also suggested an increase in the annual mortality rate (Kraus *et al.* 2005). Nonetheless, a census of the minimum number alive population index calculated from the individual sightings database as of October 21, 2011 for the years 1990-2009 suggest a positive trend in numbers of right whales (Waring *et al.* 2013). In addition, calving intervals appear to have declined to three years in recent years (Kraus *et al.* 2007), and calf production has been relatively high over the past several seasons.

4.2.2 Humpback Whale

Humpback whales inhabit all major ocean basins from the equator to subpolar latitudes. With the exception of the northern Indian Ocean population, they generally follow a predictable migratory pattern in both southern and northern hemispheres, feeding during the summer in the higher near-polar latitudes and migrating to lower latitudes in the winter where calving and breeding takes place (Perry *et al.* 1999). Humpbacks are listed as endangered under the ESA at the species level and are considered depleted under the MMPA. Therefore, information is presented below regarding the status of humpback whales throughout their range.

North Pacific, Northern Indian Ocean, and Southern Hemisphere

Humpback whales in the North Pacific feed in coastal waters from California to Russia and in the Bering Sea. They migrate south to wintering destinations off Mexico, Central America, Hawaii, southern Japan, and the Philippines (Carretta *et al.* 2011). Although the IWC only considered one stock (Donovan 1991) there is evidence to indicate multiple populations migrating between their summer/fall feeding areas to winter/spring calving and mating areas within the North Pacific Basin (Angliss and Outlaw 2007, Carretta *et al.* 2011).

NMFS recognizes three management units within the U.S. EEZ in the Pacific for the purposes of managing this species under the MMPA. These are: the California-Oregon-Washington stock (feeding areas off the U.S. west coast), the central North Pacific stock (feeding areas from Southeast Alaska to the Alaska Peninsula) and the western North Pacific stock (feeding areas from the Aleutian Islands, the Bering Sea, and Russia) (Carretta *et al.* 2011). Because fidelity appears to be greater in feeding areas than in breeding areas, the stock structure of humpback whales is defined based on feeding areas (Carretta *et al.* 2011). Recent research efforts via the Structure of Populations, Levels of Abundance, and Status of Humpback Whales (SPLASH) Project estimate the abundance of humpback whales to be just under 20,000 whales for the entire North Pacific, a number that doubles previous population predictions (Calambokidis *et al.* 2008). There are indications that the California-Oregon-Washington stock was growing in the 1980s and early 1990s, with a best estimate of 8% growth per year (Carretta *et al.* 2011). The best available estimate for the California-Oregon-Washington stock is 2,043 whales (Carretta *et al.* 2011). The central North Pacific stock is estimated at 4,005 (Allen and Angliss 2011), and various studies report that it appears to have increased in abundance at rates between 6.6%-10% per year (Allen and Angliss 2011). Although there is no reliable population trend data for the western North Pacific stock, as surveys of the known feeding areas are incomplete and many feeding areas remain unknown, minimum population size is currently estimated at 732 whales (Allen and Angliss 2011).

The Northern Indian Ocean population of humpback whales consists of a resident stock in the Arabian Sea, which apparently does not migrate (Minton *et al.* 2008). The lack of photographic matches with other areas suggests this is an isolated subpopulation. The Arabian Sea subpopulation of humpback whales is geographically, demographically, and genetically isolated, residing year-round in sub-tropical waters of the Arabian Sea (Minton *et al.* 2008). Although potentially an underestimate due to small sample sizes and insufficient spatial and temporal coverage of the population's suspected range, based on photo-identification, the abundance estimate off the coast of Oman is 82 animals [60-111 95% confidence interval (CI)](Minton *et al.* 2008).

The Southern Hemisphere population of humpback whales is known to feed mainly in the Antarctic, although some have been observed feeding in the Benguela Current ecosystem on the migration route west of South Africa (Reilly *et al.* 2008). The IWC Scientific Committee recognizes seven major breeding stocks, some of which are tentatively further subdivided into substocks. The seven major breeding stocks, with their respective breeding ground estimates in parenthesis, include Southwest Atlantic (6,251), Southeast Atlantic (1,594), Southwestern Indian Ocean (5,965), Southeastern Indian Ocean (10,032), Southwest Pacific (7,472), Central South Pacific (not available), and Southeast Pacific (2,917) (Reilly *et al.* 2008). The total abundance estimate of 36,600 humpback whales for the Southern Hemisphere is negatively biased due to no available abundance estimate for the Central South Pacific subpopulation and only a partial estimate for the Southeast Atlantic subpopulation. Additionally, these abundance estimates have been obtained on each subpopulation's wintering grounds, and the possibility exists that the entire population does not migrate to the wintering grounds (Reilly *et al.* 2008).

Like other whales, Southern Hemisphere humpback whales were heavily exploited for commercial whaling. Although they were given protection by the IWC in 1963, Soviet-era whaling data made available in the 1990s revealed that 48,477 Southern Hemisphere humpback whales were taken from 1947 to 1980, contrary to the original reports to the IWC which accounted for the take of only 2,710 humpbacks (Zemsky *et al.* 1995; IWC 1995; Perry *et al.* 1999).

Gulf of Maine (North Atlantic)

Humpback whales from most Atlantic feeding areas calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod bays. Previously, the North Atlantic humpback whale population was treated as a single stock for management purposes, however due to the strong fidelity to the region displayed by many whales, the Gulf of Maine stock was reclassified as a separate feeding stock (Waring *et al.* 2012). The Gulf of St. Lawrence, Newfoundland/Labrador, western Greenland, Iceland, and northern Norway are the other regions that represent relatively discrete subpopulations. Sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge (CeTAP 1982) and peak in May and August. Small numbers of individuals may be present in this area, including the waters of Stellwagen Bank, year-round. They feed on small schooling fishes, particularly sand lance and Atlantic herring, targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales may also feed on euphausiids (krill) as well as on capelin (Waring *et al.* 2010; Stevick *et al.* 2006).

In winter, whales from waters off New England, Canada, Greenland, Iceland, and Norway migrate to mate and calve primarily in the West Indies, where spatial and genetic mixing among these groups occurs (Waring *et al.* 2012). Various papers (Clapham and Mayo 1990; Clapham

1992; Barlow and Clapham 1997; Clapham *et al.* 1999) summarize information gathered from a catalogue of photographs of 643 individuals from the western North Atlantic population of humpback whales. These photographs identified reproductively mature western North Atlantic humpbacks wintering in tropical breeding grounds in the Antilles, primarily on Silver and Navidad banks north of the Dominican Republic. The primary winter range also includes the Virgin Islands and Puerto Rico (NMFS 1991a).

Humpback whales use the Mid-Atlantic as a migratory pathway to and from the calving/mating grounds, but it may also be an important winter feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the Mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle *et al.* 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle *et al.* (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Identified whales using the Mid-Atlantic area were found to be residents of the Gulf of Maine and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding populations in the Mid-Atlantic region. Strandings of humpback whales have increased between New Jersey and Florida since 1985, consistent with the increase in Mid-Atlantic whale sightings. Strandings between 1985 and 1992 were most frequent September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley *et al.* 1995).

Abundance Estimates and Trends

Photographic mark-recapture analyses from the Years of the North Atlantic Humpback (YONAH) project gave an ocean-basin-wide estimate of 11,570 animals during 1992/1993 and an additional genotype-based analysis yielded a similar but less precise estimate of 10,400 whales (95% CI. = 8,000-13,600) (Stevick *et al.* 2003; Waring *et al.* 2013). For management purposes under the MMPA, the estimate of 11,570 individuals is regarded as the best available estimate for the North Atlantic population (Waring *et al.* 2012). The minimum population estimate for the Gulf of Maine stock is 823 whales, derived from a 2008 mark-recapture based count (Waring *et al.* 2013).

Population modeling, using data obtained from photographic mark-recapture studies, estimates the growth rate of the Gulf of Maine stock to be 6.5% for the period 1979-1991 (Barlow and Clapham 1997). More recent analysis for the period 1992-2000 estimated lower population growth rates ranging from 0% to 4.0%, depending on calf survival rate (Clapham *et al.* 2003 in Waring *et al.* 2012). However, it is unclear whether the apparent decline in growth rate is a bias result due to a shift in distribution documented for the period 1992-1995, or whether the population growth rates truly declined due to high mortality of young-of-the-year whales in U.S. Mid-Atlantic waters (Waring *et al.* 2012). Regardless, calf survival appears to have increased since 1996, presumably accompanied by an increase in population growth (Waring *et al.* 2012). Stevick *et al.* (2003) calculated an average population growth rate of 3.1% in the North Atlantic population overall for the period 1979-1993.

Anthropogenic Injury and Mortality

The PBR for the Gulf of Maine stock of humpback whale is 2.7. As with other large whales, the major known sources of anthropogenic mortality and injury of humpback whales occur from fishing gear entanglements and ship strikes. For the period 2006-2010, the minimum annual rate of human-caused mortality and serious injury to the Gulf of Maine humpback whale stock averaged 7.8 animals per year (U.S. waters, 7.2; Canadian waters, 0.6) (Waring *et al.* 2013). Between 2006 and 2010, humpback whales were involved in 101 confirmed entanglement events and 21 confirmed ship strike events (Henry *et al.* 2012). Over the five-year period, humpback whales were the most commonly reported entangled whale species; entanglements accounted for nine mortalities and 20 serious injuries (Henry *et al.* 2012). Of the 21 confirmed ship strikes, 10 of the events were fatal (Henry *et al.* 2012). It was assumed that all of these events involved members of the Gulf of Maine stock of humpback whales unless a whale was confirmed to be from another stock. In reports prior to 2007, only events involving whales confirmed to be members of the Gulf of Maine stock were included. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. Decomposed and/or unexamined animals (e.g., carcasses reported but not retrieved or no necropsy performed) represent 'lost data,' some of which may relate to human impacts (Henry *et al.* 2012; Waring *et al.* 2012).

Based on photographs taken from 2000-2002 of the caudal peduncle and fluke of humpback whales, Robbins and Mattila (2004) estimated that at least half (48-57%) of the sample (187 individuals) was coded as having a high likelihood of prior entanglement. Evidence suggests that entanglements have occurred at a minimum rate of 8-10% per year. Scars acquired by Gulf of Maine humpback whales between 2000 and 2002 suggest a minimum of 49 interactions with gear. Based on composite scar patterns, male humpback whales appear to be more vulnerable to entanglement than females. Males may be subject to other sources of injury that could affect scar pattern interpretation. Of the images obtained from a humpback whale breeding ground, 24% showed raw injuries, presumably a result from agonistic interactions. However, current evidence suggests that breeding ground interactions alone cannot explain the higher frequency of healed scar patterns among Gulf of Maine male humpback whales (Robbins and Matilla 2004).

Humpback whales, like other baleen whales, may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources resulting from a variety of activities including fisheries operations, vessel traffic, and coastal development. Currently, there is no evidence that these types of activities are affecting humpback whales. However, Geraci *et al.* (1989) provide strong evidence that a mass mortality of humpback whales in 1987-1988 resulted from the consumption of mackerel whose livers contained high levels of saxitoxin, a naturally occurring red tide toxin, the origin of which remains unknown. The occurrence of a red tide event may be related to an increase in freshwater runoff from coastal development, leading some observers to suggest that such events may become more common among marine mammals as coastal development continues (Clapham *et al.* 1999). There were three additional known cases of a mass mortality involving large whale species along the East Coast between 1998 and 2008. In the 2006 mass mortality event, 21 dead humpback whales were found between July 10 and December 31, 2006, triggering NMFS to declare an unusual mortality event (UME) for humpback whales in the Northeast United States.

The UME was officially closed on December 31, 2007 after a review of 2007 humpback whale strandings and mortality showed that the elevated numbers were no longer being observed. The cause of the 2006 UME is listed as “undetermined,” and the investigation has been closed, though could be re-opened if new information becomes available.

Changes in humpback whale distribution in the Gulf of Maine have been found to be associated with changes in herring, mackerel, and sand lance abundance associated with local fishing pressures (Stevick *et al.* 2006; Waring *et al.* 2012). Shifts in relative finfish species abundance correspond to changes in observed humpback whale movements (Stevick *et al.* 2006). However, whether humpback whales were adversely affected by these trophic changes is unknown.

Humpback whales are expected to be affected by climate change; however, no significant climate change-related impacts to humpback whales have been observed to date. The impact of climate change on cetaceans is likely to be related to changes in sea temperatures, potential freshening of sea water due to melting ice and increased rainfall, sea level rise, the loss of polar habitats, and the potential decline of forage.

Of the main factors affecting distribution of cetaceans, water temperature appears to be the main influence on geographic ranges of cetacean species (MacLeod 2009). Humpback whales are distributed in all water temperature zones, therefore, it is unlikely that their range will be directly affected by an increase in water temperature.

The indirect effects to humpback whales that may be associated with sea level rise are the construction of sea-wall defenses and protective measures for coastal habitats, which may impact coastal marine species and may interfere with migration (Learmonth *et al.* 2006). Cetaceans are unlikely to be directly affected by sea level rise, although important coastal bays for humpback breeding could be affected (IWC 1997).

The direct effects of increased CO_2 concentrations, and associated decrease in pH (ocean acidification), on marine mammals are unknown (Learmonth *et al.* 2006). Marine plankton is a vital food source for many marine species. Studies have demonstrated adverse impacts from ocean acidification on the ability of free-swimming zooplankton to maintain protective shells as well as a reduction in the survival of larval marine species.

Summary of Humpback Whale Status

The best available population estimate for humpback whales in the North Atlantic Ocean is 11,570 animals, and the best recent estimate for the Gulf of Maine stock is 823 whales (Waring *et al.* 2013). Anthropogenic mortality associated with fishing gear entanglements and ship strikes remains significant. In the winter, mating and calving occurs in areas located outside of the U.S. where the species is afforded less protection. Despite all of these factors, current data suggest that the Gulf of Maine humpback stock is steadily increasing in size (Waring *et al.* 2013). This is consistent with an estimated average trend of 3.1% in the North Atlantic population overall for the period 1979-1993 (Stevick *et al.* 2003). With respect to the species overall, there are also indications of increasing abundance for the California-Oregon-Washington, central North Pacific, and Southern Hemisphere stocks: Southwest Atlantic, Southeast Atlantic, Southwest

Indian Ocean, Southeast Indian Ocean, and Southwest Pacific. Trend data is lacking for the western North Pacific stock, the central South Pacific and Southeast Pacific subpopulations of the southern hemisphere humpback whales, and the northern Indian Ocean humpbacks.

4.2.3 Fin Whale

The fin whale (*Balaenoptera physalus*) is listed as endangered under the ESA and also is designated as depleted under the MMPA. Fin whales inhabit a wide range of latitudes between 20-75°N and 20-75°S (Perry *et al.* 1999). The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the Arctic ice pack (NMFS 1998b). The overall pattern of fin whale movement is complex, consisting of a less obvious north-south pattern of migration than that of right and humpback whales. Based on acoustic recordings from hydrophone arrays, Clark (1995) reported a general southward flow pattern of fin whales in the fall from the Labrador/Newfoundland region, past Bermuda, and into the West Indies. The overall distribution may be based on prey availability, as this species preys opportunistically on both invertebrates and fish (Watkins *et al.* 1984). Fin whales feed by gulping prey concentrations and filtering the water for the associated prey. Fin whales are larger and faster than humpback and right whales and are less concentrated in nearshore environments.

Pacific Ocean

Within U.S. waters of the Pacific, fin whales are found seasonally off the coast of North America and Hawaii and in the Bering Sea during the summer (Allen and Angliss 2010). Although stock structure in the Pacific is not fully understood, NMFS recognizes three fin whale stocks in U.S. Pacific waters for the purposes of managing this species under the MMPA. These are: Alaska (Northeast Pacific), California/Washington/Oregon, and Hawaii (Carretta *et al.* 2011). Reliable estimates of current abundance for the entire Northeast Pacific fin whale stock are not available (Allen and Angliss 2010). A provisional population estimate of 5,700 was calculated for the Alaska stock west of the Kenai Peninsula by adding estimates from multiple surveys (Allen and Angliss 2010). This can be considered a minimum estimate for the entire stock because the surveys covered only a portion of its range (Allen and Angliss 2010). An annual population increase of 4.8% between 1987-2003 was estimated for fin whales in coastal waters south of the Alaska Peninsula (Allen and Angliss 2010). This is the first estimate of population trend for North Pacific fin whales; however, it must be interpreted cautiously due to the uncertainty in the initial population estimate and the population structure (Allen and Angliss 2010). The best available estimate for the California/Washington/Oregon stock is 3,044, which is likely an underestimate (Carretta *et al.* 2011). The best available estimate for the Hawaii stock is 174, based on a 2002 line-transect survey (Carretta *et al.* 2011).

Stock structure for fin whales in the Southern Hemisphere is unknown. Prior to commercial exploitation, the abundance of Southern Hemisphere fin whales was estimated at 400,000 (IWC 1979, Perry *et al.* 1999). There are no current estimates of abundance for Southern Hemisphere fin whales. Since these fin whales do not occur in U.S. waters, there is no recovery plan or stock assessment report for the Southern Hemisphere fin whales.

North Atlantic

NMFS has designated one population of fin whales in U.S. waters of the North Atlantic (Waring *et al.* 2012). This species is commonly found from Cape Hatteras northward. Researchers have suggested the existence of fin whale subpopulations in the North Atlantic based on local depletions resulting from commercial overharvesting (Mizroch and York 1984) or genetics data (Bérubé *et al.* 1998). Photo-identification studies in western North Atlantic feeding areas, particularly in Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years and among years (Seipt *et al.* 1990) suggesting some level of site fidelity. The Scientific Committee of the International Whaling Commission (IWC) has proposed stock boundaries for North Atlantic fin whales. Fin whales off the eastern United States, Nova Scotia, and southeastern coast of Newfoundland are believed to constitute a single stock of fin whales under the present IWC scheme (Donovan 1991). However, it is uncertain whether the proposed boundaries define biologically isolated units (Waring *et al.* 2012).

During the 1978-1982 aerial surveys, fin whales accounted for 24% of all cetaceans and 46% of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring *et al.* 2012). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). The single most important area for this species appeared to be from the Great South Channel, along the 50 meter isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffreys Ledge (Hain *et al.*1992).

Like right and humpback whales, fin whales are believed to use North Atlantic waters primarily for feeding, and more southern waters for calving. However, evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Clark (1995) reported a general pattern of fin whale movements in the fall from the Labrador/Newfoundland region, south past Bermuda and into the West Indies, but neonate strandings along the U.S. Mid-Atlantic coast from October through January suggest the possibility of an offshore calving area (Hain *et al.* 1992).

Fin whales achieve sexual maturity at 6-10 years of age in males and 7-12 years in females (Jefferson *et al.* 2008), although physical maturity may not be reached until 20-30 years (Aguilar and Lockyer 1987). Conception is believed to occur in tropical and subtropical areas during the winter with birth of a single calf after an 11-12 month gestation (Jefferson *et al.* 2008). The calf is weaned 6-11 months after birth (Perry *et al.* 1999). The mean calving interval is 2.7 years (Agler *et al.* 1993).

The predominant prey of fin whales varies greatly in different geographical areas depending on what is locally available (IWC 1992). In the western North Atlantic, fin whales feed on a variety of small schooling fish (*i.e.*, herring, capelin, sand lance).

Population Trends and Status

Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. One method used the catch history and trends in Catch Per Unit Effort (CPUE) to obtain an estimate of 3,590 to 6,300 fin whales for the entire western North Atlantic (Perry *et al.* 1999). Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the Northeastern U.S. continental shelf waters. The 2012 Stock Assessment Report (SAR) gives a

best estimate of abundance for fin whales in the western North Atlantic of 3,522 (CV = 0.27). However, this estimate must be considered extremely conservative in view of the incomplete coverage of the known habitat of the stock and the uncertainties regarding population structure and whale movements between surveyed and unsurveyed areas (Waring *et al.* 2012). The minimum population estimate for the western North Atlantic fin whale is 2,817 (Waring *et al.* 2012). However, there are insufficient data at this time to determine population trends for the fin whale (Waring *et al.* 2012). The PBR for the western North Atlantic fin whale is 5.6.
Other estimates of the abundance of fin whales in the North Atlantic are presented in Pike *et al.* (2008) and Hammond *et al.* (2011). Pike *et al.* (2008) estimates the abundance of fin whales to be 27,493 (CV 0.2) in waters around Iceland and the Denmark Strait. Hammond *et al.* (2008) estimates the abundance of 19,354 (CV 0.24) fin whales in the eastern North Atlantic.

Anthropogenic Injury and Mortality
The major known sources of anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. The minimum annual rate of confirmed human-caused serious injury and mortality to North Atlantic fin whales in U.S. and Canadian waters from 2006 to 2010 was 2.0 (U.S. waters, 1.8; Canadian waters, 0.2) (Waring *et al.* 2012). During this five-year period, there were 15 confirmed entanglements (two fatal; two serious injuries) and eight ship strikes (six fatal) (Henry *et al.* 2012). Fin whales are believed to be the cetacean most commonly struck by large vessels (Laist *et al.* 2001). In addition, hunting of fin whales continued well into the 20th century. Fin whales were given total protection in the North Atlantic in 1987 with the exception of an aboriginal subsistence whaling hunt for Greenland (Gambell 1993; Caulfield 1993). However, Iceland has increased its whaling activities in recent years and reported a catch of 136 whales in the 1988/89 and 1989/90 seasons (Perry *et al.* 1999), seven in 2006/07, and 273 in 2009/2010. Fin whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources resulting from a variety of activities.

Fin whales are expected to be affected by climate change; however, no significant climate change-related impacts to fin whales have been observed to date. The impact of climate change on cetaceans is likely to be related to changes in sea temperatures, potential freshening of sea water due to melting ice and increased rainfall, sea level rise, the loss of polar habitats, and the potential decline of forage.

Of the factors affecting geographic distribution of cetaceans, water temperature appears to be the main influence, with other factors primarily influencing how individuals are distributed within their ranges(MacLeod 2009). Cetacean species most likely to be affected by increases in water temperature are those with ranges restricted to non-tropical waters and with a preference for shelf waters. Fin whales are distributed in all water temperature zones, therefore, it is unlikely that their range will be directly affected by an increase in water temperature.

The indirect effects to fin whales that may be associated with sea level rise are the construction of sea-wall defenses and protective measures for coastal habitats, which may impact coastal marine species and may interfere with migration (Learmonth *et al.* 2006). The effect of sea level rise to fin whales is likely negligible.

The direct effects of increased CO_2 concentrations, and associated decrease in pH (ocean acidification), on marine mammals are unknown (Learmonth *et al.* 2006). Marine plankton is a vital food source for many marine species. Studies have demonstrated adverse impacts from ocean acidification on the ability of free-swimming zooplankton to maintain protective shells as well as a reduction in the survival of larval marine species. A decline in marine plankton could have serious consequences for the marine food web.

Summary of Fin Whale Status
Information on the abundance and population structure of fin whales worldwide is limited. NMFS recognizes three fin whale stocks in the Pacific for the purposes of managing this species under the MMPA. Reliable estimates of current abundance for the entire Northeast Pacific fin whale stock are not available (Angliss *et al.* 2001). Stock structure for fin whales in the Southern Hemisphere is unknown and there are no current estimates of abundance for Southern Hemisphere fin whales. As noted above, the best population estimate for the western North Atlantic fin whale is 3,522 and the minimum population estimate is 2,817. The 2012 SAR indicates that there are insufficient data at this time to determine population trends for the fin whale. Fishing gear appears to pose less of a threat to fin whales in the North Atlantic Ocean than to North Atlantic right or humpback whales. However, commercial whaling for fin whales in the North Atlantic has resumed and fin whales continue to be struck by large vessels. Based on the information currently available, for the purposes of this Opinion, NMFS considers the population trend for fin whales to be undetermined.

4.3 Status of Atlantic sturgeon
The section below describes the Atlantic sturgeon listing, provides life history information that is relevant to all DPSs of Atlantic sturgeon, and provides information specific to the status of each DPS of Atlantic sturgeon. The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is a subspecies of sturgeon distributed along the eastern coast of North America from Hamilton Inlet, Labrador, Canada to Cape Canaveral, FL (Scott and Scott 1988; ASSRT 2007;). NMFS has divided U.S. populations of Atlantic sturgeon into five DPSs[6] (77 FR 5880 and 77 FR 5914). These are: the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs (see Figure 5.).

The results of genetic studies suggest that natal origin influences the distribution of Atlantic sturgeon in the marine environment (Wirgin and King 2011). However, genetic data, as well as tracking and tagging data, demonstrate that sturgeon from each DPS and Canada occur throughout the full range of the subspecies. Therefore, sturgeon originating from any of the five DPSs can be affected by threats in the marine, estuarine, and riverine environment that occur far from natal spawning rivers.

On February 6, 2012, we published notice in the *Federal Register* that we were listing the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs as endangered, and the Gulf of

6 To be considered for listing under the ESA, a group of organisms must constitute a “species.” A “species” is defined in section 3 of the ESA to include “any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.”

Maine DPS as threatened (77 FR 5880 and 77 FR 5914). The effective date of the listings was April 6, 2012. The DPSs do not include Atlantic sturgeon spawned in Canadian rivers. Therefore, fish that originated in Canada are not included in the listings.

Atlantic Sturgeon Life History

Atlantic sturgeon are long-lived (approximately 60 years), late maturing, estuarine dependent, anadromous[7] fish (Bigelow and Schroeder 1953; Vladykov and Greeley 1963; Mangin 1964; Pikitch *et al.* 2005; Dadswell 2006; ASSRT 2007).

The life history of Atlantic sturgeon can be divided up into five general categories as described in the table below (adapted from ASSRT 2007).

Age Class	**Size**	**Description**
Egg		Fertilized or unfertilized
Larvae		Negative photo-taxic, nourished by yolk sac
Young of Year (YOY)	**0.3 grams <41 cm TL**	Fish that are > 3 months and < one year; capable of capturing and consuming live food
Non-migrant subadults or juveniles	**>41 cm and <76 cm TL**	Fish that are at least age 1 and are not sexually mature and do not make coastal migrations.
Subadults	**>76cm and <150cm TL**	Fish that are not sexually mature but make coastal migrations
Adults	**>150 cm TL**	Sexually mature fish

Table 5. Descriptions of Atlantic sturgeon life history stages.

7 Anadromous refers to a fish that is born in freshwater, spends most of its life in the sea, and returns to freshwater to spawn (NEFSC FAQs, available at http://www.nefsc.noaa.gov/faq/fishfaq1a.html, modified June 16, 2011)

Atlantic sturgeon can grow to over 14 feet weighing 800 pounds(Pikitch *et al.* 2005). Atlantic sturgeon are bottom feeders that suck food into a ventral protruding mouth (Bigelow and Schroeder 1953). Four barbels in front of the mouth assist the sturgeon in locating prey (Bigelow and Schroeder 1953). Diets of adult and migrant subadult Atlantic sturgeon include mollusks, gastropods, amphipods, annelids, decapods, isopods, and fish such as sand lance (Bigelow and Schroeder 1953; ASSRT 2007; Guilbard *et al.* 2007; Savoy 2007). Juvenile Atlantic sturgeon feed on aquatic insects, insect larvae, and other invertebrates (Bigelow and Schroeder 1953; ASSRT 2007; Guilbard *et al.* 2007).

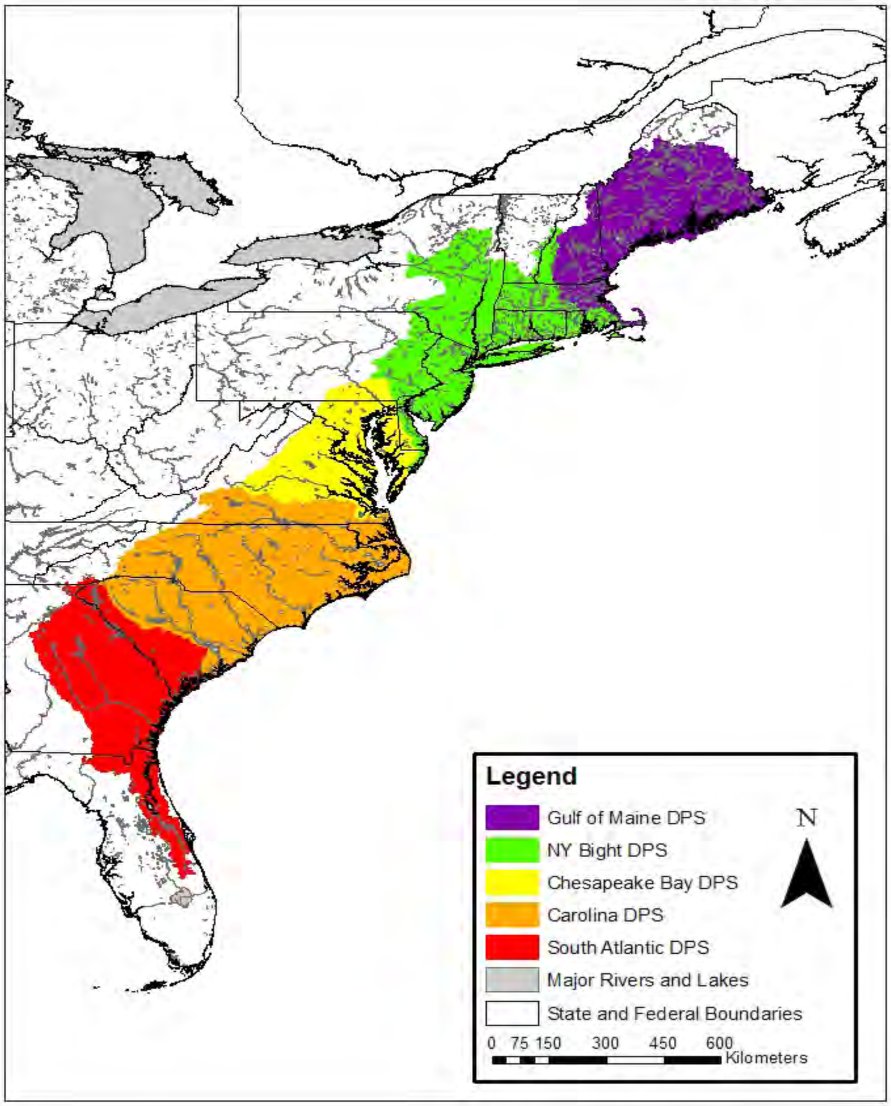

Figure 5. Map Depicting the five Atlantic sturgeon DPSs

Rate of maturation is affected by water temperature and gender. In general: (1) Atlantic sturgeon that originate from southern systems grow faster and mature sooner than Atlantic sturgeon that originate from more northern systems; (2) males grow faster than females; (3) fully mature females attain a larger size (i.e. length) than fully mature males. The largest recorded Atlantic sturgeon was a female captured in 1924 that measured approximately 4.26 meters (Vladykov and Greeley 1963). Dadswell (2006) reported seeing seven fish of comparable size in the St. John River estuary from 1973 to 1995. Observations of large-sized sturgeon are particularly important given that egg production is correlated with age and body size (Smith *et al.* 1982; Van Eenennaam *et al.* 1996; Van Eenennaam and Doroshov 1998; Dadswell 2006). The lengths of Atlantic sturgeon caught since the mid-late 20th century have typically been less than three meters (Smith *et al.* 1982; Smith and Dingley 1984; Smith 1985; Scott and Scott 1988; Young *et al.* 1998; Collins *et al.* 2000; Caron *et al.* 2002; Dadswell 2006; ASSRT 2007; Kahnle *et al.* 2007; DFO, 2011). While females are prolific, with egg production ranging from 400,000 to 4 million eggs per spawning year, females spawn at intervals of two to five years (Vladykov and Greeley 1963; Smith *et al.*, 1982; Van Eenennaam *et al.* 1996; Van Eenennaam and Doroshov 1998; Stevenson and Secor 1999; Dadswell 2006). Given spawning periodicity and a female's relatively late age to maturity, the age at which 50% of the maximum lifetime egg production is achieved is estimated to be 29 years (Boreman 1997). Males exhibit spawning periodicity of one to five years (Smith 1985; Collins *et al.* 2000; Caron *et al.* 2002). While long-lived, Atlantic sturgeon are exposed to a multitude of threats prior to achieving maturation and have a limited number of spawning opportunities once mature.

Water temperature plays a primary role in triggering the timing of spawning migrations (ASMFC, 2009). Spawning migrations generally occur during February-March in southern systems, April-May in Mid-Atlantic systems, and May-July in Canadian systems (Murawski and Pacheco 1977; Smith 1985; Bain 1997; Smith and Clugston 1997; Caron *et al.* 2002). Male sturgeon begin upstream spawning migrations when waters reach approximately 6°C (43° F) (Smith *et al.* 1982; Dovel and Berggren 1983; Smith 1985; ASMFC 2009), and remain on the spawning grounds throughout the spawning season (Bain 1997). Females begin spawning migrations when temperatures are closer to 12°to 13°C (54° to 55°F) (Dovel and Berggren 1983; Smith 1985; Collins *et al.* 2000), make rapid spawning migrations upstream, and quickly depart following spawning (Bain 1997).

The spawning areas in most U.S. rivers have not been well defined. However, the habitat characteristics of spawning areas have been identified based on historical accounts of where fisheries occurred, tracking and tagging studies of spawning sturgeon, and physiological needs of early life stages. Spawning is believed to occur in flowing water between the salt front of estuaries and the fall line of large rivers, when and where optimal flows are 46-76 centimeters per second and depths are 3-27 meters (Borodin 1925; Dees 1961; Leland 1968; Scott and Crossman 1973; Crance 1987; Shirey *et al.* 1999; Bain *et al.* 2000; Collins *et al.* 2000; Caron *et al.* 2002; Hatin *et al.* 2002; ASMFC 2009). Sturgeon eggs are deposited on hard bottom substrate such as cobble, coarse sand, and bedrock (Dees 1961; Scott and Crossman 1973; Gilbert 1989; Smith and Clugston 1997; Bain *et al.* 2000; Collins *et al.* 2000; Caron *et al.* 2002; Hatin *et al.* 2002; Mohler 2003; ASMFC 2009), and become adhesive shortly after fertilization (Murawski and Pacheco 1977; Van den Avyle 1984; Mohler 2003). Incubation time for the eggs increases as water temperature decreases (Mohler 2003). At temperatures of 20° and 18° C, hatching occurs approximately 94 and 140 hours, respectively, after egg deposition (ASSRT 2007).

Larval Atlantic sturgeon (i.e. less than four weeks old, with total lengths (TL) less than 30 millimeters; Van Eenennaam *et al.* 1996) are assumed to mostly live on or near the bottom and inhabit the same riverine or estuarine areas where they were spawned (Smith *et al.* 1980; Bain *et al.* 2000; Kynard and Horgan 2002; ASMFC 2009). Studies suggest that age-0 (i.e., young-of-year), age-1, and age-2 juvenile Atlantic sturgeon occur in low salinity waters of the natal estuary (Haley 1999; Hatin *et al.* 2007; McCord *et al.* 2007; Munro *et al.* 2007) while older fish are more salt-tolerant and occur in both high salinity and low salinity waters (Collins *et al.* 2000). Atlantic sturgeon remain in the natal estuary for months to years before emigrating to open ocean as subadults (Holland and Yelverton 1973; Dovel and Berggen 1983; Waldman *et al.* 1996; Dadswell 2006; ASSRT 2007).

After emigration from the natal estuary, subadults and adults travel within the marine environment, typically in waters less than 50 meters in depth, using coastal bays, sounds, and ocean waters (Vladykov and Greeley 1963; Murawski and Pacheco 1977; Dovel and Berggren 1983; Smith 1985; Collins and Smith 1997; Welsh *et al.* 2002; Savoy and Pacileo 2003; Stein *et al.* 2004a; Laney *et al.* 2007; Dunton *et al.* 2010; Erickson *et al.* 2011; Wirgin and King 2011). Tracking and tagging studies reveal seasonal movements of Atlantic sturgeon along the coast. Satellite-tagged adult sturgeon from the Hudson River concentrated in the southern part of the Mid-Atlantic Bight at depths greater than 20 meters during winter and spring, and in the northern portion of the Mid-Atlantic Bight at depths less than 20 meters in summer and fall (Erickson *et al.* 2011). Shirey (Delaware Department of Fish and Wildlife, unpublished data reviewed in ASMFC 2009) found a similar movement pattern for juvenile Atlantic sturgeon based on recaptures of fish originally tagged in the Delaware River. After leaving the Delaware River estuary during the fall, juvenile Atlantic sturgeon were recaptured by commercial fishermen in nearshore waters along the Atlantic coast as far south as Cape Hatteras, NC from November through early March. In the spring, a portion of the tagged fish re-entered the Delaware River estuary. However, many fish continued a northerly coastal migration through the Mid-Atlantic as well as into southern New England waters, where they were recovered throughout the summer months. Movements as far north as Maine were documented. A southerly coastal migration was apparent from tag returns reported in the fall, with the majority of these tag returns from relatively shallow nearshore fisheries, with few fish reported from waters in excess of 25 meters (C. Shirey, Delaware Department of Fish and Wildlife, unpublished data reviewed in ASMFC 2009). Areas where migratory Atlantic sturgeon commonly aggregate include the Bay of Fundy (e.g., Minas and Cumberland Basins), Massachusetts Bay, Connecticut River estuary, Long Island Sound, New York Bight, Delaware Bay, Chesapeake Bay, and waters off of North Carolina from the Virginia/North Carolina border to Cape Hatteras at depths up to 24 meters (Dovel and Berggren 1983; Dadswell *et al.* 1984; Johnson *et al.* 1997; Rochard *et al.* 1997; Kynard *et al.* 2000; Eyler *et al.* 2004; Stein *et al.* 2004a; Wehrell 2005; Dadswell 2006; ASSRT 2007; Laney *et al.* 2007). These sites may be used as foraging sites and/or thermal refuge.

Distribution and Abundance
Atlantic sturgeon underwent significant range-wide declines from historical abundance levels

due to overfishing in the mid to late 19th century when a caviar market was established (Scott and Crossman 1973; Taub 1990; Kennebec River Resource Management Plan 1993; Smith and Clugston 1997; Dadswell 2006; ASSRT 2007). Abundance of spawning-aged females prior to this period of exploitation was predicted to be greater than 100,000 for the Delaware River, and at least 10,000 females for other spawning stocks (Secor and Waldman 1999; Secor 2002). Historical records suggest that Atlantic sturgeon spawned in at least 35 rivers prior to this period. Currently, only 17 U.S. rivers are known to support spawning (i.e., presence of young-of-year or gravid Atlantic sturgeon documented within the past 15 years) (ASSRT 2007). While there may be other rivers supporting spawning for which definitive evidence has not been obtained (e.g., in the Penobscot and York Rivers), the number of rivers supporting spawning of Atlantic sturgeon is approximately half of what it was historically. In addition, only five rivers (Kennebec, Androscoggin, Hudson, Delaware, James) are known to currently support spawning from Maine through Virginia, where historical records show that there used to be 15 spawning rivers (ASSRT 2007). Thus, there are substantial gaps between Atlantic sturgeon spawning rivers among northern and Mid-Atlantic states which could make recolonization of extirpated populations more difficult.

At the time of the listing, there were no current, published population abundance estimates for any of the currently known spawning stocks or for any of the five DPSs of Atlantic sturgeon. An estimate of 863 mature adults per year (596 males and 267 females) was calculated for the Hudson River based on fishery-dependent data collected from 1985 to 1995 (Kahnle *et al.*, 2007). An estimate of 343 spawning adults per year is available for the Altamaha River, GA, based on fishery-independent data collected in 2004 and 2005 (Schueller and Peterson 2006). Using the data collected from the Hudson and Altamaha Rivers to estimate the total number of Atlantic sturgeon in either subpopulation is not possible, since mature Atlantic sturgeon may not spawn every year (Vladykov and Greeley 1963; Smith 1985; Van Eenennaam *et al.* 1996; Stevenson and Secor 1999; Collins *et al.* 2000; Caron *et al.* 2002), the age structure of these populations is not well understood, and stage-to-stage survival is unknown. In other words, the information that would allow us to take an estimate of annual spawning adults and expand that estimate to an estimate of the total number of individuals (*e.g.,* yearlings, subadults, and adults) in a population is lacking. The ASSRT presumed that the Hudson and Altamaha rivers had the most robust of the remaining U.S. Atlantic sturgeon spawning populations and concluded that the other U.S. spawning populations were likely less than 300 spawning adults per year (ASSRT 2007).

Lacking complete estimates of population abundance across the distribution of Atlantic sturgeon, the NEFSC developed a virtual population analysis model with the goal of estimating bounds of Atlantic sturgeon ocean abundance (see Kocik et al. 2013). The NEFSC suggested that cumulative annual estimates of surviving fishery discards could provide a minimum estimate of abundance. The objectives of producing the Atlantic Sturgeon Production Index (ASPI) were to characterize uncertainty in abundance estimates arising from multiple sources of observation and process error and to complement future efforts to conduct a more comprehensive stock assessment (Table 6). The ASPI provides a general abundance metric to assess risk for actions that may affect Atlantic sturgeon in the ocean. In general, the model uses empirical estimates of post-capture survivors and natural survival, as well as probability estimates of recapture using tagging data from the United States Fish and Wildlife Service (USFWS) sturgeon tagging database, and federal fishery discard estimates from 2006 to 2010 to produce a virtual population. The USFWS sturgeon tagging database is a repository for sturgeon tagging information on the Atlantic coast. The database contains tag, release, and recapture information from state and federal researchers. The database records recaptures by the fishing fleet, researchers, and researchers on fishery vessels.

In addition to the ASPI, a population estimate was derived from the Northeast Area Monitoring and Assessment Program (NEAMAP) (
Table). NEAMAP trawl surveys are conducted from Cape Cod, Massachusetts to Cape Hatteras, North Carolina in nearshore waters at depths up to 18.3 meters (60 feet) during the fall since 2007 and spring since 2008. Each survey employs a spatially stratified random design with a total of 35 strata and 150 stations. The ASMFC has initiated a new stock assessment with the goal of completing it by the end of 2014. NOAA Fisheries will be partnering with them to conduct the stock assessment, and the ocean population abundance estimates produced by the NEFSC will be shared with the stock assessment committee for consideration in the stock assessment.

Table 6. Description of the ASPI model and NEAMAP survey based area estimate method.

Model Name	Model Description
A. ASPI	Uses tag-based estimates of recapture probabilities from 1999 to 2009. Natural mortality based on Kahnle *et al.* (2007) rather than estimates derived from tagging model. Tag recaptures from commercial fisheries are adjusted for non reporting based on recaptures from observers and researchers. Tag loss assumed to be zero.
B. NEAMAP Swept Area	Uses NEAMAP survey-based swept area estimates of abundance and assumed estimates of gear efficiency. Estimates based on average of ten surveys from fall 2007 to spring 2012.

Table 7. Modeled Results

Model Run	**Model Years**	**95% low**	**Mean**	**95% high**
A. ASPI	1999-2009	165,381	417,934	744,597
B.1 NEAMAP Survey, swept area assuming 100% efficiency	2007-2012	8,921	33,888	58,856
B.2 NEAMAP Survey, swept area assuming 50% efficiency	2007-2012	13,962	67,776	105,984
B.3 NEAMAP Survey, swept area assuming 10% efficiency	2007-2012	89,206	338,882	588,558

The information from the NEAMAP survey can be used to calculate minimum swept area population estimates within the strata swept by the survey. The estimate from fall surveys ranges from 6,980 to 42,160 with coefficients of variation between 0.02 and 0.57, and the estimates from spring surveys ranges from 25,540 to 52,990 with coefficients of variation between 0.27 and 0.65 (Table 7). These are considered minimum estimates because the calculation makes the assumption that the gear will capture (i.e. net efficiency) 100% of the sturgeon in the water column along the tow path and that all sturgeon are with the sampling domain of the survey. We define catchability as: 1) the product of the probability of capture given encounter (i.e. net efficiency), and 2) the fraction of the population within the sampling domain. Catchabilities less than 100% will result in estimates greater than the minimum. The true catchability depends on many factors including the availability of the species to the survey and the behavior of the species with respect to the gear. True catchabilities much less than 100% are common for most species. The ratio of total sturgeon habitat to area sampled by the NEAMAP survey is unknown, but is certainly greater than one (i.e. the NEAMAP survey does not survey 100% of the Atlantic sturgeon habitat).

Table 8. Annual minimum swept area estimates for Atlantic sturgeon during the spring and fall from the Northeast Area Monitoring and Assessment Program survey. Estimates assume 100% net efficiencies. Estimates provided by Dr. Chris Bonzek, Virginia Institute of Marine Science (VIMS).

Year	Fall Number	CV	Spring Number	CV
2007	6,981	0.015		
2008	33,949	0.322	25,541	0.391
2009	32,227	0.316	41,196	0.353
2010	42,164	0.566	52,992	0.265
2011	22,932	0.399	52,840	0.480
2012			28,060	0.652

Available data do not support estimation of true catchabilty (i.e., net efficiency X availability) of the NEAMAP trawl survey for Atlantic sturgeon. Thus, the NEAMAP swept area biomass estimates were produced and presented in Kocik et al. (2013) for catchabilities from 5 to 100%. In estimating the efficiency of the sampling net, we consider the likelihood that an Atlantic sturgeon in the survey area is likely to be captured by the trawl. True efficiencies less than 100% are common for most species. Assuming the NEAMAP surveys have been 100% efficient would require the unlikely assumption that the survey gear captures all Atlantic sturgeon within the path of the trawl and all sturgeon are within the sampling area of the NEAMAP survey. In estimating the fraction of the Atlantic sturgeon population within the sampling area of the NEAMAP, we consider that the NEAMAP-based estimates do not include young of the year fish and juveniles in the rivers where the NEAMAP survey does not sample. Additionally, although the NEAMAP surveys are not conducted in the Gulf of Maine or south of Cape Hatteras, NC, the NEAMAP surveys are conducted from Cape Cod to Cape Hatteras at depths up to 18.3 meters (60 feet), which is within the preferred depth ranges of subadult and adult Atlantic sturgeon. NEAMAP surveys take place during seasons that coincide with known Atlantic sturgeon coastal migration patterns in the ocean. Therefore, the NEAMAP estimates are minimum estimates of the ocean population of Atlantic sturgeon but are based on sampling in a large portion of the marine range of the five DPSs, in known sturgeon coastal migration areas during times that sturgeon are expected to be migrating north and south.

Based on the above, we consider that the NEAMAP samples an area utilized by Atlantic sturgeon, but does not sample all the locations and times where Atlantic sturgeon are present and the trawl net captures some, but likely not all, of the Atlantic sturgeon present in the sampling area. Therefore, we assumed that net efficiency and the fraction of the population exposed to the NEAMAP survey in combination result in a 50% catchability. The 50% catchability assumption seems to reasonably account for the robust, yet not complete sampling of the Atlantic sturgeon oceanic temporal and spatial ranges and the documented high rates of encounter with NEAMAP survey gear and Atlantic sturgeon.

The ASPI model projects a mean population size of 417,934 Atlantic sturgeon and the NEAMAP Survey projects mean population sizes ranging from 33,888 to 338,882 depending on the assumption made regarding efficiency of that survey (see Table 7). The ASPI model uses estimates of post-capture survivors and natural survival, as well as probability estimates of recapture using tagging data from the United States Fish and Wildlife Service (USFWS) sturgeon tagging database, and federal fishery discard estimates from 2006 to 2010 to produce a virtual population. The NEAMAP estimate, in contrast does not depend on as many assumptions. For the purposes of this Opinion, we consider the NEAMAP estimate resulting from the 50% catchability rate is the best available information on the number of subadult and adult Atlantic sturgeon in the ocean.

The ocean population abundance of 67,776 fish estimated from the NEAMAP survey assuming 50% efficiency (based on net efficiency and the fraction of the total population exposed to the survey) was subsequently partitioned by DPS based on genetic frequencies of occurrence (Table 9) in the sampled area. Given the proportion of adults to subadults in the observer database (approximate ratio of 1:3), we have also estimated a number of subadults originating from each DPS. However, this cannot be considered an estimate of the total number of subadults because it only considers those subadults that are of a size vulnerable to capture in commercial sink gillnet and otter trawl gear in the marine environment and are present in the marine environment, which is only a fraction of the total number of subadults.

Table 9. Summary of calculated population estimates based upon the NEAMAP Survey swept area assuming 50% efficiency (based on net efficiency and area sampled) derived from applying the Mixed Stock Analysis to the total estimate of Atlantic sturgeon in the Ocean and the 1:3 ratio of adults to subadults)

DPS	Estimated Ocean Population Abundance	Estimated Ocean Population of Adults	Estimated Ocean Population of Subadults (of size vulnerable to capture in fisheries)
GOM	7,455	1,864	5,591
NYB	34,566	8,642	25,925
CB	8,811	2,203	6,608
Carolina	1,356	339	1,017
SA	14,911	3,728	11,183
Canada	678	170	509

Threats Faced by Atlantic Sturgeon Throughout Their Range

Atlantic sturgeon are susceptible to over-exploitation given their life history characteristics (e.g., late maturity and dependence on a wide variety of habitats). Similar to other sturgeon species (Vladykov and Greeley 1963; Pikitch *et al.* 2005), Atlantic sturgeon experienced range-wide declines from historical abundance levels due to overfishing (for caviar and meat) and impacts to habitat in the 19th and 20th centuries (Taub 1990; Smith and Clugston 1997; Secor and Waldman 1999).

Because a DPS is a group of populations, the stability, viability, and persistence of individual populations that make up the DPS affects the persistence and viability of the larger DPS. The loss of any population within a DPS could result in: (1) a long-term gap in the range of the DPS that is unlikely to be recolonized; (2) loss of reproducing individuals; (3) loss of genetic biodiversity; (4) loss of unique haplotypes; (5) loss of adaptive traits; and (6) reduction in total number. The loss of a population will negatively impact the persistence and viability of the DPS as a whole, as fewer than two individuals per generation spawn outside their natal rivers (Secor and Waldman 1999). The persistence of individual populations, and in turn the DPS, depends on successful spawning and rearing within the freshwater habitat, emigration to marine habitats to grow, and return of adults to natal rivers to spawn.

Based on the best available information, NMFS has concluded that bycatch in fisheries, vessel strikes, poor water quality, fresh water availability, dams, lack of regulatory mechanisms for protecting the fish, and dredging are the most significant threats to Atlantic sturgeon (77 FR 5880 and 77 FR 5914; February 6, 2012). While all the threats are not necessarily present in the same area at the same time, given that Atlantic sturgeon subadults and adults use ocean waters from Labrador, Canada to Cape Canaveral, FL, as well as estuaries of large rivers along the U.S.

East Coast, activities affecting these water bodies are likely to impact more than one Atlantic sturgeon DPS. In addition, because Atlantic sturgeon depend on a variety of habitats, every life stage is likely affected by one or more of the identified threats.

Atlantic sturgeon are particularly sensitive to bycatch mortality because they are a long-lived species, have an older age at maturity, have lower maximum fecundity values, and a large percentage of egg production occurs later in life. Based on these life history traits, Boreman (1997) calculated that Atlantic sturgeon can only withstand the annual loss of up to 5% of their population to bycatch mortality without suffering population declines. Mortality rates of Atlantic sturgeon taken as bycatch in various types of fishing gear range are variable with the greatest mortality occurring in sturgeon caught by sink gillnets. Atlantic sturgeon are particularly vulnerable to being caught in sink gillnets; therefore, fisheries using this type of gear account for a high percentage of Atlantic sturgeon bycatch. Fisheries known to incidentally catch Atlantic sturgeon occur throughout the marine range of the species and in some riverine waters as well. Because Atlantic sturgeon mix extensively in marine waters and may access multiple river systems, they are subject to being caught in multiple fisheries throughout their range. In addition, stress or injury to Atlantic sturgeon taken as bycatch but released alive may result in increased susceptibility to other threats, such as poor water quality (e.g., exposure to toxins and low DO). This may result in reduced ability to perform major life functions, such as foraging and spawning, or may result in delayed post-capture mortality.

As a wide-ranging anadromous species, Atlantic sturgeon are subject to numerous federal (U.S. and Canadian), state and provincial, and inter-jurisdictional laws, regulations, and agency activities. While these mechanisms, including the prohibition on possession, have addressed impacts to Atlantic sturgeon through directed fisheries, the listing determination concluded that the mechanisms in place to address the risk posed to Atlantic sturgeon from commercial bycatch were insufficient.

An ASMFC interstate fishery management plan for sturgeon (Sturgeon FMP) was developed and implemented in 1990 (Taub 1990). In 1998, the remaining Atlantic sturgeon fisheries in U.S. state waters were closed per Amendment 1 to the Sturgeon FMP. Complementary regulations were implemented by NMFS in 1999 that prohibit fishing for, harvesting, possessing, or retaining Atlantic sturgeon or their parts in or from the EEZ in the course of a commercial fishing activity.

Commercial fisheries for Atlantic sturgeon still exist in Canadian waters (DFO 2011). Sturgeon belonging to one or more of the DPSs may be harvested in the Canadian fisheries. In particular, the Bay of Fundy fishery in the Saint John estuary may capture sturgeon of U.S. origin given that sturgeon from the Gulf of Maine and the New York Bight DPSs have been incidentally captured in other Bay of Fundy fisheries (DFO, 2010; Wirgin and King 2011). Because Atlantic sturgeon are listed under Appendix II of the Convention on International Trade in Endangered Species (CITES), the U.S. and Canada are currently working on a conservation strategy to address the potential for captures of U.S. fish in Canadian-directed Atlantic sturgeon fisheries and of Canadian fish incidentally captured in U.S. commercial fisheries. At this time, there are no estimates of the number of individuals from any of the DPSs that are captured or killed in

Canadian fisheries each year.

Based on geographic distribution, most U.S. Atlantic sturgeon that are intercepted in Canadian fisheries are likely to originate from the Gulf of Maine DPS, with a smaller percentage from the New York Bight DPS.

Bycatch in U.S. waters is one of the threats faced by all five DPSs. At this time, we have an estimate of the number of Atlantic sturgeon captured and killed in sink gillnet and otter trawl fisheries authorized by federal FMPs (NMFS NEFSC 2011b) in the Northeast Region but do not have a similar estimate for southeast fisheries. We also do not have an estimate of the number of Atlantic sturgeon captured or killed in state fisheries. At this time, we are not able to quantify the effects of other significant threats (e.g., vessel strikes, poor water quality, water availability, dams, and dredging) in terms of habitat impacts or loss of individuals. While we have some information on the number of mortalities that have occurred in the past in association with certain activities (e.g., mortalities in the Delaware and James Rivers that are thought to be due to vessel strikes), we are not able to use those numbers to extrapolate effects throughout one or more DPSs. This is because of (1) the small number of data points and, (2) the lack of information on the percent of incidents that the observed mortalities represent.

As noted above, the NEFSC prepared an estimate of the number of encounters of Atlantic sturgeon in fisheries authorized by Northeast FMPs (NMFS NEFSC 2011b). The analysis estimates that from 2006 through 2010, there were averages of 1,548 and 1,569 encounters per year in observed gillnet and trawl fisheries, respectively, with an average of 3,118 encounters combined annually. Mortality rates in gillnet gear were approximately 20%. Mortality rates in otter trawl gear are generally lower, at approximately 5%.

Determination of DPS Composition in the Action Area

As explained above, the range of all five DPSs overlaps and extends from Canada through Cape Canaveral, Florida. We have considered the best available information to determine from which DPSs individuals in the action area are likely to have originated. Based on mixed-stock analysis, we have determined that Atlantic sturgeon in the action area likely originate from the five DPSs at the following frequencies: NYB 51%; South Atlantic 22%; Chesapeake Bay 13%; Gulf of Maine 11%; and Carolina 2.0%. These percentages are largely based on genetic sampling of individuals (n=173) sampled in commercial fisheries by the Northeast Fisheries Observers Program (NEFOP). This covers captures from the Gulf of Maine to Cape Hatteras and is generally aligned with the action area for this consultation. Therefore, this represents the best available information on the likely genetic makeup of individuals occurring in the action area. The genetic assignments have a plus/minus 5% confidence interval; however, for purposes of section 7 consultation we have selected the reported values above, which approximate the mid-point of the range, as a reasonable indication of the likely genetic makeup of Atlantic sturgeon in the action area. These assignments and the data from which they are derived are described in detail in Damon-Randall *et al.* (2012a).

4.3.1 Gulf of Maine DPS of Atlantic sturgeon

The Gulf of Maine DPS includes the following: all anadromous Atlantic sturgeons that are spawned in the watersheds from the Maine/Canadian border and, extending southward, all watersheds draining into the Gulf of Maine as far south as Chatham, MA. Within this range, Atlantic sturgeon historically spawned in the Androscoggin, Kennebec, Merrimack, Penobscot, and Sheepscot Rivers (ASSRT, 2007). Spawning still occurs in the Kennebec River, and it is possible that it still occurs in the Penobscot River as well. Recent evidence indicates that spawning may also be occurring in the Androscoggin River. During the 2011 spawning season, the Maine Department of Marine Resources captured a larval Atlantic sturgeon below the Brunswick Dam. There is no evidence of recent spawning in the remaining rivers. In the 1800s, construction of the Essex Dam on the Merrimack River at river kilometer (rkm) 49 blocked access to 58 percent of Atlantic sturgeon habitat in the river (Oakley, 2003; ASSRT, 2007). However, the accessible portions of the Merrimack seem to be suitable habitat for Atlantic sturgeon spawning and rearing (i.e., nursery habitat) (Keiffer and Kynard, 1993). Therefore, the availability of spawning habitat does not appear to be the reason for the lack of observed spawning in the Merrimack River. Studies are on-going to determine whether Atlantic sturgeon are spawning in these rivers. Atlantic sturgeons that are spawned elsewhere continue to use habitats within all of these rivers as part of their overall marine range (ASSRT, 2007). The movement of subadult and adult sturgeon between rivers, including to and from the Kennebec River and the Penobscot River, demonstrates that coastal and marine migrations are key elements of Atlantic sturgeon life history for the Gulf of Maine DPS as well as likely throughout the entire range (ASSRT, 2007; Fernandes, *et al.*, 2010).

Bigelow and Schroeder (1953) surmised that Atlantic sturgeon likely spawned in Gulf of Maine Rivers in May-July. More recent captures of Atlantic sturgeon in spawning condition within the Kennebec River suggest that spawning more likely occurs in June-July (Squiers *et al.*, 1981; ASMFC, 1998; NMFS and USFWS, 1998). Evidence for the timing and location of Atlantic sturgeon spawning in the Kennebec River includes: (1) the capture of five adult male Atlantic sturgeon in spawning condition (i.e., expressing milt) in July 1994 below the (former) Edwards Dam; (2) capture of 31 adult Atlantic sturgeon from June 15,1980, through July 26,1980, in a small commercial fishery directed at Atlantic sturgeon from the South Gardiner area (above Merrymeeting Bay) that included at least 4 ripe males and 1 ripe female captured on July 26,1980; and, (3) capture of nine adults during a gillnet survey conducted from 1977-1981, the majority of which were captured in July in the area from Merrymeeting Bay and upriver as far as Gardiner, ME (NMFS and USFWS, 1998; ASMFC 2007). The low salinity values for waters above Merrymeeting Bay are consistent with values found in other rivers where successful Atlantic sturgeon spawning is known to occur.

Several threats play a role in shaping the current status of Gulf of Maine DPS Atlantic sturgeon. Historical records provide evidence of commercial fisheries for Atlantic sturgeon in the Kennebec and Androscoggin Rivers dating back to the 17th century (Squiers *et al.*, 1979). In 1849, 160 tons of sturgeon was caught in the Kennebec River by local fishermen (Squiers *et al.*, 1979). Following the 1880s, the sturgeon fishery was almost non-existent due to a collapse of the sturgeon stocks. All directed Atlantic sturgeon fishing as well as retention of Atlantic sturgeon by-catch has been prohibited since 1998. Nevertheless, mortalities associated with bycatch in fisheries occurring in state and federal waters still occur. In the marine range, Gulf of Maine DPS Atlantic sturgeon are incidentally captured in federal and state managed fisheries, reducing survivorship of subadult and adult Atlantic sturgeon (Stein *et al.*, 2004; ASMFC 2007). As explained above, we have estimates of the number of subadults and adults that are killed as a result of bycatch in fisheries authorized under Northeast FMPs. At this time, we are not able to quantify the impacts from other threats or estimate the number of individuals killed as a result of other anthropogenic threats. Habitat disturbance and direct mortality from anthropogenic sources are the primary concerns.

Riverine habitat may be impacted by dredging and other in-water activities, disturbing spawning habitat and also altering the benthic forage base. Many rivers in the Gulf of Maine DPS have navigation channels that are maintained by dredging. Dredging outside of Federal channels and in-water construction occurs throughout the Gulf of Maine DPS. While some dredging projects operate with observers present to document fish mortalities, many do not. To date we have not received any reports of Atlantic sturgeon killed during dredging projects in the Gulf of Maine region; however, as noted above, not all projects are monitored for interactions with fish. At this time, we do not have any information to quantify the number of Atlantic sturgeon killed or disturbed during dredging or in-water construction projects. We are also not able to quantify any effects to habitat.

Connectivity is disrupted by the presence of dams on several rivers in the Gulf of Maine region, including the Penobscot and Merrimack Rivers. While there are also dams on the Kennebec, Androscoggin and Saco Rivers, these dams are near the site of natural falls and likely represent the maximum upstream extent of sturgeon occurrence even if the dams were not present. Because no Atlantic sturgeon are known to occur upstream of any hydroelectric projects in the Gulf of Maine region, passage over hydroelectric dams or through hydroelectric turbines is not a source of injury or mortality in this area. While not expected to be killed or injured during passage at a dam, the extent that Atlantic sturgeon are affected by the existence of dams and their operations in the Gulf of Maine region is currently unknown. The documentation of an Atlantic sturgeon larvae downstream of the Brunswick Dam in the Androscoggin River suggests however, that Atlantic sturgeon spawning may be occurring in the vicinity of at least that project and therefore, may be affected by project operations. Until it was breached in July 2013, the range of Atlantic sturgeon in the Penobscot River was limited by the presence of the Veazie Dam. Since the removal of the Veazie Dam, sturgeon can now travel as far upstream as the Great Works Dam. The Great Works Dam prevents Atlantic sturgeon from accessing the presumed historical spawning habitat located downstream of Milford Falls, the site of the Milford Dam. While removal of the Great Works Dams is anticipated to occur in the near future, the presence of this dam is currently preventing access to significant habitats within the Penobscot River. While Atlantic sturgeon are known to occur in the Penobscot River, it is unknown if spawning is currently occurring or whether the presence of the Great Works Dam affects the likelihood of spawning occurring in this river. The Essex Dam on the Merrimack River blocks access to approximately 58% of historically accessible habitat in this river. Atlantic sturgeon occur in the Merrimack River but spawning has not been documented. Like the Penobscot, it is unknown how the Essex Dam affects the likelihood of spawning occurring in this river.

Gulf of Maine DPS Atlantic sturgeon may also be affected by degraded water quality. In general, water quality has improved in the Gulf of Maine over the past decades (Lichter *et al.* 2006; EPA, 2008). Many rivers in Maine, including the Androscoggin River, were heavily polluted in the past from industrial discharges from pulp and paper mills. While water quality has improved and most discharges are limited through regulations, many pollutants persist in the benthic environment. This can be particularly problematic if pollutants are present on spawning and nursery grounds as developing eggs and larvae are particularly susceptible to exposure to contaminants.

Other than the NEAMAP and ASPI estimates discussed above, there are no empirical abundance estimates for the Gulf of Maine DPS. The Atlantic sturgeon SRT (2007) presumed that the Gulf of Maine DPS was comprised of less than 300 spawning adults per year, based on abundance estimates for the Hudson and Altamaha River riverine populations of Atlantic sturgeon. Surveys of the Kennebec River over two time periods, 1977-1981 and 1998-2000, resulted in the capture of nine adult Atlantic sturgeon (Squiers, 2004). However, since the surveys were primarily directed at capture of shortnose sturgeon, the capture gear used may not have been selective for the larger-sized, adult Atlantic sturgeon; several hundred subadult Atlantic sturgeon were caught in the Kennebec River during these studies.

Summary of the Gulf of Maine DPS

Spawning for the Gulf of Maine DPS is known to occur in two rivers (Kennebec and Androscoggin) and possibly in a third. Spawning may be occurring in other rivers, such as the Sheepscot or Penobscot, but has not been confirmed. There are indications of increasing abundance of Atlantic sturgeon belonging to the Gulf of Maine DPS. Atlantic sturgeon continue to be present in the Kennebec River; in addition, they are captured in directed research projects in the Penobscot River, and are observed in rivers where they were unknown to occur or had not been observed to occur for many years (e.g., the Saco, Presumpscot, and Charles rivers). These observations suggest that abundance of the Gulf of Maine DPS of Atlantic sturgeon is sufficient such that recolonization to rivers historically suitable for spawning may be occurring. However, despite some positive signs, there is not enough information to establish a trend for this DPS.

Some of the impacts from the threats that contributed to the decline of the Gulf of Maine DPS have been removed (e.g., directed fishing), or reduced as a result of improvements in water quality and removal of dams (e.g., the Edwards Dam on the Kennebec River in 1999). There are strict regulations on the use of fishing gear in Maine state waters that incidentally catch sturgeon. In addition, there have been reductions in fishing effort in state and federal waters, which most likely would result in a reduction in bycatch mortality of Atlantic sturgeon. A significant amount of fishing in the Gulf of Maine is conducted using trawl gear, which is known to have a much lower mortality rate for Atlantic sturgeon caught in the gear compared to sink gillnet gear (ASMFC, 2007). Atlantic sturgeon from the GOM DPS are not commonly taken as bycatch in areas south of Chatham, MA, with only 8 percent (e.g., 7 of the 84 fish) of interactions observed in the Mid Atlantic/Carolina region being assigned to the Gulf of Maine DPS (Wirgin and King, 2011). Tagging results also indicate that Gulf of Maine DPS fish tend to remain within the waters of the Gulf of Maine and only occasionally venture to points south. However, data on Atlantic sturgeon incidentally caught in trawls and intertidal fish weirs fished in the Minas Basin area of the Bay of Fundy.(Canada) indicate that approximately 35 percent originated from the

Gulf of Maine DPS (Wirgin *et al.*, in draft).

As noted previously, studies have shown that in order to rebuild, Atlantic sturgeon can only sustain low levels of bycatch and other anthropogenic mortality (Boreman, 1997; ASMFC, 2007; Kahnle *et al.*, 2007; Brown and Murphy, 2010). NMFS has determined that the Gulf of Maine DPS is at risk of becoming endangered in the foreseeable future throughout all of its range (i.e., is a threatened species) based on the following: (1) significant declines in population sizes and the protracted period during which sturgeon populations have been depressed; (2) the limited amount of current spawning; and, (3) the impacts and threats that have and will continue to affect recovery.

4.3.2 New York Bight DPS of Atlantic sturgeon

The New York Bight DPS includes the following: all anadromous Atlantic sturgeon spawned in the watersheds that drain into coastal waters from Chatham, MA to the Delaware-Maryland border on Fenwick Island. Within this range, Atlantic sturgeon historically spawned in the Connecticut, Delaware, Hudson, and Taunton Rivers (Murawski and Pacheco, 1977; Secor, 2002; ASSRT, 2007). Spawning still occurs in the Delaware and Hudson Rivers, but there is no recent evidence (within the last 15 years) of spawning in the Connecticut and Taunton Rivers (ASSRT, 2007). Atlantic sturgeon that are spawned elsewhere continue to use habitats within the Connecticut and Taunton Rivers as part of their overall marine range (ASSRT, 2007; Savoy, 2007; Wirgin and King, 2011).

The abundance of the Hudson River Atlantic sturgeon riverine population prior to the onset of expanded exploitation in the 1800s is unknown but, has been conservatively estimated at 10,000 adult females (Secor, 2002). Current abundance is likely at least one order of magnitude smaller than historical levels (Secor, 2002; ASSRT, 2007; Kahnle *et al.*, 2007). As described above, an estimate of the mean annual number of mature adults (863 total; 596 males and 267 females) was calculated for the Hudson River riverine population based on fishery-dependent data collected from 1985-1995 (Kahnle *et al.*, 2007). Kahnle *et al.* (1998; 2007) also showed that the level of fishing mortality from the Hudson River Atlantic sturgeon fishery during the period of 1985-1995 exceeded the estimated sustainable level of fishing mortality for the riverine population and may have led to reduced recruitment. All available data on abundance of juvenile Atlantic sturgeon in the Hudson River Estuary indicate a substantial drop in production of young since the mid 1970s (Kahnle *et al.*, 1998). A decline appeared to occur in the mid to late 1970s followed by a secondary drop in the late 1980s (Kahnle *et al.*, 1998; Sweka *et al.*, 2007; ASMFC, 2010). Catch-per-unit-effort data suggests that recruitment has remained depressed relative to catches of juvenile Atlantic sturgeon in the estuary during the mid-late 1980s (Sweka *et al.*, 2007; ASMFC, 2010). In examining the CPUE data from 1985-2007, there are significant fluctuations during this time. There appears to be a decline in the number of juveniles between the late 1980s and early 1990s although the CPUE is generally higher in the 2000s as compared to the 1990s. Given the significant annual fluctuation, it is difficult to discern any trend. Despite the CPUEs from 2000-2007 being generally higher than those from 1990-1999, they are low compared to the late 1980s. In addition to bycatch mortality in Federal waters, bycatch and mortality also occur in state fisheries; however, the primary fishery that impacted juvenile sturgeon (shad), has now been closed and there is no indication that it will reopen soon. In the

Hudson River sources of potential mortality include vessel strikes and entrainment in dredges. Individuals are also exposed to effects of bridge construction (including the ongoing replacement of the Tappan Zee bridge). Impingement at water intakes, including the Danskammer, Roseton and Indian Point power plants also occurs. There is currently not enough information regarding any life stage to establish a trend for the Hudson River population.

There is no abundance estimate for the Delaware River population of Atlantic sturgeon. Harvest records from the 1800s indicate that this was historically a large population with an estimated 180,000 adult females prior to 1890 (Secor and Waldman, 1999; Secor, 2002). Sampling in 2009 to target young-of- the year (YOY) Atlantic sturgeon in the Delaware River (i.e., natal sturgeon) resulted in the capture of 34 YOY, ranging in size from 178 to 349 mm TL (Fisher, 2009) and the collection of 32 YOY Atlantic sturgeon in a separate study (Brundage and O'Herron in Calvo *et al.*, 2010). Genetics information collected from 33 of the 2009 year class YOY indicates that at least 3 females successfully contributed to the 2009 year class (Fisher, 2011). Therefore, while the capture of YOY in 2009 provides evidence that successful spawning is still occurring in the Delaware River, the relatively low numbers suggest the existing riverine population is limited in size.

Several threats play a role in shaping the current status and trends observed in the Delaware River and Estuary. In-river threats include habitat disturbance from dredging, and impacts from historical pollution and impaired water quality. A dredged navigation channel extends from Trenton seaward through the tidal river (Brundage and O'Herron, 2009), and the river receives significant shipping traffic. Vessel strikes have been identified as a threat in the Delaware River; however, at this time we do not have information to quantify this threat or its impact to the population or the New York Bight DPS. Similar to the Hudson River, there is currently not enough information to determine a trend for the Delaware River population.

Summary of the New York Bight DPS

Atlantic sturgeon originating from the New York Bight DPS spawn in the Hudson and Delaware rivers. While genetic testing can differentiate between individuals originating from the Hudson or Delaware river the available information suggests that the straying rate is high between these rivers. There are no indications of increasing abundance for the New York Bight DPS (ASSRT, 2009; 2010). Some of the impact from the threats that contributed to the decline of the New York Bight DPS have been removed (e.g., directed fishing) or reduced as a result of improvements in water quality since passage of the Clean Water Act (CWA). In addition, there have been reductions in fishing effort in state and federal waters, which may result in a reduction in bycatch mortality of Atlantic sturgeon. Nevertheless, areas with persistent, degraded water quality, habitat impacts from dredging, continued bycatch in state and federally-managed fisheries, and vessel strikes remain significant threats to the New York Bight DPS.

In the marine range, New York Bight DPS Atlantic sturgeon are incidentally captured in federal and state managed fisheries, reducing survivorship of subadult and adult Atlantic sturgeon (Stein *et al.*, 2004; ASMFC 2007). As explained above, currently available estimates indicate that at least 4% of adults may be killed as a result of bycatch in fisheries authorized under Northeast FMPs. Based on mixed stock analysis results presented by Wirgin and King (2011), over 40 percent of the Atlantic sturgeon bycatch interactions in the Mid Atlantic Bight region were sturgeon from the New York Bight DPS. Individual-based assignment and mixed stock analysis of samples collected from sturgeon captured in Canadian fisheries in the Bay of Fundy indicated that approximately 1-2% were from the New York Bight DPS. At this time, we are not able to quantify the impacts from other threats or estimate the number of individuals killed as a result of other anthropogenic threats.

Riverine habitat may be impacted by dredging and other in-water activities, disturbing spawning habitat and also altering the benthic forage base. Both the Hudson and Delaware rivers have navigation channels that are maintained by dredging. Dredging is also used to maintain channels in the nearshore marine environment. Dredging outside of Federal channels and in-water construction occurs throughout the New York Bight region. While some dredging projects operate with observers present to document fish mortalities many do not. We have reports of one Atlantic sturgeon entrained during hopper dredging operations in Ambrose Channel, New Jersey. At this time, we do not have any information to quantify the number of Atlantic sturgeon killed or disturbed during dredging or in-water construction projects are also not able to quantify any effects to habitat.

In the Hudson and Delaware Rivers, dams do not block access to historical habitat. The Holyoke Dam on the Connecticut River blocks further upstream passage; however, the extent that Atlantic sturgeon would historically have used habitat upstream of Holyoke is unknown. Connectivity may be disrupted by the presence of dams on several smaller rivers in the New York Bight region. Because no Atlantic sturgeon occur upstream of any hydroelectric projects in the New York Bight region, passage over hydroelectric dams or through hydroelectric turbines is not a source of injury or mortality in this area. The extent that Atlantic sturgeon are affected by operations of dams in the New York Bight region is currently unknown.

New York Bight DPS Atlantic sturgeon may also be affected by degraded water quality. In general, water quality has improved in the Hudson and Delaware over the past decades (Lichter *et al.* 2006; EPA, 2008). Both the Hudson and Delaware rivers, as well as other rivers in the New York Bight region, were heavily polluted in the past from industrial and sanitary sewer discharges. While water quality has improved and most discharges are limited through regulations, many pollutants persist in the benthic environment. This can be particularly problematic if pollutants are present on spawning and nursery grounds as developing eggs and larvae are particularly susceptible to exposure to contaminants.

Vessel strikes occur in the Delaware River. Twenty-nine mortalities believed to be the result of vessel strikes were documented in the Delaware River from 2004 to 2008, and at least 13 of these fish were large adults. Given the time of year in which the fish were observed (predominantly May through July, with two in August), it is likely that many of the adults were migrating through the river to the spawning grounds. Because we do not know the percent of total vessel strikes that the observed mortalities represent, we are not able to quantify the number of individuals likely killed as a result of vessel strikes in the New York Bight DPS.

Studies have shown that to rebuild, Atlantic sturgeon can only sustain low levels of anthropogenic mortality (Boreman, 1997; ASMFC, 2007; Kahnle *et al.*, 2007; Brown and Murphy, 2010). There are no empirical abundance estimates of the number of Atlantic sturgeon in the New York Bight DPS. NMFS has determined that the New York Bight DPS is currently at risk of extinction due to: (1) precipitous declines in population sizes and the protracted period in which sturgeon populations have been depressed; (2) the limited amount of current spawning; and (3) the impacts and threats that have and will continue to affect population recovery.

4.3.3 Chesapeake Bay DPS of Atlantic sturgeon

The Chesapeake Bay DPS includes the following: all anadromous Atlantic sturgeons that are spawned in the watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, VA. Within this range, Atlantic sturgeon historically spawned in the Susquehanna, Potomac, James, York, Rappahannock, and Nottoway Rivers (ASSRT, 2007). Based on the review by Oakley (2003), 100 percent of Atlantic sturgeon habitat is currently accessible in these rivers since most of the barriers to passage (i.e. dams) are located upriver of where spawning is expected to have historically occurred (ASSRT, 2007). Spawning still occurs in the James River, and the presence of juvenile and adult sturgeon in the York River suggests that spawning may occur there as well (Musick *et al.*, 1994; ASSRT, 2007; Greene, 2009). However, conclusive evidence of current spawning is only available for the James River. Atlantic sturgeon that are spawned elsewhere are known to use the Chesapeake Bay for other life functions, such as foraging and as juvenile nursery habitat prior to entering the marine system as subadults (Vladykov and Greeley, 1963; ASSRT, 2007; Wirgin *et al.*, 2007; Grunwald *et al.*, 2008).

Age to maturity for Chesapeake Bay DPS Atlantic sturgeon is unknown. However, Atlantic sturgeon riverine populations exhibit clinal variation with faster growth and earlier age to maturity for those that originate from southern waters, and slower growth and later age to maturity for those that originate from northern waters (75 FR 61872; October 6, 2010). Age at maturity is 5 to 19 years for Atlantic sturgeon originating from South Carolina rivers (Smith *et al.*, 1982) and 11 to 21 years for Atlantic sturgeon originating from the Hudson River (Young *et al.*, 1998). Therefore, age at maturity for Atlantic sturgeon of the Chesapeake Bay DPS likely falls within these values.

Several threats play a role in shaping the current status of Chesapeake Bay DPS Atlantic sturgeon. Historical records provide evidence of the large-scale commercial exploitation of Atlantic sturgeon from the James River and Chesapeake Bay in the 19th century (Hildebrand and Schroeder, 1928; Vladykov and Greeley, 1963; ASMFC, 1998; Secor, 2002; Bushnoe *et al.*, 2005; ASSRT, 2007) as well as subsistence fishing and attempts at commercial fisheries as early as the 17th century (Secor, 2002; Bushnoe *et al.*, 2005; ASSRT, 2007; Balazik *et al.*, 2010). Habitat disturbance caused by in-river work such as dredging for navigational purposes is thought to have reduced available spawning habitat in the James River (Holton and Walsh, 1995; Bushnoe *et al.*, 2005; ASSRT, 2007). At this time, we do not have information to quantify this loss of spawning habitat.

Decreased water quality also threatens Atlantic sturgeon of the Chesapeake Bay DPS, especially since the Chesapeake Bay system is vulnerable to the effects of nutrient enrichment due to a relatively low tidal exchange and flushing rate, large surface to volume ratio, and strong stratification during the spring and summer months (Pyzik *et al.*, 2004; ASMFC, 1998; ASSRT, 2007; EPA, 2008). These conditions contribute to reductions in dissolved oxygen levels throughout the Bay. The availability of nursery habitat, in particular, may be limited given the recurrent hypoxia (low dissolved oxygen) conditions within the Bay (Niklitschek and Secor, 2005; 2010). At this time we do not have sufficient information to quantify the extent that degraded water quality effects habitat or individuals in the James River or throughout the Chesapeake Bay.

Vessel strikes have been observed in the James River (ASSRT, 2007). Eleven Atlantic sturgeon were reported to have been struck by vessels from 2005 through 2007. Several of these were mature individuals. Because we do not know the percent of total vessel strikes that the observed mortalities represent, we are not able to quantify the number of individuals likely killed as a result of vessel strikes in the New York Bight DPS.

In the marine and coastal range of the Chesapeake Bay DPS from Canada to Florida, fisheries bycatch in federally and state managed fisheries pose a threat to the DPS, reducing survivorship of subadults and adults and potentially causing an overall reduction in the spawning population (Stein *et al.*, 2004; ASMFC, 2007; ASSRT, 2007).

Summary of the Chesapeake Bay DPS

Spawning for the Chesapeake Bay DPS is known to occur in only the James River. Spawning may be occurring in other rivers, such as the York, but has not been confirmed. There are anecdotal reports of increased sightings and captures of Atlantic sturgeon in the James River. However, this information has not been comprehensive enough to develop a population estimate for the James River or to provide sufficient evidence to confirm increased abundance. Some of the impact from the threats that facilitated the decline of the Chesapeake Bay DPS have been removed (e.g., directed fishing) or reduced as a result of improvements in water quality since passage of the Clean Water Act (CWA). We do not currently have enough information about any life stage to establish a trend for this DPS.

Areas with persistent, degraded water quality, habitat impacts from dredging, continued bycatch in U.S. state and federally-managed fisheries, Canadian fisheries and vessel strikes remain significant threats to the Chesapeake Bay DPS of Atlantic sturgeon. Studies have shown that Atlantic sturgeon can only sustain low levels of bycatch mortality (Boreman, 1997; ASMFC, 2007; Kahnle *et al.*, 2007). The Chesapeake Bay DPS is currently at risk of extinction given (1) precipitous declines in population sizes and the protracted period in which sturgeon populations have been depressed; (2) the limited amount of current spawning; and, (3) the impacts and threats that have and will continue to affect the potential for population recovery.

4.3.4 Carolina DPS of Atlantic sturgeon

The Carolina DPS includes all Atlantic sturgeon that spawn or are spawned in the watersheds (including all rivers and tributaries) from Albemarle Sound southward along the southern Virginia, North Carolina, and South Carolina coastal areas to Charleston Harbor. The marine range of Atlantic sturgeon from the Carolina DPS extends from the Hamilton Inlet, Labrador, Canada, to Cape Canaveral, Florida. Sturgeon are commonly captured 40 miles offshore (D. Fox, DSU, pers. comm.). Records providing fishery bycatch data by depth show the vast majority of Atlantic sturgeon bycatch via gillnets is observed in waters less than 50 meters deep (Stein et al. 2004, ASMFC 2007), but Atlantic sturgeon are recorded as bycatch out to 500 fathoms.

Rivers known to have current spawning populations within the range of the Carolina DPS include the Roanoke, Tar-Pamlico, Cape Fear, Waccamaw, and Pee Dee Rivers. We determined spawning was occurring if young-of-the-year (YOY) were observed, or mature adults were present, in freshwater portions of a system (Table 10). However, in some rivers, spawning by Atlantic sturgeon may not be contributing to population growth because of lack of suitable habitat and the presence of other stressors on juvenile survival and development. There may also be spawning populations in the Neuse, Santee and Cooper Rivers, though it is uncertain. Historically, both the Sampit and Ashley Rivers were documented to have spawning populations at one time. However, the spawning population in the Sampit River is believed to be extirpated and the current status of the spawning population in the Ashley River is unknown. Both rivers may be used as nursery habitat by young Atlantic sturgeon originating from other spawning populations. This represents our current knowledge of the river systems utilized by the Carolina DPS for specific life functions, such as spawning, nursery habitat, and foraging. However, fish from the Carolina DPS likely use other river systems than those listed here for their specific life functions.

River/Estuary	Spawning Population	Data
Roanoke River, VA/NC; Albemarle Sound, NC	Yes	collection of 15 YOY (1997-1998); single YOY (2005)
Tar-Pamlico River, NC; Pamlico Sound	Yes	one YOY (2005)
Neuse River, NC; Pamlico Sound	Unknown	
Cape Fear River, NC	Yes	upstream migration of adults in the fall, carcass of a ripe female upstream in mid-September (2006)
Waccamaw River, SC; Winyah Bay	Yes	age-1, potentially YOY (1980s)
Pee Dee River, SC; Winyah Bay	Yes	running ripe male in Great Pee Dee River (2003)
Sampit, SC; Winyah Bay	Extirpated	
Santee River, SC	Unknown	
Cooper River, SC	Unknown	
Ashley River, SC	Unknown	

Table 10. Major rivers, tributaries, and sounds within the range of the Carolina DPS and currently available data on the presence of an Atlantic sturgeon spawning population in each

system.

The riverine spawning habitat of the Carolina DPS occurs within the Mid-Atlantic Coastal Plain ecoregion (TNC 2002a), which includes bottomland hardwood forests, swamps, and some of the world's most active coastal dunes, sounds, and estuaries. Natural fires, floods, and storms are so dominant in this region that the landscape changes very quickly. Rivers routinely change their courses and emerge from their banks. The primary threats to biological diversity in the Mid-Atlantic Coastal Plain, as listed by TNC are: global climate change and rising sea level; altered surface hydrology and landform alteration (e.g., flood-control and hydroelectric dams, inter-basin transfers of water, drainage ditches, breached levees, artificial levees, dredged inlets and river channels, beach renourishment, and spoil deposition banks and piles); a regionally receding water table, probably resulting from both over-use and inadequate recharge; fire suppression; land fragmentation, mainly by highway development; land-use conversion (e.g., from forests to timber plantations, farms, golf courses, housing developments, and resorts); the invasion of exotic plants and animals; air and water pollution, mainly from agricultural activities including concentrated animal feed operations; and over-harvesting and poaching of species. Many of the Carolina DPS' spawning rivers, located in the Mid-Coastal Plain, originate in areas of marl. Waters draining calcareous, impervious surface materials such as marl are: (1) likely to be alkaline; (2) dominated by surface run-off; (3) have little groundwater connection; and, (4) are seasonally ephemeral.

Historical landings data indicate that between 7,000 and 10,500 adult female Atlantic sturgeon were present in North Carolina prior to 1890 (Armstrong and Hightower 2002, Secor 2002). Secor (2002) estimates that 8,000 adult females were present in South Carolina during that same time-frame. Reductions from the commercial fishery and ongoing threats have drastically reduced the numbers of Atlantic sturgeon within the Carolina DPS. Currently, the Atlantic sturgeon spawning population in at least one river system within the Carolina DPS has been extirpated, with a potential extirpation in an additional system. The ASSRT estimated the remaining river populations within the DPS to have fewer than 300 spawning adults; this is thought to be a small fraction of historic population sizes (ASSRT 2007).

Threats

The Carolina DPS was listed as endangered under the ESA as a result of a combination of habitat curtailment and modification, overutilization (i.e, being taken as bycatch) in commercial fisheries, and the inadequacy of regulatory mechanisms in ameliorating these impacts and threats.

The modification and curtailment of Atlantic sturgeon habitat resulting from dams, dredging, and degraded water quality is contributing to the status of the Carolina DPS. Dams have curtailed Atlantic sturgeon spawning and juvenile developmental habitat by blocking over 60 percent of the historical sturgeon habitat upstream of the dams in the Cape Fear and Santee-Cooper River systems. Water quality (velocity, temperature, and dissolved oxygen (DO)) downstream of these dams, as well as on the Roanoke River, has been reduced, which modifies and curtails the extent of spawning and nursery habitat for the Carolina DPS. Dredging in spawning and nursery grounds modifies the quality of the habitat and is further curtailing the extent of available habitat in the Cape Fear and Cooper Rivers, where Atlantic sturgeon habitat has already been modified and curtailed by the presence of dams. Reductions in water quality from terrestrial activities have modified habitat utilized by the Carolina DPS. In the Pamlico and Neuse systems, nutrient-loading and seasonal anoxia are occurring, associated in part with concentrated animal feeding operations (CAFOs). Heavy industrial development and CAFOs have degraded water quality in the Cape Fear River. Water quality in the Waccamaw and Pee Dee rivers have been affected by industrialization and riverine sediment samples contain high levels of various toxins, including dioxins. Additional stressors arising from water allocation and climate change threaten to exacerbate water quality problems that are already present throughout the range of the Carolina DPS. Twenty interbasin water transfers in existence prior to 1993, averaging 66.5 million gallons per day (mgd), were authorized at their maximum levels without being subjected to an evaluation for certification by North Carolina Department of Environmental and Natural Resources or other resource agencies. Since the 1993 legislation requiring certificates for transfers, almost 170 mgd of interbasin water withdrawals have been authorized, with an additional 60 mgd pending certification. The removal of large amounts of water from the system will alter flows, temperature, and DO. Existing water allocation issues will likely be compounded by population growth and potentially climate change. Climate change is also predicted to elevate water temperatures and exacerbate nutrient-loading, pollution inputs, and lower DO, all of which are current stressors to the Carolina DPS.

Overutilization of Atlantic sturgeon from directed fishing caused initial severe declines in Atlantic sturgeon populations in the Southeast, from which they have never rebounded. Further, continued overutilization of Atlantic sturgeon as bycatch in commercial fisheries is an ongoing impact to the Carolina DPS. Little data exists on bycatch in the Southeast and high levels of bycatch underreporting are suspected. Further, a total population abundance for the DPS is not available, and it is therefore not possible to calculate the percentage of the DPS subject to bycatch mortality based on the available bycatch mortality rates for individual fisheries. However, fisheries known to incidentally catch Atlantic sturgeon occur throughout the marine range of the species and in some riverine waters as well. Because Atlantic sturgeon mix extensively in marine waters and may access multiple river systems, they are subject to being caught in multiple fisheries throughout their range. In addition, stress or injury to Atlantic sturgeon taken as bycatch but released alive may result in increased susceptibility to other threats, such as poor water quality (e.g., exposure to toxins and low DO). This may result in reduced ability to perform major life functions, such as foraging and spawning, or even post-capture mortality.

As a wide-ranging anadromous species, Carolina DPS Atlantic sturgeon are subject to numerous Federal (U.S. and Canadian), state and provincial, and inter-jurisdictional laws, regulations, and agency activities. While these mechanisms have addressed impacts to Atlantic sturgeon through directed fisheries, there are currently no mechanisms in place to address the significant risk posed to Atlantic sturgeon from commercial bycatch. Though statutory and regulatory mechanisms exist that authorize reducing the impact of dams on riverine and anadromous species, such as Atlantic sturgeon, and their habitat, these mechanisms have proven inadequate for preventing dams from blocking access to habitat upstream and degrading habitat downstream. Further, water quality continues to be a problem in the Carolina DPS, even with existing controls on some pollution sources. Current regulatory regimes are not necessarily effective in controlling water allocation issues (e.g., no restrictions on interbasin water transfers in South Carolina, the lack of ability to regulate non-point source pollution, etc.)

The recovery of Atlantic sturgeon along the Atlantic Coast, especially in areas where habitat is limited and water quality is severely degraded, will require improvements in the following areas: (1) elimination of barriers to spawning habitat either through dam removal, breaching, or installation of successful fish passage facilities; (2) operation of water control structures to provide appropriate flows, especially during spawning season; (3) imposition of dredging restrictions including seasonal moratoriums and avoidance of spawning/nursery habitat; and, (4) mitigation of water quality parameters that are restricting sturgeon use of a river (i.e., DO). Additional data regarding sturgeon use of riverine and estuarine environments is needed.

The concept of a viable population able to adapt to changing environmental conditions is critical to Atlantic sturgeon, and the low population numbers of every river population in the Carolina DPS put them in danger of extinction throughout their range; none of the populations are large or stable enough to provide with any level of certainty for continued existence of Atlantic sturgeon in this part of its range. Although the largest impact that caused the precipitous decline of the species has been curtailed (directed fishing), the population sizes within the Carolina DPS are at greatly reduced levels (compared to historical population sizes). Small numbers of individuals resulting from drastic reductions in populations, such as occurred with Atlantic sturgeon due to the commercial fishery, can remove the buffer against natural demographic and environmental variability provided by large populations (Berry, 1971; Shaffer, 1981; Soulé, 1980). Recovery of depleted populations is an inherently slow process for a late-maturing species such as Atlantic sturgeon, and they continue to face a variety of other threats that contribute to their risk of extinction. While a long life-span also allows multiple opportunities to contribute to future generations, it also increases the timeframe over which exposure to the multitude of threats facing the Carolina DPS can occur.

The viability of the Carolina DPS depends on having multiple self-sustaining riverine spawning populations and maintaining suitable habitat to support the various life functions (spawning, feeding, growth) of Atlantic sturgeon populations. Because a DPS is a group of populations, the stability, viability, and persistence of individual populations affects the persistence and viability of the larger DPS. The loss of any population within a DPS will result in: (1) a long-term gap in the range of the DPS that is unlikely to be recolonized; (2) loss of reproducing individuals; (3) loss of genetic biodiversity; (4) potential loss of unique haplotypes; (5) potential loss of adaptive traits; and (6) reduction in total number. The loss of a population will negatively impact the persistence and viability of the DPS as a whole, as fewer than two individuals per generation spawn outside their natal rivers (Secor and Waldman 1999). The persistence of individual populations, and in turn the DPS, depends on successful spawning and rearing within the freshwater habitat, the immigration into marine habitats to grow, and then the return of adults to natal rivers to spawn.

Summary of the Status of the Carolina DPS of Atlantic Sturgeon
In summary, the Carolina DPS is a small fraction of its historic population size. The ASSRT

estimated to be less than 300 spawning adults per year (total of both sexes) in each of the major river systems occupied by the DPS in which spawning still occurs. Recovery of depleted populations is an inherently slow process for a late-maturing species such as Atlantic sturgeon. While a long life-span allows multiple opportunities to contribute to future generations, this is hampered within the Carolina DPS by habitat alteration and bycatch. This DPS was severely depleted by past directed commercial fishing, and faces ongoing impacts and threats from habitat alteration or inaccessibility, bycatch, and the inadequacy of existing regulatory mechanisms to address and reduce habitat alterations and bycatch that have prevented river populations from rebounding and will prevent their recovery.

The presence of dams has resulted in the loss of over 60 percent of the historical sturgeon habitat on the Cape Fear River and in the Santee-Cooper system. Dams are contributing to the endangered status of the Carolina DPS by curtailing the extent of available spawning habitat and further modifying the remaining habitat downstream by affecting water quality parameters (such as depth, temperature, velocity, and DO) that are important to sturgeon. Dredging is also contributing to the status of the Carolina DPS by modifying Atlantic sturgeon spawning and nursery habitat. Habitat modifications through reductions in water quality are contributing to the status of the Carolina DPS due to nutrient-loading, seasonal anoxia, and contaminated sediments. Interbasin water transfers and climate change threaten to exacerbate existing water quality issues. Bycatch is also a current threat to the Carolina DPS that is contributing to its status. Fisheries known to incidentally catch Atlantic sturgeon occur throughout the marine range of the species and in some riverine waters as well. Because Atlantic sturgeon mix extensively in marine waters and may utilize multiple river systems for nursery and foraging habitat in addition to their natal spawning river, they are subject to being caught in multiple fisheries throughout their range. In addition to direct mortality, stress or injury to Atlantic sturgeon taken as bycatch but released alive may result in increased susceptibility to other threats, such as poor water quality (e.g., exposure to toxins). This may result in reduced ability to perform major life functions, such as foraging and spawning. While many of the threats to the Carolina DPS have been ameliorated or reduced due to the existing regulatory mechanisms, such as the moratorium on directed fisheries for Atlantic sturgeon, bycatch is currently not being addressed through existing mechanisms. Further, access to habitat and water quality continues to be a problem even with NMFS' authority under the Federal Power Act to recommend fish passsage and existing controls on some pollution sources. The inadequacy of regulatory mechanisms to control bycatch and habitat alterations is contributing to the status of the Carolina DPS.

4.3.5 South Atlantic DPS of Atlantic sturgeon

The South Atlantic DPS includes all Atlantic sturgeon that spawn or are spawned in the watersheds (including all rivers and tributaries) of the Ashepoo, Combahee, and Edisto Rivers (ACE) Basin southward along the South Carolina, Georgia, and Florida coastal areas to the St. Johns River, Florida. The marine range of Atlantic sturgeon from the South Atlantic DPS extends from the Hamilton Inlet, Labrador, Canada, to Cape Canaveral, Florida.

Rivers known to have current spawning populations within the range of the South Atlantic DPS include the Combahee, Edisto, Savannah, Ogeechee, Altamaha, and Satilla Rivers. We determined spawning was occurring if young-of-the-year (YOY) were observed, or mature adults were present, in freshwater portions of a system (Table 11). However, in some rivers, spawning by Atlantic sturgeon may not be contributing to population growth because of lack of suitable habitat and the presence of other stressors on juvenile survival and development. Historically, both the Broad-Coosawatchie and St. Marys Rivers were documented to have spawning populations at one time; there is also evidence that spawning may have occurred in the St. Johns River or one of its tributaries. However, the spawning population in the St. Marys River, as well as any historical spawning population present in the St. Johns, is believed to be extirpated, and the status of the spawning population in the Broad-Coosawatchie is unknown. Both the St. Marys and St. Johns Rivers are used as nursery habitat by young Atlantic sturgeon originating from other spawning populations. The use of the Broad-Coosawatchie by sturgeon from other spawning populations is unknown at this time. The presence of historical and current spawning populations in the Ashepoo River has not been documented; however, this river may currently be used for nursery habitat by young Atlantic sturgeon originating from other spawning populations. This represents our current knowledge of the river systems utilized by the South Atlantic DPS for specific life functions, such as spawning, nursery habitat, and foraging. However, fish from the South Atlantic DPS likely use other river systems than those listed here for their specific life functions.

River/Estuary	**Spawning Population**	**Data**
ACE (Ashepoo, Combahee, and Edisto Rivers) Basin, SC; St. Helena Sound	Yes	1,331 YOY (1994-2001); gravid female and running ripe male in the Edisto (1997); 39 spawning adults (1998)
Broad-Coosawhatchie Rivers, SC; Port Royal Sound	Unknown	
Savannah River, SC/GA	Yes	22 YOY (1999-2006); running ripe male (1997)
Ogeechee River, GA	Yes	age-1 captures, but high inter-annual variability (1991-1998); 17 YOY (2003); 9 YOY (2004)
Altamaha River, GA	Yes	74 captured/308 estimated spawning adults (2004); 139 captured/378 estimated spawning adults (2005)
Satilla River, GA	Yes	4 YOY and spawning adults (1995-1996)
St. Marys River, GA/FL	Extirpated	
St. Johns River, FL	Extirpated	

Table 11. Major rivers, tributaries, and sounds within the range of the South Atlantic DPS and currently available data on the presence of an Atlantic sturgeon spawning population in each system.

The riverine spawning habitat of the South Atlantic DPS occurs within the South Atlantic Coastal Plain ecoregion (TNC 2002b), which includes fall-line sandhills, rolling longleaf pine uplands, wet pine flatwoods, isolated depression wetlands, small streams, large river systems, and estuaries. Other ecological systems in the ecoregion include maritime forests on barrier islands, pitcher plant seepage bogs and Altamaha grit (sandstone) outcrops. Other ecological systems in the ecoregion include maritime forests on barrier islands, pitcher plant seepage bogs and Altamaha grit (sandstone) outcrops. The primary threats to biological diversity in the South Atlantic Coastal Plain listed by TNC are intensive silvicultural practices, including conversion of natural forests to highly managed pine monocultures and the clear-cutting of bottomland hardwood forests. Changes in water quality and quantity, caused by hydrologic alterations (impoundments, groundwater withdrawal, and ditching), and point and nonpoint pollution, are threatening the aquatic systems. Development is a growing threat, especially in coastal areas. Agricultural conversion, fire regime alteration, and the introduction of nonnative species are additional threats to the ecoregion's diversity. The South Atlantic DPS' spawning rivers, located in the South Atlantic Coastal Plain, are primarily of two types: brownwater (with headwaters north of the Fall Line, silt-laden) and blackwater (with headwaters in the coastal plain, stained by tannic acids).

Secor (2002) estimates that 8,000 adult females were present in South Carolina prior to 1890. Prior to the collapse of the fishery in the late 1800s, the sturgeon fishery was the third largest fishery in Georgia. Secor (2002) estimated from U.S. Fish Commission landing reports that approximately 11,000 spawning females were likely present in the state prior to 1890. Reductions from the commercial fishery and ongoing threats have drastically reduced the numbers of Atlantic sturgeon within the South Atlantic DPS. Currently, the Atlantic sturgeon spawning population in at least two river systems within the South Atlantic DPS has been extirpated. The Altamaha River population of Atlantic sturgeon, with an estimated 343 adults spawning annually, is believed to be the largest population in the Southeast, yet is estimated to be only 6 percent of its historical population size. The ASSRT estimated the abundances of the remaining river populations within the DPS, each estimated to have fewer than 300 spawning adults to be less than 1 percent of what they were historically (ASSRT 2007).

Threats

The South Atlantic DPS was listed as endangered under the ESA as a result of a combination of habitat curtailment and modification, overutilization (i.e, being taken as bycatch) in commercial fisheries, and the inadequacy of regulatory mechanisms in ameliorating these impacts and threats.

The modification and curtailment of Atlantic sturgeon habitat resulting from dredging and degraded water quality is contributing to the status of the South Atlantic DPS. Dredging is a present threat to the South Atlantic DPS and is contributing to their status by modifying the quality and availability of Atlantic sturgeon habitat. Maintenance dredging is currently modifying Atlantic sturgeon nursery habitat in the Savannah River and modeling indicates that the proposed deepening of the navigation channel will result in reduced DO and upriver movement of the salt wedge, curtailing spawning habitat. Dredging is also modifying nursery and foraging habitat in the St. Johns River. Reductions in water quality from terrestrial activities have modified habitat utilized by the South Atlantic DPS. Low DO is modifying sturgeon habitat in the Savannah due to dredging, and non-point source inputs are causing low DO in the Ogeechee River and in the St. Marys River, which completely eliminates juvenile nursery habitat in summer. Low DO has also been observed in the St. Johns River in the summer. Sturgeon are more sensitive to low DO and the negative (metabolic, growth, and feeding) effects caused by low DO increase when water temperatures are concurrently high, as they are within the range of the South Atlantic DPS. Additional stressors arising from water allocation and climate change threaten to exacerbate water quality problems that are already present throughout the range of the South Atlantic DPS. Large withdrawals of over 240 million gallons per day mgd of water occur in the Savannah River for power generation and municipal uses. However, users withdrawing less than 100,000 gallons per day (gpd) are not required to get permits, so actual water withdrawals from the Savannah and other rivers within the range of the South Atlantic DPS are likely much higher. The removal of large amounts of water from the system will alter flows, temperature, and DO. Water shortages and “water wars” are already occurring in the rivers occupied by the South Atlantic DPS and will likely be compounded in the future by population growth and potentially by climate change. Climate change is also predicted to elevate water temperatures and exacerbate nutrient-loading, pollution inputs, and lower DO, all of which are current stressors to the South Atlantic DPS.

Overutilization of Atlantic sturgeon from directed fishing caused initial severe declines in Atlantic sturgeon populations in the Southeast, from which they have never rebounded. Further, continued overutilization of Atlantic sturgeon as bycatch in commercial fisheries is an ongoing impact to the South Atlantic DPS. The loss of large subadults and adults as a result of bycatch impacts Atlantic sturgeon populations because they are a long-lived species, have an older age at maturity, have lower maximum fecundity values, and a large percentage of egg production occurs later in life. Little data exists on bycatch in the Southeast and high levels of bycatch underreporting are suspected. Further, a total population abundance for the DPS is not available, and it is therefore not possible to calculate the percentage of the DPS subject to bycatch mortality based on the available bycatch mortality rates for individual fisheries. However, fisheries known to incidentally catch Atlantic sturgeon occur throughout the marine range of the species and in some riverine waters as well. Because Atlantic sturgeon mix extensively in marine waters and may access multiple river systems, they are subject to being caught in multiple fisheries throughout their range. In addition, stress or injury to Atlantic sturgeon taken as bycatch but released alive may result in increased susceptibility to other threats, such as poor water quality (e.g., exposure to toxins and low DO). This may result in reduced ability to perform major life functions, such as foraging and spawning, or even post-capture mortality.

As a wide-ranging anadromous species, Atlantic sturgeon are subject to numerous Federal (U.S. and Canadian), state and provincial, and inter-jurisdictional laws, regulations, and agency activities. While these mechanisms have addressed impacts to Atlantic sturgeon through directed fisheries, there are currently no mechanisms in place to address the significant risk posed to Atlantic sturgeon from commercial bycatch. Though statutory and regulatory mechanisms exist that authorize reducing the impact of dams on riverine and anadromous species, such as Atlantic sturgeon, and their habitat, these mechanisms have proven inadequate for preventing dams from blocking access to habitat upstream and degrading habitat downstream. Further, water quality continues to be a problem in the South Atlantic DPS, even with existing controls on some pollution sources. Current regulatory regimes are not necessarily effective in controlling water allocation issues (e.g., no permit requirements for water withdrawals under 100,000 gpd in Georgia, no restrictions on interbasin water transfers in South Carolina, the lack of ability to regulate non-point source pollution.)

The recovery of Atlantic sturgeon along the Atlantic Coast, especially in areas where habitat is limited and water quality is severely degraded, will require improvements in the following areas: (1) elimination of barriers to spawning habitat either through dam removal, breaching, or installation of successful fish passage facilities; (2) operation of water control structures to provide appropriate flows, especially during spawning season; (3) imposition of dredging restrictions including seasonal moratoriums and avoidance of spawning/nursery habitat; and, (4) mitigation of water quality parameters that are restricting sturgeon use of a river (i.e., DO). Additional data regarding sturgeon use of riverine and estuarine environments is needed.

A viable population able to adapt to changing environmental conditions is critical to Atlantic sturgeon, and the low population numbers of every river population in the South Atlantic DPS put them in danger of extinction throughout their range. None of the populations are large or stable enough to provide with any level of certainty for continued existence of Atlantic sturgeon in this part of its range. Although the largest impact that caused the precipitous decline of the species has been curtailed (directed fishing), the population sizes within the South Atlantic DPS have remained relatively constant at greatly reduced levels for 100 years. Small numbers of individuals resulting from drastic reductions in populations, such as occurred with Atlantic sturgeon due to the commercial fishery, can remove the buffer against natural demographic and environmental variability provided by large populations (Berry, 1971; Shaffer, 1981; Soulé, 1980). Recovery of depleted populations is an inherently slow process for a late-maturing species such as Atlantic sturgeon, and they continue to face a variety of other threats that contribute to their risk of extinction. While a long life-span also allows multiple opportunities to contribute to future generations, it also increases the timeframe over which exposure to the multitude of threats facing the South Atlantic DPS can occur.

Summary of the Status of the South Atlantic DPS of Atlantic Sturgeon

The South Atlantic DPS is estimated to number a fraction of its historical abundance. There are an estimated 343 spawning adults per year in the Altamaha and less than 300 spawning adults per year (total of both sexes) in each of the other major river systems occupied by the DPS in which spawning still occurs, whose freshwater range occurs in the watersheds (including all rivers and tributaries) of the ACE Basin southward along the South Carolina, Georgia, and Florida coastal areas to the St. Johns River, Florida. Recovery of depleted populations is an inherently slow process for a late-maturing species such as Atlantic sturgeon. While a long life-span also allows multiple opportunities to contribute to future generations, this is hampered within the South Atlantic DPS by habitat alteration, bycatch, and from the inadequacy of existing regulatory mechanisms to address and reduce habitat alterations and bycatch.

Dredging is contributing to the status of the South Atlantic DPS by modifying spawning, nursery, and foraging habitat. Habitat modifications through reductions in water quality are also contributing to the status of the South Atlantic DPS through reductions in DO, particularly during times of high water temperatures, which increase the detrimental effects on Atlantic sturgeon habitat. Interbasin water transfers and climate change threaten to exacerbate existing water quality issues. Bycatch is also a current impact to the South Atlantic DPS that is contributing to its status. Fisheries known to incidentally catch Atlantic sturgeon occur throughout the marine range of the species and in some riverine waters as well. Because Atlantic sturgeon mix extensively in marine waters and may utilize multiple river systems for nursery and foraging habitat in addition to their natal spawning river, they are subject to being caught in multiple fisheries throughout their range. In addition to direct mortality, stress or injury to Atlantic sturgeon taken as bycatch but released alive may result in increased susceptibility to other threats, such as poor water quality (e.g., exposure to toxins). This may result in reduced ability to perform major life functions, such as foraging and spawning. While many of the threats to the South Atlantic DPS have been ameliorated or reduced due to the existing regulatory mechanisms, such as the moratorium on directed fisheries for Atlantic sturgeon, bycatch is currently not being addressed through existing mechanisms. Further, access to habitat and water quality continues to be a problem even with NMFS' authority under the Federal Power Act to recommend fish passsage and existing controls on some pollution sources. There is a lack of regulation for some large water withdrawals, which threatens sturgeon habitat. Current regulatory regimes do not require a permit for water withdrawals under 100,000 gpd in Georgia and there are no restrictions on interbasin water transfers in South Carolina. Existing water allocation issues will likely be compounded by population growth, drought, and potentially climate change. The inadequacy of regulatory mechanisms to control bycatch and habitat alterations is contributing to the status of the South Atlantic DPS.

5.0 ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR § 402.02). The environmental baseline for this Opinion includes the effects of several activities that may affect the survival and recovery of the listed species in the action area. The activities that shape the environmental baseline in the action area of this consultation generally include: dredging operations, vessel and fishery operations, water quality/pollution, and recovery activities associated with reducing those impacts.

5.1 Federal Actions that have Undergone Formal or Early Section 7 Consultation

NMFS has undertaken several ESA section 7 consultations to address the effects of actions authorized, funded or carried out by Federal agencies. Each of those consultations sought to develop ways of reducing the probability of adverse impacts of the action on listed species. Consultations are detailed below.

5.1.1 New York and New Jersey Harbor Deepening Project (HDP)

An Opinion regarding the HDP was issued by NMFS to the USACE on October 13, 2000. The Opinion included an Incidental Take Statement (ITS) exempting the incidental taking of two (2) loggerhead, one (1) green, one (1), Kemp's ridley, or one (1) leatherback for the duration (i.e., 3 years) of the deepening, via a hopper dredge, of the Ambrose Channel. Consultation was reinitiated in 2012 and an Opinion was issued on October 25, 2012. The Opinion included an ITS exempting the incidental taking of (1), Kemp's ridley, or one (1) leatherback, and (1) Atlantic sturgeon (any DPS) for the duration of the deepening, via a hopper dredge, of the Ambrose Channel. To date, no adverse impacts to listed species have been reported as a result of the HDP.

5.1.2 Emergency Beach Renourishment Along the Shoreline of New Jersey

The USACE, NY District, is undertaking Hurricane Sandy emergency beach renourishment activities along the shorelines of New Jersey. Currently, under the authority of Public Law 84-99, the USACE is renourishing the following coastal areas of New Jersey, which the ACOE had previously authorized and constructed: Sea Bright to Monmouth; Belmar to Manasquan; Long Branch, Asbury to Avon, and Keansburg. All material for renourshing these stretches of NJ coastline have or will be obtained from the Sea Bright Borrow Area. Table 12 provides information on the approximate time frame for renourishment activities and estimated volume of material to be removed from Sea Bright Borrow Area and placed on the designated shoreline.

Location of Project	Approximate Duration	Volume of Material (million CY)	Acres Dredged
Sea Bright to Monmouth	July 2013 – January 2014	2.2	138
Belmar to Manasquan	October 2013 – March 2014	1.5	133
Keansburg (Raritan Bay)	November 2013 – May 2014	1.1	120
Long Beach	November 2013 – June 2013	3.3	181
Asbury to Avon	December 2013 – May 2014	1.2	115

Table 12. Approximate time frame for renourishment activities and estimated volume of material to be removed

5.1.3 Amboy Aggregate Mining of Ambrose Channel

On October 11, 2002 NMFS issued an Opinion that considered the effects of the USACE's proposed issuance of a permit to Amboy Aggregates, Inc. for sand mining activities in the Ambrose Channel, New Jersey. The permit authorizes sand mining activities every year for a period of ten years. NMFS concluded that the proposed action may adversely affect, but would not likely jeopardize the continued existence of listed species of sea turtles. The 2002 Opinion included an ITS which exempted the take, via injury or mortality, of two (2) loggerhead, one (1) green, one (1) Kemp's ridley, or one (1) leatherback sea for the ten year duration of the permit. To date, no takes of listed species have been recorded.

5.1.4 Federal Vessel Operations

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the US Navy (USN) and the US Coast Guard (USCG), which maintain the largest federal vessel fleets, the EPA, the National Oceanic and Atmospheric Administration

(NOAA), and the USACE. NMFS has conducted formal consultations with the USCG, the USN, EPA and NOAA on their vessel operations. In addition to operation of USACE vessels, NMFS has consulted with the USACE to provide recommended permit restrictions for operations of contract or private vessels around whales. Through the section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid adverse effects to listed species. Refer to the biological opinions for the USCG (September 15, 1995; July 22, 1996; and June 8, 1998) and the USN (May 15, 1997) for details on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

5.1.5 Federally Authorized Fisheries

NMFS authorizes the operation of several fisheries in the action area under the authority of the Magnuson-Stevens Fishery Conservation and Management Act and through Fishery Management Plans (FMPs) and their implementing regulations. The action area includes a portion of NOAA Statistical Area 612. Fisheries that operate in the action area that may affect ESA-listed species include: American lobster, Atlantic bluefish, Atlantic herring, Atlantic mackerel/squid/ butterfish, Atlantic sea scallop, monkfish, Northeast multispecies, spiny dogfish, surf clam/ocean quahog and summer flounder/scup/black sea bass. Section 7 consultations have been completed on these fisheries to consider effects to listed whales, sea turtles and sturgeon. Of the fisheries noted above, we expect that interactions may occur in all except Atlantic herring and surf clam/ocean quahog.

Batched Fisheries

On December 16, 2013, NMFS issued an Opinion on the continued implementation of management measures for the Northeast multispecies, monkfish, spiny dogfish, Atlantic bluefish, Northeast skate complex, mackerel/squid/butterfish, and summer flounder/scup/black sea bass fisheries. NMFS concluded that the proposed actions may adversely affect, but would not likely jeopardize the continued existence of listed whales, sea turtles and Atlantic sturgeon. The Opinion included an ITS which exempted the following take, via injury or mortality:

- Loggerhead sea turtles: 269 over a five-year average in gillnet gear, 213 loggerheads over a four-year average in bottom trawl gear, and one loggerhead in trap/pot gear
- Leatherback sea turtles: the annual take of 4 leatherbacks in gillnet gear, 4 in bottom trawl, and 4 in trap/pot gear
- Kemp's ridley sea turtles: the annual take of 4 in gillnet gear and 3 in bottom trawl gear.
- Green sea turtles: annual take of 4 in gillnet gear, and 3 in bottom trawl
- Atlantic sturgeon from the GOM DPS, annual take of up to 137 individuals over a five-year average in gillnet gear, the annual take of up to 148 individuals over a five-year average in bottom trawl gear
- Atlantic sturgeon from the NYB DPS, annual take of up to 632 individuals over a five-year average in gillnet gear, the annual take of up to 685 individuals over a five-year average in bottom trawl gear
- Atlantic sturgeon from the CB DPS, annual take of up to 162 individuals over a five-year average in gillnet gear, the annual take of up to 175 individuals over a five-year average in bottom trawl gear

- Atlantic sturgeon from the Carolina DPS, annual take of up to 162 individuals over a five-year average in gillnet gear, the annual take of up to 175 individuals over a five-year average in bottom trawl gear
- Atlantic sturgeon from the SA DPS, annual take of up to 273 individuals over a five-year average in gillnet gear, the annual take of up to 296 individuals over a five-year average in bottom trawl gear
- GOM DPS Atlantic Salmon, 5 over a five-year average in gillnet gear and 5 over a five-year average in trawl gear

American Lobster Fishery
The American lobster fishery has been identified as causing injuries to and mortality of loggerhead and leatherback sea turtles as a result of entanglement in buoy lines of the pot/trap gear. Pot/trap gear has also been identified as a gear type causing injuries and mortality of right, Humpback, and fin whales. The most recent Opinion for this fishery, completed on August 3, 2012, concluded that operation of the federally regulated portion of the lobster trap fishery may adversely affect loggerhead and leatherback sea turtles as a result of entanglement in the groundlines and/or buoy lines associated with this type of gear. An ITS was issued with the 2012 Opinion that exempted the take of 1 loggerhead sea turtle and 5 leatherback sea turtles.

Atlantic Sea Scallop Fishery
Loggerhead, Kemp's ridley, and green sea turtles have been reported by NMFS observers as being captured in scallop dredge and or trawl gear. The average number of annual observable interactions of hard-shelled sea turtles in the Mid-Atlantic dredge fishery prior to the implementation of chain mats (January 1, 2001, through September 25, 2006) was estimated to be 288 turtles, of which 218 could be confirmed as loggerheads (Murray 2011). After the implementation of chain mats (September 26, 2006, through December 31, 2008), the average annual number of observable plus unobservable, quantifiable interactions in the Mid-Atlantic dredge fishery was estimated to be 125 turtles, of which 95 could be confirmed as loggerheads (Murray 2011). An estimate of loggerhead bycatch in Mid-Atlantic scallop trawl gear from 2005-2008 averaged 95 turtles annually (Warden 2011a).

Formal section 7 consultation on the continued authorization of the scallop fishery was last reinitiated on February 28, 2012, with an Opinion issued by NMFS on July 12, 2012. In this Opinion, NMFS determined that the continued authorization of the Scallop FMP (including the seasonal use of turtle deflector dredges [TDDs] in Mid-Atlantic waters starting in 2013) may adversely affect but was not likely to jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, and green sea turtles, or the five DPSs of Atlantic sturgeon, and issued an ITS. In the ITS, the scallop fishery is estimated to interact annually with up to 301 loggerhead, two leatherback, three Kemp's ridley, and two green sea turtles, as well as one Atlantic sturgeon from any of the five DPSs. Of the loggerhead interactions, up to 112 per year are anticipated to be lethal from 2013 going forward.

5.1.6 Research Activities
We have completed ESA section 7 consultation on two research projects that occur in the action area. The US Fish and Wildlife Service funds an ocean trawl survey carried out by the State of

New Jersey; the project is currently funded through May 3, 2014. This federal action was the subject of a consultation completed in May, 2012. In the Opinion, we concluded that the action may adversely affect, but was not likely to jeopardize the continued existence of any DPS of Atlantic sturgeon. The ITS exempts the take of 109 Atlantic sturgeon through May 2014. All captured Atlantic sturgeon are expected to be released alive and no lethal take is anticipated.

We provide funding to the Virginia Institute of Marine Science (VIMS) to carry out the Northeast Area Monitoring and Assessment Program (NEAMAP) Near Shore Trawl Program. In an April 2012 Opinion, we concluded that the 2012 spring and fall surveys may adversely affect, but were not likely to jeopardize the continued existence of any DPS of Atlantic sturgeon. The ITS exempted the take of 32 Atlantic sturgeon through 2012. All captured Atlantic sturgeon were expected to be released alive and no lethal take was anticipated.

5.2 Non-Federal Regulatory Actions

Private and Commercial Vessel Operations

The New York/New Jersey Harbor complex is a major shipping port and center of commerce, there are numerous private and commercial vessels (e.g., container ships, commuter ferries) that operate in the action area that have the potential to interact with listed species. On an annual basis more than 5,124 commercial vessels and approximately 5,292,020 container vessels, as well as numerous recreational vessels transit the New York Harbor complex.

Ship strikes have been identified as a significant source of mortality to the North Atlantic right whale population (Kraus 1990) and are also known to impact all other endangered whales. Data also shows that vessel traffic is a substantial cause of sea turtle mortality. Fifty to 500 loggerheads and 5 to 50 Kemp's ridley turtles are estimated to be killed by vessel traffic per year in the U.S. (National Research Council 1990). In ceratin geographic areas, vessel strikes have also been identified as a threat to Atlantic sturgeon. Although the exact number of Atlantic sturgeon killed as a result of being stuck by vessels is unknown, records of these interactions have been documented (e.g., Brown and Murphy, 2010). These commercial and private activities therefore, have the potential to result in lethal (boat strike) or non-lethal (through harassment) takes of listed species that could prevent or slow a species' recovery. As whales, Atlantic sturgeon, and turtles may be in the area where high vessel traffic occurs, the potential exists for collisions with vessels transiting from within and out of the action area.

An unknown number of private recreational boaters frequent coastal waters; some of these are engaged in whale watching or sport fishing activities. These activities have the potential to result in lethal (through entanglement or boat strike) or non-lethal (through harassment) takes of listed species. Effects of harassment or disturbance which may be caused by such vessel activities are currently unknown; however, no conclusive detrimental effects have been demonstrated. Recent federal efforts regarding mitigating impacts of the whale watch and shipping industries on endangered whales are discussed below.

Non-Federally Regulated Fishery Operations

State fisheries do operate in the state waters of New Jersey. Very little is known about the level of interactions with listed species in fisheries that operate strictly in state waters. Impacts on

Atlantic sturgeon and sea turtles from state fisheries may be greater than those from federal activities in certain areas due to the distribution of these species in these waters. Impacts of state fisheries on endangered whales are addressed as appropriate through the MMPA take reduction planning process. NMFS is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters.

5.3 Other Potential Sources of Impacts to Listed Species

Pollution and Water Quality

Dredging and point source discharges (e.g., municipal wastewater, industrial or power plant cooling water or waste water) and the compounds either associated with discharges or released from the sediments during dredging operations (e.g., metals, dioxins, dissolved solids, phenols, and hydrocarbons) contribute to poor water quality and may also impact the health of sturgeon populations. The compounds associated with discharges can alter the pH or dissolved oxygen levels of receiving waters, which may lead to mortality, changes in fish behavior, deformations, and reduced egg production and survival. Additionally, concentrated amounts of suspended solids discharged into a river system may lead to smothering of fish eggs and larvae and may result in a reduction in the amount of available dissolved oxygen.

Sources of contamination in the action area include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, and industrial development. Chemical contaminants may also have an effect on sea turtle reproduction and survival. Although the effects of contaminants on turtles is relatively unclear, pollution may be linked to the fibropapilloma virus that kills many turtles each year (NMFS 1997). If pollution is not the causal agent, it may make sea turtles more susceptible to disease by weakening their immune systems.

Excessive turbidity due to coastal development and/or construction sites could influence Atlantic sturgeon, sea turtle, and whale foraging ability; however, based on the best available information, whales, Atlantic sturgeon, and turtle foraging ability is not very easily affected by changes in increased suspended sediments unless these alterations make habitat less suitable for listed species and hinder their capability to forage and/or for their foraging items to exist. If the latter occurs, eventually these species will tend to leave or avoid these less desirable areas (Ruben and Morreale 1999).

Marine debris (*e.g.*, discarded fishing line or lines from boats) can entangle turtles and whales causing serious injuries or mortalities to these species. Turtles commonly ingest plastic or mistake debris for food (Magnuson et al. 1990). Sources of contamination in the action area include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, industrial development, and debris. While the effects of contaminants on Atlantic sturgeon, whales, and turtles are relatively unclear, pollutants may make Atlantic sturgeon, sea turtles and whales more susceptible to disease by weakening their immune systems or may have an effect on Atlantic sturgeon, sea turtle, and whale reproduction and survival. For instance, pollution may be linked to the fibropapilloma virus that kills many turtles each year (NMFS 1997).

Noise pollution has been raised as a concern primarily for marine mammals. The potential effects of noise pollution on marine mammals range from minor behavioral disturbance to injury to death. The noise level in the ocean is thought to be increasing at a substantial rate due to increases in shipping and other activities, including seismic exploration, offshore drilling and sonar used by military and research vessels (NMFS 2007b). Because under some conditions, low frequency sound travels very well through water, few oceans are free of the threat of human noise. While there is no hard evidence of a whale population being adversely impacted by noise, scientists think it is possible that masking, the covering up of one sound by another, could interfere with marine mammals ability to feed and to communicate for mating (NMFS 2007b). Masking is a major concern with shipping, but only a few species of marine mammals have been observed to demonstrate behavioral changes to low level sounds. Concerns about noise in the action area of this consultation include increasing noise due to increasing commercial shipping and recreational vessels. Although noise pollution has been identified as a concern for marine mammals, these elevated levels of underwater noise may also be of concern for sea turtles and Atlantic sturgeon. Until additional studies are undertaken, it is difficult to determine the effects these elevated levels of noise will have on sea turtles and Atlantic sturgeon and to what degree these levels of noise may be altering the behavior or physiology of these species.

It should be noted, NMFS and the US Navy have been working cooperatively to establish a policy for monitoring and managing acoustic impacts from anthropogenic sound sources in the marine environment. Acoustic impacts can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns. It is expected that the policy on managing anthropogenic sound in the oceans will provide guidance for programs such as the use of acoustic deterrent devices in reducing marine mammal-fishery interactions and review of federal activities and permits for research involving acoustic activities.

As noted above, private and commercial vessels, including fishing vessels, operating in the action area of this consultation also have the potential to interact with sea turtles, Atlantic sturgeon, or whales. The effects of fishing vessels, recreational vessels, or other types of commercial vessels on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. It is important to note that minor vessel collisions may not kill an animal directly, but may weaken or otherwise affect it so it is more likely to become vulnerable to effects such as entanglements. Listed species may also be affected by fuel oil spills resulting from vessel accidents. Fuel oil spills could affect animals directly or indirectly through the food chain. Fuel spills involving fishing vessels are common events. However, these spills typically involve small amounts of material that are unlikely to adversely affect listed species.

5.4 Conservation and Recovery Actions Reducing Threats to Listed Species

A number of activities are in progress that may ameliorate some of the threat that activities summarized in the *Environmental Baseline* pose to threatened and endangered species in the action area of this consultation. These include education/outreach activities; specific measures to reduce the adverse effects of entanglement in fishing gear, including: gear modifications; fishing gear time area closures; and whale disentanglement. In addition there are measures to reduce ship and other vessel impacts to protected species. Many of these measures have been implemented to reduce risk to critically endangered right whales. Despite the focus on right whales, other cetaceans and some sea turtles will likely benefit from the measures as well.

5.4.1 Reducing Threats to Listed Whales

5.4.1.1 Atlantic Large Whale Take Reduction Plan

The Atlantic Large Whale Take Reduction Plan (ALWTRP) reduces the risk of serious injury or mortality to large whales due to incidental entanglement in U.S. commercial trap/pot and gillnet fishing gear. The ALWTRP focuses on the critically endangered North Atlantic right whale, but is also intended to reduce entanglement of endangered humpback and fin whales. The plan is required by the Marine Mammal Protection Act (MMPA) and has been developed by NOAA's National Marine Fisheries Service (NMFS). The ALWTRP covers the U.S. Atlantic Exclusive Economic Zone (EEZ) from Maine through Florida. The requirements are year-round in the Northeast, and seasonal in the Mid and South Atlantic.

Regulatory actions are directed at reducing serious entanglement injuries and mortality of right, humpback, and fin whales from fixed gear fisheries (*i.e.*, trap and gillnet fisheries). The non-regulatory component of the ALWTRP is composed of four principal parts: (1) gear research and development, (2) disentanglement, (3) the Sighting Advisory System (SAS), and (4) education/outreach. The first ALWTRP went into effect in 1997. For more information, see the ALWTRP (available online at http://www.nero.noaa.gov/whaletrp/)

5.4.1.2 Ship Strike Reduction Program

The Ship Strike Reduction Program is currently focused on protecting the North Atlantic right whale, but the operational measures are expected to reduce the incidence of ship strike on other large whales to some degree. The program consists of five basic elements and includes both regulatory and non-regulatory components: 1) operational measures for the shipping industry, including speed restrictions and routing measures, 2) section 7 consultations with federal agencies that maintain vessel fleets, 3) education and outreach programs, 4) a bilateral conservation agreement with Canada, and 5) ongoing measures to reduce ship strikes of right whales (*e.g.*, SAS, ongoing research into the factors that contribute to ship strikes, and research to identify new technologies that can help mariners and whales avoid each other).

5.4.1.3 Regulatory Measures to Reduce Vessel Strikes to Large Whales

Restricting vessel approach to right whales

In one recovery action aimed at reducing vessel-related impacts, including disturbance, NMFS published an interim final rule in February 1997 that prohibits, except in limited circumstances, both boats and aircraft from approaching any right whale closer than 500 yards.

Mandatory Ship Reporting System (MSR)

In April 1998, the USCG submitted, on behalf of the US, a proposal to the International Maritime Organization (IMO) requesting approval of a mandatory ship reporting system (MSR) in two areas off the east coast of the US, the right whale feeding grounds in the Northeast, and the right whale calving grounds in the Southeast. The USCG worked closely with NMFS and other agencies on technical aspects of the proposal. The package was submitted to the IMO's Subcommittee on Safety and Navigation for consideration and submission to the Marine Safety Committee at IMO and approved in December 1998. The USCG and NOAA play important roles in helping to operate the MSR system, which was implemented on July 1, 1999. Ships entering the northeast and southeast MSR boundaries are required to report the vessel identity, date, time, course, speed, destination, and other relevant information. In return, the vessel receives an automated reply with the most recent right whale sightings or management areas and information on precautionary measures to take while in the vicinity of right whales.

Vessel Speed Restrictions

A key component of NOAA's right whale ship strike reduction program is the implementation of speed restrictions for vessels transiting the U.S. Atlantic in areas and seasons where right whales predictably occur in high concentrations. We published regulations on October 10, 2008 to implement a 10-knot speed restriction for all vessels 65 feet (19.8 m) or longer in Seasonal Management Areas (SMAs) along the east coast of the U.S. Atlantic seaboard at certain times of the year (73 FR 60173; October 10, 2008).

SMAs are supplemented by Dynamic Management Areas (DMAs) that are implemented for 15 day periods in areas in which right whales are sighted outside of SMA boundaries. When NOAA aerial surveys or other reliable sources report aggregations of 3 or more right whales in a density that indicates the whales are likely to persist in the area, NOAA calculates a buffer zone around the aggregation and announces the boundaries of the zone to mariners via various mariner communication outlets, including NOAA Weather Radio, USCG Broadcast Notice to Mariners, MSR return messages, email distribution lists, and the Right Whale Sighting Advisory System (SAS). NOAA requests mariners to route around these zones or transit through them at 10 knots or less. Compliance with DMAs is voluntary.

The rule was set to expire five years from the date of effectiveness. NOAA has analyzed data on compliance with the rule and the effectiveness of the rule since its implementation and published a final rule (78 FR 73726: December 9, 2013) to eliminate the planned December 2013 expiration date of the 2008 rule.

Vessel Routing Measures to Reduce the Co-occurrence of Ships and Whales

Another critical, non-regulatory component of NOAA's right whale ship strike reduction program involves the development and implementation of routing measures that reduce the co-occurrence of vessels and right whales, thus reducing the risk of vessel collisions. Recommended routes were developed for the Cape Cod Bay feeding grounds and Southeast calving grounds by overlaying right whale sightings data on existing vessel tracks, and plotting alternative routes where vessels could expect to encounter fewer right whales. Full implementation of these routes was completed at the end of November 2006. The routes are now charted on all NOAA electronic and printed charts, published in U.S. Coast Pilots, and mariners have been notified through USCG Notices to Mariners.

Through a joint effort between NOAA and the USCG, the U.S. also submitted a proposal to the IMO to shift the northern leg of the existing Boston Traffic Separation Scheme (TSS) 12 degrees to the north to reduce vessel strikes. In 2009 this TSS was modified by narrowing the width of the north-south portion by one mile to further reduce the threat of ship collisions with endangered right whales and other whale species.

In 2009, NOAA and the USCG established the Great South Channel as an Area To Be Avoided (ATBA). This is a voluntary seasonal ATBA for ships weighing 300 gross tons or more. The ATBA will be in effect each year from April 1 to July 31, when right whales are known to congregate around the Great South Channel. Implementing this ATBA coupled with narrowing the TSS by one nautical mile will reduce the relative risk of right whale ship strikes by an estimated 74% during April-July (63% from the ATBA and 11% from the narrowing of the TSS).

Sighting Advisory System (SAS)

The right whale Sighting Advisory System (SAS) was initiated in early 1997 as a partnership among several federal and state agencies and other organizations to conduct aerial and ship board surveys to locate right whales and to alert mariners to right whale sighting locations in a near real time manner. The SAS surveys and opportunistic sightings reports document the presence of right whales and are provided to mariners via fax, email, NAVTEX, Broadcast Notice to Mariners, NOAA Weather Radio, several web sites, and the Traffic Controllers at the Cape Cod Canal. Fishermen and other vessel operators can obtain SAS sighting reports, and make necessary adjustments in operations to decrease the potential for interactions with right whales.

5.4.2 Reducing Threats to Listed Sea Turtles

NMFS has implemented multiple measures to reduce the capture and mortality of sea turtles in fishing gear, and other measures to contribute to the recovery of these species. While some of these actions occur outside of the action area for this consultation, the measures affect sea turtles that do occur within the action area.

5.4.2.1 Education and Outreach Activities

Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. For example, NMFS has been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques, as well as guidelines for recreational fishermen and boaters to avoid the likelihood of interactions with marine mammals. NMFS intends to continue these outreach efforts in an attempt to reduce interactions with protected species, and to reduce the likelihood of injury to protected species when interactions do occur.

5.4.2.2 Sea Turtle Stranding and Salvage Network (STSSN)

The Sea Turtle Stranding and Salvage Network (STSSN) does not directly reduce the threats to sea turtles. However, the extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts not only collects data on dead sea turtles, but also rescues and rehabilitates live stranded turtles, reducing mortality of injured or sick animals. NMFS manages the activities of the STSSN. Data collected by the STSSN are used to monitor stranding levels, to identify areas where unusual or elevated mortality is occurring, and to identify sources of mortality. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All of the states that participate in the STSSN tag live turtles when encountered (either via the stranding network through incidental takes or in-water studies). Tagging studies help improve our understanding of sea turtle movements, longevity, and reproductive patterns, all of which contribute to our ability to reach recovery goals for the species.

5.4.2.3 Sea Turtle Disentanglement Network (STDN)

The Sea Turtle Disentanglement Network (STDN) is considered a component of the larger STSSN program, and it operates in all states in the region. The STDN responds to entangled sea turtles and disentangles and releases live animals, thereby reducing serious injury and mortality. In addition, the STDN collects data on live and dead sea turtle entanglement events, providing valuable information for management purposes. The NMFS Northeast Regional Office oversees the STDN program and manages the STDN database.

5.4.2.4 Regulatory Measures for Sea Turtles

Large-Mesh Gillnet Requirements in the Mid-Atlantic

Since 2002, NMFS has regulated the use of large mesh gillnets in Federal waters off North Carolina and Virginia (67 FR 13098, March 21, 2002) to reduce the impact of these fisheries on ESA-listed sea turtles. Currently, gillnets with stretched mesh size 7-inches (17.8 cm) or larger are prohibited in the Exclusive Economic Zone during the following times and in the following areas: (1) north of the NC/SC border to Oregon Inlet, NC at all times, (2) north of Oregon Inlet to Currituck Beach Light, NC from March 16 through January 14, (3) north of Currituck Beach Light, NC to Wachapreague Inlet, VA from April 1 through January 14, and (4) north of Wachapreague Inlet, VA to Chincoteague, VA from April 16 through January 14.

NMFS has also issued regulations to address the take of sea turtles in gillnet gear fished in Pamlico Sound, NC. Waters of Pamlico Sound are closed to fishing with gillnets with a stretched mesh size larger than 4 ¼ inch (10.8 cm) from September 1 through December 15 each year to protect sea turtles. The closed area includes all inshore waters of Pamlico Sound, and all contiguous tidal waters, south of $35^{o}46.3'$ N. lat., north of $35^{o}\ 00'$ N. lat., and east of $76^{o}\ 30'$ W. long.

TED Requirements in Trawl Fisheries

Turtle Excluder Devices (TEDs) are required in the shrimp and summer flounder fisheries. TEDs allow sea turtles to escape the trawl net, reducing injury and mortality resulting from capture in the net. Approved TEDs are required in the shrimp trawl fishery operating in the Atlantic and Gulf Areas unless the trawler is fishing under one of the exemptions (*e.g.*, skimmer trawl, try net) and all requirements of the exemption (50 CFR§ 223.206) are met. On February 21, 2003, NMFS issued a final rule to amend the TED regulations to enhance their effectiveness in reducing sea turtle mortality resulting from shrimp trawling in the Atlantic and Gulf Areas of the southeastern United States by requiring an escape opening designed to exclude leatherbacks as well as large loggerhead and green turtles (68 FR 8456; February 21, 2003). In 2011, NMFS published a Notice of Intent to prepare an Environmental Impact Statement (EIS) and to conduct scoping meetings. NMFS is considering a variety of regulatory measures to reduce the bycatch of threatened and endangered sea turtles in the shrimp fishery of the southeastern United States in light of new concerns regarding the effectiveness of existing TED regulations in protecting sea turtles (76 FR 37050, June 24, 2011). TEDs are also required for summer flounder trawlers in the summer flounder fishery-sea turtle protection area (50 CFR §223.206).

5.4.3 Reducing Threats to Atlantic Sturgeon

Atlantic Sturgeon Recovery Planning

Several conservation actions aimed at reducing threats to Atlantic sturgeon are currently ongoing. We will be convening a recovery team and drafting a recovery plan to outline recovery goals and criteria, as well as steps necessary to recover all Atlantic sturgeon DPSs. Numerous research activities are underway involving NMFS and other federal, state, and academic partners to obtain more information on the distribution and abundance of Atlantic sturgeon throughout their range, including in the action area, and to develop population estimates for each DPS. We will be working closely with ASMFC and NEFSC on the new stock assessment process described above. Efforts are also underway to better understand threats faced by the DPSs and to find ways to minimize these threats, including bycatch and water quality. Fishing gear researchers are working on designing fishing gear that minimizes interactions with Atlantic sturgeon while maximizing retention of targeted fish species. Several states are in the process of preparing ESA Section 10 Habitat Conservation Plans aimed at minimizing the effects of state fisheries on Atlantic sturgeon.

Education and Outreach Activities

NMFS has a program called “SCUTES” (Student Collaborating to Undertake Tracking Efforts for Sturgeon), which offers educational programs and activities about the movements, behaviors, and threats to Atlantic sturgeon. NMFS intends to continue these outreach efforts in an attempt to reduce interactions with protected species, and to reduce the likelihood of injury to protected species when interactions do occur.

Stranding and Salvage Programs

A salvage program is now in place for Atlantic sturgeon. Atlantic sturgeon carcasses can provide pertinent life history data and information on new or evolving threats to Atlantic sturgeon. Their use in scientific research studies can reduce the need to collect live Atlantic sturgeon. The NMFS Sturgeon Salvage Program is a network of individuals qualified to retrieve and/or use Atlantic and shortnose sturgeon carcasses and parts for scientific research and education. All carcasses and parts are retrieved opportunistically and participation in the network is voluntary.

6.0 CLIMATE CHANGE

The discussion below presents background information on global climate change and information on past and predicted future effects of global climate change throughout the range of the listed species considered here. Additionally, we present the available information on predicted effects of climate change in the action area and how listed sea turtles, whales, and sturgeon may be affected by those predicted environmental changes over the life of the proposed actions (i.e., between now and 2064). Generally speaking, climate change may be relevant to the Status of the Species, Environmental Baseline, and Cumulative Effects sections of an Opinion; rather than include partial discussion in several sections of this Opinion, we are synthesizing this information into one discussion. Effects of the proposed actions that are relevant to climate change are included in the Effects of the Action section below (section 8.0 below).

6.1 Background Information on Global Climate Change

The global mean temperature has risen 0.76ºC (1.36°F) over the last 150 years, and the linear trend over the last 50 years is nearly twice that for the last 100 years (IPCC 2007a) and precipitation has increased nationally by 5%-10%, mostly due to an increase in heavy downpours (NAST 2000). There is a high confidence, based on substantial new evidence, that observed changes in marine systems are associated with rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels, and circulation. Ocean acidification resulting from massive amounts of carbon dioxide and other pollutants released into the air can have major adverse impacts on the calcium balance in the oceans. Changes to the marine ecosystem due to climate change include shifts in ranges and changes in algal, plankton, and fish abundance (IPCC 2007b); these trends are most apparent over the past few decades. Information on future impacts of climate change in the action area is discussed below.

Climate model projections exhibit a wide range of plausible scenarios for both temperature and precipitation over the next century. Both of the principal climate models used by the National Assessment Synthesis Team (NAST) project warming in the southeast by the 2090s, but at different rates (NAST 2000): The Canadian model scenario shows the southeast U.S. experiencing a high degree of warming, which translates into lower soil moisture as higher temperatures increase evaporation. The Hadley model scenario projects less warming and a significant increase in precipitation (about 20%). The scenarios examined, which assume no major interventions to reduce continued growth of world greenhouse gases (GHG), indicate that temperatures in the U.S. will rise by about 3^{o}-5^{o}C (5^{o}-9^{o}F) on average in the next 100 years which is more than the projected global increase (NAST 2000). A warming of about 0.2^{o}C (0.4°F) per decade is projected for the next two decades over a range of emission scenarios (IPCC 2007). This temperature increase will very likely be associated with more extreme precipitation and faster evaporation of water, leading to greater frequency of both very wet and very dry conditions. Climate warming has resulted in increased precipitation, river discharge, and glacial and sea-ice melting (Greene *et al.* 2008).

The past three decades have witnessed major changes in ocean circulation patterns in the Arctic, and these were accompanied by climate associated changes as well (Greene *et al.* 2008). Shifts in atmospheric conditions have altered Arctic Ocean circulation patterns and the export of freshwater to the North Atlantic (Greene *et al.* 2008, IPCC 2006). With respect specifically to the North Atlantic Oscillation (NAO), changes in salinity and temperature are thought to be the result of changes in the earth's atmosphere caused by anthropogenic forces (IPCC 2006). The NAO impacts climate variability throughout the northern hemisphere (IPCC 2006). Data from the 1960s through the present show that the NAO index has increased from minimum values in the 1960s to strongly positive index values in the 1990s and somewhat declined since (IPCC 2006). This warming extends over 1000m (0.62 miles) deep and is deeper than anywhere in the world oceans and is particularly evident under the Gulf Stream/ North Atlantic Current system (IPCC 2006). On a global scale, large discharges of freshwater into the North Atlantic subarctic seas can lead to intense stratification of the upper water column and a disruption of North Atlantic Deepwater (NADW) formation (Greene *et al.* 2008, IPCC 2006). There is evidence that the NADW has already freshened significantly (IPCC 2006). This in turn can lead to a slowing down of the global ocean thermohaline (large-scale circulation in the ocean that transforms low-density upper ocean waters to higher density intermediate and deep waters and returns those waters back to the upper ocean), which can have climatic ramifications for the whole earth system (Greene *et al.* 2008).

While predictions are available regarding potential effects of climate change globally, it is more difficult to assess the potential effects of climate change over the next few decades on coastal and marine resources on smaller geographic scales, such as the shoreline of Elberon to Loch Arbour or Raritan Bay, especially as climate variability is a dominant factor in shaping coastal and marine systems. The effects of future change will vary greatly in diverse coastal regions for the U.S. Warming is very likely to continue in the U.S. over the next 25 to 50 years regardless of reduction in GHGs, due to emissions that have already occurred (NAST 2000). It is very likely that the magnitude and frequency of ecosystem changes will continue to increase in the next 25 to 50 years, and it is possible that the rate of change will accelerate. Climate change can cause or exacerbate direct stress on ecosystems through high temperatures, a reduction in water availability, and altered frequency of extreme events and severe storms. Water temperatures in streams and rivers are likely to increase as the climate warms and are very likely to have both direct and indirect effects on aquatic ecosystems. Changes in temperature will be most evident during low flow periods when they are of greatest concern (NAST 2000). In some marine and freshwater systems, shifts in geographic ranges and changes in algal, plankton, and fish abundance are associated with high confidence with rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels and circulation (IPCC 2007).

A warmer and drier climate is expected to result in reductions in stream flows and increases in water temperatures. Expected consequences could be a decrease in the amount of dissolved oxygen in surface waters and an increase in the concentration of nutrients and toxic chemicals due to reduced flushing rate (Murdoch *et al.* 2000). Because many rivers are already under a great deal of stress due to excessive water withdrawal or land development, and this stress may be exacerbated by changes in climate, anticipating and planning adaptive strategies may be critical (Hulme 2005). A warmer-wetter climate could ameliorate poor water quality conditions in places where human-caused concentrations of nutrients and pollutants other than heat currently degrade water quality (Murdoch *et al.* 2000). Increases in water temperature and changes in seasonal patterns of runoff will very likely disturb fish habitat and affect recreational uses of lakes, streams, and wetlands. Surface water resources in the southeast are intensively managed with dams and channels and almost all are affected by human activities; in some systems water quality is either below recommended levels or nearly so. A global analysis of the potential effects of climate change on river basins indicates that due to changes in discharge and water stress, the area of large river basins in need of reactive or proactive management interventions in response to climate change will be much higher for basins impacted by dams than for basins with free-flowing rivers (Palmer *et al.* 2008). Human-induced disturbances also influence coastal and marine systems, often reducing the ability of the systems to adapt so that systems that might ordinarily be capable of responding to variability and change are less able to do so. Because stresses on water quality are associated with many activities, the impacts of the existing stresses are likely to be exacerbated by climate change. Within 50 years, river basins that are impacted by dams or by extensive development may experience greater changes in discharge and water stress than unimpacted, free-flowing rivers (Palmer *et al.* 2008).

While debated, researchers anticipate: 1) the frequency and intensity of droughts and floods will change across the nation; 2) a warming of about 0.2°C (0.4°F) per decade; and 3) a rise in sea level (NAST 2000). A warmer and drier climate will reduce stream flows and increase water temperature resulting in a decrease of DO and an increase in the concentration of nutrients and toxic chemicals due to reduced flushing. Sea level is expected to continue rising: during the 20th century global sea level has increased 15 to 20 cm (6-8 inches).

6.2 Species Specific Information on Climate Change Effects

6.2.1 Loggerhead Sea Turtles

The most recent Recovery Plan for loggerhead sea turtles as well as the 2009 Status Review Report identifies global climate change as a threat to loggerhead sea turtles. However, trying to assess the likely effects of climate change on loggerhead sea turtles is extremely difficult given the uncertainty in all climate change models and the difficulty in determining the likely rate of temperature increases and the scope and scale of any accompanying habitat effects. Additionally, no significant climate change-related impacts to loggerhead sea turtle populations have been observed to date. Over the long-term, climate change related impacts are expected to influence biological trajectories on a century scale (Parmesan and Yohe 2003). As noted in the 2009 Status Review (Conant *et al.* 2009), impacts from global climate change induced by human activities are likely to become more apparent in future years (Intergovernmental Panel on Climate Change (IPCC) 2007). Climate change related increasing temperatures, sea level rise, changes in ocean productivity, and increased frequency of storm events may affect loggerhead sea turtles.

Increasing temperatures are expected to result in rising sea levels (Titus and Narayanan 1995 in Conant *et al*. 2009), which could result in increased erosion rates along nesting beaches. Sea level rise could result in the inundation of nesting sites and decrease available nesting habitat (Daniels *et al*. 1993; Fish *et al*. 2005; Baker *et al*. 2006). The BRT noted that the loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis *et al*. 2006; Baker *et al*. 2006; both in Conant *et al*. 2009). Along developed coastlines, and especially in areas where erosion control structures have been constructed to limit shoreline movement, rising sea levels may cause severe effects on nesting females and their eggs as nesting females may deposit eggs seaward of the erosion control structures potentially subjecting them to repeated tidal inundation. However, if global temperatures increase and there is a range shift northwards, beaches not currently used for nesting may become available for loggerhead sea turtles, which may offset some loss of accessibility to beaches in the southern portions of the range.

Climate change has the potential to result in changes at nesting beaches that may affect loggerhead sex ratios. Loggerhead sea turtles exhibit temperature-dependent sex determination. Rapidly increasing global temperatures may result in warmer incubation temperatures and highly female-biased sex ratios (*e.g.*, Glen and Mrosovsky 2004; Hawkes *et al*. 2009); however, to the extent that nesting can occur at beaches further north where sand temperatures are not as warm, these effects may be partially offset. The BRT specifically identified climate change as a threat to loggerhead sea turtles in the neritic/oceanic zone where climate change may result in future trophic changes, thus impacting loggerhead prey abundance and/or distribution. In the threats matrix analysis, climate change was considered for oceanic juveniles and adults and eggs/hatchlings. The report states that for oceanic juveniles and adults, "although the effect of trophic level change from…climate change…is unknown it is believed to be very low." For eggs/hatchlings the report states that total mortality from anthropogenic causes, including sea level rise resulting from climate change, is believed to be low relative to the entire life stage. The BRT concludes that only limited data are available on past trends related to climate effects on loggerhead sea turtles; current scientific methods are not able to reliably predict the future magnitude of climate change, associated impacts, whether and to what extent some impacts will offset others, or the adaptive capacity of this species.

Following the publication of the 2009 Status Review, Van Houtan and Halley (2011) developed climate forcing models to investigate loggerhead nesting (considering juvenile recruitment and breeding remigration) in the North Pacific and Northwest Atlantic. These models found that climate conditions/oceanographic influences explain loggerhead nesting variability, with climate models alone explaining an average 60% (range 18%-88%) of the observed nesting changes over the past several decades. In terms of future nesting projections, modeled climate data show a future positive trend for Florida nesting, with increases through 2040 as a result of the Atlantic Multidecadal Oscillation signal.

6.2.2 Kemp's Ridley Sea Turtles

The recovery plan for Kemp's ridley sea turtles (NMFS *et al*. 2011) identifies climate change as a threat; however, as with other species discussed above, no significant climate change-related impacts to Kemp's ridley sea turtles have been observed to date. Atmospheric warming could cause habitat alteration which may change food resources such as crabs and other invertebrates. It may increase hurricane activity, leading to an increase in debris in nearshore and offshore waters, which may result in an increase in entanglement, ingestion, or drowning. In addition, increased hurricane activity may cause damage to nesting beaches or inundate nests with sea water. Atmospheric warming may change convergence zones, currents and other oceanographic features that are relevant to Kemp's ridleys, as well as change rain regimes and levels of nearshore runoff.

Considering that the Kemp's ridley has temperature-dependent sex determination (Wibbels

2003) and the vast majority of the nesting range is restricted to the State of Tamaulipas, Mexico, global warming could potentially shift population sex ratios towards females and thus change the reproductive ecology of this species. A female bias is presumed to increase egg production (assuming that the availability of males does not become a limiting factor) (Coyne and Landry 2007) and increase the rate of recovery; however, it is unknown at what point the percentage of males may become insufficient to facilitate maximum fertilization rates in a population. If males become a limiting factor in the reproductive ecology of the Kemp's ridley, then reproductive output in the population could decrease (Coyne 2000). Low numbers of males could also result in the loss of genetic diversity within a population; however, there is currently no evidence that this is a problem in the Kemp's ridley population (NMFS *et al*. 2011). Models (Davenport 1997, Hulin and Guillon 2007, Hawkes *et al.* 2007, all referenced in NMFS *et al.* 2011) predict very long-term reductions in fertility in sea turtles due to climate change, but due to the relatively long life cycle of sea turtles, reductions may not be seen until 30 to 50 years in the future.

Another potential impact from global climate change is sea level rise, which may result in increased beach erosion at nesting sites. Beach erosion may be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents. In the case of the Kemp's ridley where most of the critical nesting beaches are undeveloped, beaches may shift landward and still be available for nesting. The Padre Island National Seashore (PAIS) shoreline is accreting, unlike much of the Texas coast, and with nesting increasing and the sand temperatures slightly cooler than at Rancho Nuevo, PAIS could become an increasingly important source of males for the population.

6.2.3 Leatherback Sea Turtles

Global climate change has been identified as a factor that may affect leatherback habitat and biology (NMFS and USFWS 2007b); however, no significant climate change related impacts to leatherback sea turtle populations have been observed to date. Over the long term, climate change related impacts will likely influence biological trajectories in the future on a century scale (Parmesan and Yohe 2003). Changes in marine systems associated with rising water temperatures, changes in ice cover, salinity, oxygen levels and circulation including shifts in ranges and changes in algal, plankton, and fish abundance could affect leatherback prey distribution and abundance. Climate change is expected to expand foraging habitats into higher latitude waters and some concern has been noted that increasing temperatures may increase the female:male sex ratio of hatchlings on some beaches (Morosovsky *et al*. 1984 and Hawkes *et al*. 2007 in NMFS and USFWS 2007d). However, due to the tendency of leatherbacks to have individual nest placement preferences and deposit some clutches in the cooler tide zone of beaches, the effects of long-term climate on sex ratios may be mitigated (Kamel and Mrosovsky 2004 in NMFS and USFWS 2007d).

Additional potential effects of climate change on leatherbacks include range expansion and changes in migration routes as increasing ocean temperatures shift range-limiting isotherms north (Robinson *et al*. 2008). Leatherbacks have expanded their range in the Atlantic north by 330 km in the last 17 years as warming has caused the northerly migration of the 15°C sea surface temperature (SST) isotherm, the lower limit of thermal tolerance for leatherbacks

(McMahon and Hays 2006). Leatherbacks are speculated to be the best able to cope with climate change of all the sea turtle species due to their wide geographic distribution and relatively weak beach fidelity. Leatherback sea turtles may be most affected by any changes in the distribution of their primary jellyfish prey, which may affect leatherback distribution and foraging behavior (NMFS and USFWS 2007d). Jellyfish populations may increase due to ocean warming and other factors (Brodeur *et al*. 1999; Attrill *et al*. 2007; Richardson *et al*. 2009). However, any increase in jellyfish populations may or may not impact leatherbacks as there is no evidence that any leatherback populations are currently food-limited.

Increasing temperatures are expected to result in rising sea levels (Titus and Narayanan 1995 in Conant *et al*. 2009), which could result in increased erosion rates along nesting beaches. Sea level rise could result in the inundation of nesting sites and decrease available nesting habitat (Fish *et al*. 2005). This effect would potentially be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents. While there is a reasonable degree of certainty that climate change related effects will be experienced globally (*e.g.*, rising temperatures and changes in precipitation patterns), due to a lack of scientific data, the specific effects of climate change on this species are not quantifiable at this time (Hawkes *et al.* 2009).

6.2.4 Green Sea Turtles

The five year status review for green sea turtles (NMFS and USFWS 2007c) notes that global climate change is affecting green sea turtles and is likely to continue to be a threat. There is an increasing female bias in the sex ratio of green turtle hatchlings. While this is partly attributable to imperfect egg hatchery practices, global climate change is also implicated as a likely cause. This is because warmer sand temperatures at nesting beaches are likely to result in the production of more female embryos. At least one nesting site, Ascension Island, has had an increase in mean sand temperature in recent years (Hays *et al*. 2003 in NMFS and USFWS 2007c). Climate change may also affect nesting beaches through sea level rise, which may reduce the availability of nesting habitat and increase the risk of nest inundation. Loss of appropriate nesting habitat may also be accelerated by a combination of other environmental and oceanographic changes, such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion. Oceanic changes related to rising water temperatures could result in changes in the abundance and distribution of the primary food sources of green sea turtles, which in turn could result in changes in behavior and distribution of this species. Seagrass habitats may suffer from decreased productivity and/or increased stress due to sea level rise, as well as salinity and temperature changes (Short and Neckles 1999; Duarte 2002).

6.2.5 *Right, Humpback, and Fin Whales*

Whales have persisted for millions of years and throughout this time have experienced wide variations in global climate conditions and have successfully adapted to these changes. Climate change at historical rates (thousands of years) is not thought to have been a problem for whales. The impact of climate change on cetaceans is likely to be related to changes in sea temperatures, potential freshening of sea water due to melting ice and increased rainfall, sea level rise, the loss of polar habitats and potential shifts in the distribution and abundance of prey species. Of the main factors affecting distribution of cetaceans, water temperature appears to be the main influence on geographic ranges of cetacean species (MacLeod 2009). Depending on habitat preferences, changes in water temperature due to climate change may affect the distribution of certain species of cetaceans. For instance, fin and humpback whales are distributed in all water temperature zones, therefore, it is unlikely that their range will be directly affected by an increase in water temperatures (MacLeod 2009). However, North Atlantic right whales, which currently have a range of sub-polar to sub-tropical, may respond to an increase in water temperature by shifting their range northward, with both the northern and southern limits moving pole-ward.

In regards to marine mammal prey species, there are many potential direct and indirect effects that global climate change may have on prey abundance and distribution, which in turn, poses potential behavioral and physiological effects to marine mammals. For example, Greene *et al.* (2003) described the potential oceanographic processes linking climate variability to the reproduction of North Atlantic right whales. Climate-driven changes in ocean circulation have had a significant impact on the plankton ecology of the Gulf of Maine, including effects on *Calanus finmarchicus*, a primary prey resource for right whales.

More information is needed in order to determine the potential impacts global climate change will have on the timing and extent of population movements, abundance, recruitment, distribution and species composition of prey (Learmonth *et al.* 2006). Changes in climate patterns, ocean currents, storm frequency, rainfall, salinity, melting ice, and an increase in river inputs/runoff (nutrients and pollutants) will all directly affect the distribution, abundance and migration of prey species (Waluda *et al.* 2001; Tynan and DeMaster 1997; Learmonth *et al.* 2006). These changes will likely have several indirect effects on marine mammals, which may include changes in distribution, including displacement from ideal habitats, decline in fitness of individuals, population size due to the potential loss of foraging opportunities, abundance, migration, community structure, susceptibility to disease and contaminants, and reproductive success (MacLeod 2009). Global climate change may also result in changes to the range and abundance of competitors and predators that will also indirectly affect marine mammals (Learmonth *et al.* 2006).

6.2.6 Atlantic Sturgeon

Global climate change may affect all DPSs of Atlantic sturgeon in the future; however, effects of increased water temperature and decreased water availability are most likely to affect the South Atlantic and Carolina DPSs. Rising sea level may result in the salt wedge moving upstream in affected rivers. Atlantic sturgeon spawning occurs in fresh water reaches of rivers because early life stages have little to no tolerance for salinity. Similarly, juvenile Atlantic sturgeon have limited tolerance for salinity and remain in waters with little to no salinity. If the salt wedge moves further upstream, Atlantic sturgeon spawning and rearing habitat could be restricted. In river systems with dams or natural falls that are impassable by sturgeon, the extent that spawning or rearing may be shifted upstream to compensate for the shift in the movement of the saltwedge would be limited. While there is an indication that an increase in sea level rise would result in a shift in the location of the salt wedge, at this time there are no predictions on the timing or extent of any shifts that may occur; thus, it is not possible to predict any future loss in spawning or rearing habitat. However, in all river systems, spawning occurs miles upstream of the saltwedge. It is unlikely that shifts in the location of the saltwedge would eliminate freshwater spawning or rearing habitat. If habitat was severely restricted, productivity or survivability may decrease.

The increased rainfall predicted by some models in some areas may increase runoff and scour spawning areas and flooding events could cause temporary water quality issues. Rising temperatures predicted for all of the U.S. could exacerbate existing water quality problems with DO and temperature. While this occurs primarily in rivers in the southeast U.S. and the Chesapeake Bay, it may start to occur more commonly in the northern rivers. Atlantic sturgeon prefer water temperatures up to approximately 28°C (82.4°F); these temperatures are experienced naturally in some areas of rivers during the summer months. If river temperatures rise and temperatures above 28°C are experienced in larger areas, sturgeon may be excluded from some habitats.

Increased droughts (and water withdrawal for human use) predicted by some models in some areas may cause loss of habitat including loss of access to spawning habitat. Drought conditions in the spring may also expose eggs and larvae in rearing habitats. If a river becomes too shallow or flows become intermittent, all Atlantic sturgeon life stages, including adults, may become susceptible to strandings or habitat restriction. Low flow and drought conditions are also expected to cause additional water quality issues. Any of the conditions associated with climate change are likely to disrupt river ecology causing shifts in community structure and the type and abundance of prey. Additionally, cues for spawning migration and spawning could occur earlier in the season causing a mismatch in prey that are currently available to developing sturgeon in rearing habitat.

6.3 Effects of Climate Change in the Action Area

Information on how climate change will impact the action area is limited. According to the New York State Energy Research and Development Authority's 2011 ClimAid Synthesis Report, temperatures across New York State are expected to rise by 1.5 to 3°F by the 2020s, 3 to 5.5°F by the 2050s, and 4 to 9°F by the 2080s (ClimAid 2011). In addition, data from the Office of the New Jersey State Climatologist has shown a statistically significant rise in average statewide temperature (approximately 2 degrees Fahrenheit) over the last 113 years. It is predicted that in the Northeastern US, precipitation, particularly in the form of rainfall, and runoff are expected to increase in future years (NECIA 2007). NOAA tide gauge data reported by the State indicates that the sea level within the Battery of New York Harbor has risen at a rate of approximately 2.77 mm/yr since recordings began in 1856, while at the New Jersey coast site of Sandy Hook, sea level has risen at a rate of approximately 3.9 mm/y since recording began in the early- to mid-1900s.

Sea surface temperatures have fluctuated around a mean for much of the past century, as measured by continuous 100+ year records at Woods Hole (Mass.), and Boothbay Harbor (Maine) and shorter records from Boston Harbor and other bays. Periods of higher than average temperatures (in the 1950s) and cooler periods (1960s) have been associated with changes in the North Atlantic Oscillation (NAO), which affects current patterns. Over the past 30 years however, records indicate that ocean temperatures in the Northeast have been increasing; for example, Boothbay Harbor's temperature has increased by about 1°C since 1970. While we are not able to find predictive models for New Jersey, given the geographic proximity of these waters to the Northeast, we assume that predictions would be similar. The model projections are for an increase of somewhere between 3-4°C by 2100 and a pH drop of 0.3-0.4 units by 2100 (Frumhoff *et al.* 2007). Assuming that these predictions also apply to the action area, one could anticipate similar conditions in the action area over that same time period.

Assuming that there is a linear trend in increasing water temperatures, and that a predicted 3-4°C increase in water temperature by 2100 for the waters to the Northeast would also be experienced in the action area, one could anticipate a 0.03 - 0.05°C increase each year. Because the action considered here will be complete in 50 years, we expect an increase in temperature of no more than 2.5°C in the action area over the duration of the proposed action.

6.4 Effects of Climate Change in the Action Area to Listed Species Sea Turtles

As there is significant uncertainty in the rate and timing of change as well as the effect of any changes that may be experienced in the action area due to climate change, it is difficult to predict the impact of these changes on sea turtles; however, we have considered the available information to analyze likely impacts to these species in the action area. The proposed actions under consideration are the three beach nourishment projects through 2064. Thus, we consider here likely effects of climate change during the period from now until 2064.

Sea turtles are most likely to be affected by climate change due to increasing sand temperatures at nesting beaches which in turn would result in increased female:male sex ratio among hatchlings, sea level rise which could result in a reduction in available nesting beach habitat, increased risk of nest inundation, changes in the abundance and distribution of forage species which could result in changes in the foraging behavior and distribution of sea turtle species, and changes in water temperature which could possibly lead to a northward shift in their range.

Over the time period considered in this Opinion, sea surface temperatures are expected to rise up to 2.5°C in the action area. It is unknown if that is enough of a change to contribute to shifts in the range or distribution of sea turtles. Theoretically we expect that as waters in the action area warm, more sea turtles could be present or sea turtles could be present for longer periods of time. However, if temperature affected the distribution of sea turtle forage in a way that decreased forage in the action area, sea turtles may be less likely to occur in the action area. It has been speculated that the nesting range of some sea turtle species may shift northward. Nesting in the mid-Atlantic generally is extremely rare and no nesting has been documented at any beach in the action area. In 2010, one green sea turtle came up on the beach in Sea Isle City, New Jersey; however, it did not lay any eggs. In August 2011, a loggerhead came up on the beach in Stone Harbor, New Jersey but did not lay any eggs. On August 18, 2011, a green sea turtle laid one nest at Cape Henlopen Beach in Lewes Delaware near the entrance to Delaware Bay. The nest contained 190 eggs and was transported indoors to an incubation facility on October 7. A total of twelve eggs hatched, with eight hatchlings surviving. In December, seven of the hatchlings were released in Cape Hatteras, North Carolina. It is important to consider that in order for nesting to be successful in New Jersey, fall and winter temperatures need to be warm enough to support the successful rearing of eggs and sea temperatures must be warm enough for hatchlings not to die when they enter the water. Predicted increases in water temperatures between now and 2064 are not great enough to allow successful rearing of sea turtle eggs in the action area. Therefore, it is unlikely that over the time period considered here, that there would be an increase in nesting activity in the action area or that hatchlings would be present in the action area.

We have considered whether the placement of sand at Port Monmouth, Union Beach, and Elberon to Loch Arbour would impact sea turtles. As noted above, there is the potential for a northward shift in nesting by sea turtles. Given existing nesting locations and the duration of time considered in this Opinion (50 years), it seems extremely unlikely that the range of sea turtle nesting would shift enough so that nesting would occur on beaches in New Jersey. The furthest north that leatherbacks nest is southeastern Florida. Kemp's ridleys only nest in Mexico. It is more likely that any shift in nesting to New Jersey beaches would be from loggerheads (which nest as far north as Virginia) and/or green sea turtles (which normally nest as far north as North Carolina. The placement of sand in the proposed actions is meant to stabilize and restore eroding habitats and maintain existing beach. None of the activity is likely to reduce the suitability of these beaches for potential future nesting.

6.5 Effects of Climate Change in the Action Area to Listed Species Whales

As there is significant uncertainty in the rate and timing of change as well as the effect of any changes that may be experienced in the action area due to climate change, it is difficult to predict the impact of these changes on whales; however, we have considered the available information to analyzer likely impacts to these species in the action area. The proposed actions under consideration are the three beach nourishment projects through 2064; thus, we consider here, likely effects of climate change during the period from now until 2064.

As described above, the impact of climate change on cetaceans is likely to be related to changes in sea temperatures, potential freshening of seawater due to melting ice and increased rainfall, sea level rise, the loss of polar habitats, and potential shifts in the distribution and abundance of prey species. These impacts, in turn, are likely to affect the distribution of species of whales. As described in section 4.0, listed species of whales may be found in the portion of the action area located in the waters off the coast of New Jersey (i.e., SBOBA site). Within this portion of the action area, the most likely effect to whales from climate change would be if warming temperatures led to changes in the seasonal distribution of whales. This may mean that ranges and seasonal migratory patterns are altered to coincide with changes in prey distribution on foraging grounds located outside of the action area, which may result in an increase or decrease of listed species of whales in the action area. As humpback and fin whales are distributed in all water temperature zones, it is unlikely that their range will be directly affected by an increase in water temperature; however, for right whales, increases in water temperature may result in a northward shift of their range. This may result in an unfavorable affect on the North Atlantic right whale due to an increase in the length of migrations (Macleod 2009) or a favorable effect by allowing them to expand their range. However, over the remaining life of the action (through 2064) it is unlikely that this possible shift in range will be observed due the relatively small increase in water temperature predicted to occur during the lifetime of the project (i.e., approximately 2.5^{o}C); if any shift does occur, it is likely to be minimal and thus, it seems unlikely that this small increase in temperature will cause a significant effect to right whales or a significant modification to the number of whales likely to be present in the action area through 2064.

6.6 Effects of Climate Change in the Action Area to Atlantic Sturgeon

As there is significant uncertainty in the rate and timing of change as well as the effect of any changes that may be experienced in the action area due to climate change, it is difficult to predict the impact of these changes on Atlantic sturgeon; however, we have considered the available information to analyze likely impacts to sturgeon in the action area. We consider here, likely effects of climate change during the period from now until 2064.

Over time, the most likely effect to Atlantic sturgeon would be if sea level rise was great enough to consistently shift the salt wedge far enough north in a spawning river which would restrict the range of juvenile sturgeon and may affect the development of these life stages. However, there are no spawning rivers in the action area.

In the action area, it is possible that changing seasonal temperature regimes could result in changes in the timing of seasonal migrations as sturgeon move throughout the area. There could be shifts in the timing of spawning. Presumably, if water temperatures warm earlier in the spring, because water temperature is a primary spawning cue, spawning migrations and spawning events could occur earlier in the year. However, because spawning is not triggered solely by water temperature, but also by day length (which would not be affected by climate change) and river flow (which could be affected by climate change), it is not possible to predict how any change in water temperature or river flow by itself will affect the seasonal movements of sturgeon through the action area. However, it seems most likely that spawning would shift earlier in the year.

Any forage species that are temperature dependent may also shift in distribution as water temperatures warm. However, because we do not know the adaptive capacity of these individuals or how much of a change in temperature would be necessary to cause a shift in distribution, it is not possible to predict how these changes may affect foraging sturgeon. If sturgeon distribution shifted along with prey distribution, it is likely that there would be minimal, if any, impact on the availability of food. Similarly, if sturgeon shifted to areas where different forage was available and sturgeon were able to obtain sufficient nutrition from that new source of forage, any effect would be minimal. The greatest potential for effect to forage resources would be if sturgeon shifted to an area or time where insufficient forage was available; however, the likelihood of this happening seems low because sturgeon feed on a wide variety of species and in a wide variety of habitats.

Limited information on the thermal tolerances of Atlantic sturgeon is available. Atlantic sturgeon have been observed in water temperatures above 30°C in the south (see Damon-Randall *et al.* 2010). In the laboratory, juvenile Atlantic sturgeon showed negative behavioral and bioenergetics responses (related to food consumption and metabolism) after prolonged exposure to temperatures greater than 28°C (82.4°F) (Niklitschek 2001). Tolerance to temperatures is thought to increase with age and body size (Ziegweid *et al.* 2008 and Jenkins *et al.* 1993), however, no information on the lethal thermal maximum or stressful temperatures for subadult or adult Atlantic sturgeon is available.

Mean monthly ambient temperatures in the Sandy Hook NJ, range from 2.2 - 22.2°C[8]. As explained above, available predictions estimate an increase in ambient water temperature in the area of up to 2.5°C over the duration of the proposed actions. This would result in the ambient temperatures in Sandy NJ, to range from 4.7 – 24.7°C. Warming temperatures predicted to occur over the next 50 years would likely result in a northward shift/extension of their range (i.e. into the St. Lawrence River, Canada) while truncating the southern distribution, thus effecting the recruitment and distribution of sturgeon rangewide. However, Atlantic sturgeon are known to currently occur at temperatures consistent with the predicted range over the next 50 years (4.7 – 24.7°C). If any shift does occur, it seems unlikely that this small increase in temperature will cause a significant effect to Atlantic sturgeon or a significant modification to the number of sturgeon likely to be present in the action area over the life of the action.

As described above, over the long term, global climate change may affect Atlantic sturgeon by affecting the location of the salt wedge, distribution of prey, water temperature and water quality. However, there is significant uncertainty, due to a lack of scientific data, on the degree to which these effects may be experienced and the degree to which Atlantic sturgeon will be able to successfully adapt to any such changes. Any activities occurring within and outside the action area that contribute to global climate change are also expected to affect Atlantic sturgeon in the action area. While we can make some predictions on the likely effects of climate change on these species, without modeling and additional scientific data these predictions remain speculative. Additionally, these predictions do not take into account the adaptive capacity of these species which may allow them to deal with change differently than predicted.

7.0 EFFECTS OF THE ACTION

This section of an Opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR § 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR § 402.02). We have not identified any interdependent or interrelated actions. Because there is no critical habitat in the action areas, there are no effects to critical habitat to consider in this Opinion.

This Opinion examines the likely effects (direct and indirect) of the proposed actions on whales, sea turtles, and five DPSs of Atlantic sturgeon in the action areas and their habitat within the context of the species current status now and projected over the course of the action, the environmental baseline and cumulative effects. As explained in the "Description of the Action" section, the action under consideration in this Opinion includes the initial dredging cycles needed to aquire sand for three beach nourishment projects (i.e., Port Monmouth, Union Beach, and Elberon to Loch Arbour) as well as proposed actions the USACE may undertake for shore

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[8] Information obtained from www.nodc.noaa.gov/dsdt/cwtg/satl.html; last accessed 7-25-12.

protection and flood risk management (i.e., placement of fill, groin construction, and pile driving). We also consider effects of dredging in the SBOBA for beach renourishment cycles through 2064.

7.1 Effects of Dredging Operations

As explained in the "Description of the Action" section above, the USACE plans on dredging within the SBOBA. Below, the effects of dredging, via the use of a hopper dredge, on threatened and endangered species will be considered. Effects of dredging include (1) entrainment and impingement of Atlantic sturgeon and sea turtles; (2) alteration of sea turtle and Atlantic sturgeon prey items and foraging behavior due to dredging; (3) suspended sediment associated with dredging operations; and (4) the potential for interactions between project vessels and individual Atlantic sturgeon, whales, or sea turtles.

As noted above, sea turtles are likely to occur in the action area from May-November of any year. The primary concern for loggerhead, Kemp's ridley, and green sea turtles is entrainment and the potential for effects to foraging, while the primary concern for leatherbacks is vessel collision. Right whales are likely to be present from November 1 – April 30 of any year; fin and humpback whales are most likely to be present in the spring, summer and fall; however, individual transient right, humpback, and fin whales could be present in the action area outside of these time frames as this area (SBOBA) is used by whales moving between calving/mating grounds and foraging grounds. Due to their large size, whales are not vulnerable to entrainment in dredges; as such, the primary concern for listed species of whales is the potential for vessel collisions. Atlantic sturgeon are likely to be present in the action area year round. The primary concern for Atlantic sturgeon is entrainment, loss of forage, and vessel collision.

Hopper dredges are self-propelled seagoing vessels that are equipped with propulsion machinery, sediment containers (hoppers), dredge pumps, and trailing suction drag-heads required to perform their essential function of excavating sediments from the ocean bottom. Hopper dredges have propulsion power adequate for required free-running speed and dredge against strong currents. They also have excellent maneuverability. This allows hopper dredges to provide a safe working environment for crew and equipment dredging bar channels or other areas subject to rough seas. Hopper dredges also are more practicable when interference with vessel traffic must be minimized.

A hopper dredge removes material from the bottom of the channel in relatively thin layers, usually 2-12 inches, depending upon the density and cohesiveness of the dredged material. Pumps located within the hull, but sometimes mounted on the drag arm, create a region of low pressure around the dragheads and force water and sediment up the drag arm and into the hopper. The more closely the draghead is maintained in contact with the sediment, the more efficient the dredging, provided sufficient water is available to slurry the sediments. Hopper dredges can efficiently dredge non-cohesive sands and cohesive silts and low density clay. Draghead types may consist of IHC and California type dragheads.

California type dragheads sit flatter in the sediment than the IHC configuration which is more upright. Individual draghead designs (i.e. dimensions, structural reinforcing/configuration) vary between dredging contractors and hopper vessels. Port openings on the bottom of dragheads also vary between contractors and draghead design. Generally speaking, the port geometry is typically rectangular or square with minimum openings of ten inch by ten inch or twelve inch by twelve inch or some rectangular variation.

Industry and government hopper dredges are equipped with various power and pump configurations and may differ in hopper capacity with different dredging capabilities. An engineering analysis of the known hydraulic characteristics of the pump and pipeline system on the USACE hopper dredge “Essayons” (a 6,423 cy hopper dredge) indicates an operational flow rate of forty cubic feet per second with a flow velocity of eleven feet per second at the draghead port openings. The estimated force exerted on a one-foot diameter turtle (i.e., one foot diameter disc shaped object) at the pump operational point in this system was estimated to be twenty-eight pounds of suction or drag force on the object at the port opening of the draghead.

Dredging is typically parallel to the centerline or axis of the channel. Under certain conditions, a waffle or crisscross pattern may be utilized to minimize trenching or during clean-up dredging operations to remove ridges and produce a more level channel bottom. This movement up and down the channel while dredging is called trailing and may be accomplished at speeds of 1-3 knots, depending on the shoaling, sediment characteristics, sea conditions, and numerous other factors. In the hopper, the slurry mixture of the sediment and water is managed by a weir system to settle out the dredged material solids and overflow the supernatant water. When an economic load is achieved, the vessel suspends dredging, the drag arms are raised, and the dredge travels to the designated placement site. Because dredging stops during the trip to the placement site, the overall efficiency of the hopper dredge is dependent on the distance between the dredging location and placement sites; the more distance to the placement site, the less efficient the dredging operation resulting in longer contract periods to accomplish the work.

Sea turtle deflectors utilized on hopper dredges are rigid V-shaped attachments on the front of the dragheads and are designed and intended to plow the sediment in front of the draghead. The plowing action creates a sand wave that rolls in front of the deflector. The propagated sand wave is intended to shed a turtle away from the deflector and out of the path of the draghead. The effectiveness of the rigid deflector design and its ability to reduce entrainment was studied by the USACE through model and field testing during the 1980s and early 1990s. The deflectors are most effective when operating on a uniform or flat bottom. The deflector effectiveness may be diminished when significant ridges and troughs are present that prevent the deflector from plowing and maintaining the sand wave and the dragheads from maintaining firm contact with the channel bottom.

There has been evidence of UXO mined along with the sand at the SBOBA, and because of the danger to human safety posed by these objects if taken directly into a hopper dredge, the hopper dredges used in the proposed actions will utilize UXO screens. UXO screens are comprised of longitudinal bars with openings/spacings of 1.25/ 1.5-inches by 6 inches. These dimensions will prevent any UXO from being brought on-board the hopper dredge. The screens will also prevent any whole ESA-listed species from being entrained by the dredge, instead, small pieces of the animal may be entrained. Animals impinged on the UXO screen may free or dislodge themselves from the screen once the suction of the dredge has been turned off. Animals that free themselves may suffer severe injuries that may result in death.

7.1.1 Alteration of foraging habitat

As discussed above, listed species of whales may be present within the action area year round as this area is used by whales moving between southern calving/mating grounds and northern foraging grounds. Whales forage upon pelagic prey items (e.g., krill, copepods, sand lance) and as such, dredging and its impacts on the benthic environment will not have any direct or indirect effects on whale prey/foraging items. As such, the remainder of this section will discuss the effects of dredging and the alteration of sea turtle and Atlantic sturgeon foraging habitat.

Atlantic sturgeon

Subadult (less than 150cm in total length, not sexually mature, but have left their natal rivers) and adult Atlantic sturgeon undertake seasonal, nearshore (i.e., typically depths less than 50 meters), coastal marine migrations along the United States eastern coastline (Erickson *et al*. 2011; Dunton *et al*. 2010). Based on tagging data, it is believed that beginning in the fall, Atlantic sturgeon undergo large scale migrations to more southerly waters (e.g., off the coast North Carolina, the mouth of the Chesapeake Bay) and primarily remain in these waters throughout the winter (i.e., approximately December through March), while in the spring, it appears that migrations begin to shift to more northerly waters (e.g., waters off New Jersey and New York) (Dovel and Berggren 1983; Dunton *et al*. 2010; Erikson *et al*. 2011). Atlantic sturgeon aggregate in several distinct areas along the Mid-Atlantic coastline; Atlantic sturgeon are most likely to occur in areas adjacent to estuaries and/or coastal features formed by bay mouths and inlets (Stein *et al.* 2004a; Laney *et. al* 2007; Erickson et al. 2011; Dunton *et al*. 2010). These aggregation areas are located within the coastal waters off North Carolina; waters between the Chesapeake Bay and Delaware Bay; the New Jersey Coast; and the southwest shores of Long Island (Laney *et. al* 2007; Erickson et al. 2011; Dunton *et al*. 2010). Based on five fishery-independent surveys, Dunton *et al*. (2010) identified several “hotspots” for Atlantic sturgeon captures, including an area off Sandy Hook, New Jersey, and off Rockaway, New York. These “hotspots” are aggregation areas that are most often used during the spring, summer, and fall months (Erickson *et al*. 2011; Dunton *et al*. 2010). Areas between these sites serve as migration corridors to and from these areas, as well as to spawning grounds found within natal rivers.

The SBOBA is approximately 1-3 miles from the nearest identified aggregation areas (i.e., off Sandy Hook, New Jersey). Atlantic sturgeon have been captured near the SBOBA. Based on this information, as well as information on the habitat characteristics of the SBOBA and the distribution of Atlantic sturgeon, opportunistic foraging may occur at this site. While opportunistic foraging may occur at these sites, it is more likely that the SBOBA is used by migrating individuals as they move from foraging, overwintering, and spawning grounds. As the foraging may occur in the SBOBA, foraging impacts to Atlantic sturgeon, as a result of dredging the SBOBA, will be considered below.

Sea Turtles

As outlined above, sea turtles may occur in the waters of New Jersey from May to the first week in November each year when water temperatures are above 15°C, with the largest numbers present from June through October of any year. The sea turtles present in these waters are typically small juveniles with the most abundant being the threatened loggerhead (*Caretta caretta*) followed by the endangered Kemp's ridley (*Lepidochelys kempi*). Endangered green sea turtles (*Chelonia mydas*) also occur in these waters from June through October. Endangered leatherback sea turtles (*Dermochelys coriacea*) are typically found further offshore but may occur in nearshore waters while pursuing jellyfish, their preferred prey.

During the warmer months, most turtles in the Northeast appear to spend the majority of the time in waters between 16 and 49 feet. This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles (Morreale and Standora 1990). As the SBOBA has a mean water depth of 50 feet (USACE-NYD 2013), the SBOBA is likely too deep to be considered suitable for sea turtle foraging. However, it is possible for foraging sea turtles to be present in the SBOBA. Therefore, effects to foraging sea turtles may occur within this portion of the action area and are considered below.

Alteration of Foraging Habitat

Dredging can cause indirect effects on Atlantic sturgeon and sea turtles by reducing prey species through the alteration of the existing biotic assemblages. As noted above, the SBOBA is not believed to be an area where Atlantic sturgeon concentrate to forage. However, opportunistic foraging may occur at this site. Since dredging involves removing the bottom material down to a specific depth, dredging is likely to entrain and kill some of these forage items that may be consumed by Atlantic sturgeon during their migrations.

Similar to Atlantic sturgeon, the SBOBA is not known to be an area where sea turtles concentrate to forage; however, based on surveys conducted in the area, potential sea turtle foraging items appear to be present, including crabs and mollusks. Of the listed sea turtle species found in the action area, loggerhead and Kemp's ridley sea turtles are the most likely to utilize these areas for feeding, foraging mainly on benthic species, such as crabs and mollusks (Morreale and Standora 1992; Bjorndal 1997). As no seagrass beds exist within the SBOBA, green sea turtles will not use the area as foraging areas and as such, dredging activities are not likely to disrupt normal feeding behaviors of green sea turtles. Additionally, jellyfish, the primary foraging item of leatherback sea turtles, are not likely to be affected by dredging activities as jellyfish occur within the upper portions of the water column and away from the sediment surface where dredging will occur. As jellyfish are not likely to be entrained during dredging, there is not likely to be any reduction in available forage for leatherback sea turtles due to the dredging operations. However, as suitable loggerhead and Kemp's ridley sea turtle foraging items may occur on the benthos of the areas, some loggerhead and Kemp's ridley sea turtle foraging may occur at the SBOBA and therefore, may be affected by dredging activities within this portion of the action area.

While some areas may be more desirable to certain sturgeon and turtles due to prey availability, there is no information to indicate that the SBOBA has more abundant turtle prey or better foraging habitat than other surrounding areas. The assumption can be made that sturgeon and sea turtles are not likely to be more attracted to the SBOBA than to other foraging areas and should be able to find sufficient prey in alternate areas. Depending on the species, recolonization of a dredged area can begin within as short as a month (Guerra-Garcia and Garcia-Gomez 2006). The dredged area is expected to be completely recolonized by benthic organisms within approximately 12 months after the dredging is complete. These conclusions are supported by a benthic habitat study which examined an area of Sandbridge Shoals following dredging, which concluded that recolonization of the dredged area was rapid, with macrobenthic organisms abundant on the first sampling date following cessation of dredging activities (less than a month later), and that there was no significant difference in macrofaunal abundance or biomass/production between areas that had and had not been dredged (Diaz *et al*. 2006); suggesting that dredging had no long term impact on prey availability. Based on this information, sturgeon and sea turtles should only be exposed to a reduction in forage in the areas where dredging occurs for one to two seasons immediately following dredging. Additionally, suitable foraging items should continue to be available within other portions of the Atlantic Ocean at all times.

Based on this and the best available information, NMFS anticipates that while the dredging activities may temporarily disrupt normal feeding behaviors for sturgeon and sea turtles by causing them to move to alternate areas, the action is not likely to remove critical amounts of prey resources from the portion of the action area located in SBOBA and any disruption to normal foraging is likely to be insignificant. In addition, the dredging activities are not likely to alter the habitat in any way that prevents sturgeon and sea turtles from using the action area as a migratory pathway to other near-by areas that may be more suitable for foraging.

7.1.2 Entrainment

7.1.2.1 Sea Turtles

Entrainment is defined as the direct uptake of aquatic organisms by the suction field generated at the draghead. Dredging operations within the SBOBA will involve the use of a hopper dredge. Given their large size, leatherback sea turtles are not vulnerable to entrainment in hopper dredges. To date, no leatherback sea turtles have been documented entrained in any dredge operation along the U.S. Atlantic coast (USACE Sea Turtle Warehouse, 2012). Therefore, this section of the Opinion will only consider the effects of entrainment on loggerhead, Kemp's ridley and green sea turtles. Sea turtles are likely to be feeding on or near the bottom of the water column during the warmer months, with loggerhead and Kemp's ridley sea turtles being the most common species in these waters. Although not expected to be as numerous as loggerheads and Kemp's ridleys, green sea turtles are also likely to occur seasonally in the SBOBA.

Sea turtles become entrained in hopper dredges as the draghead moves along the bottom. Entrainment occurs when sea turtles do not or cannot escape from the suction of the dredge. Sea turtles can also be crushed on the bottom by the moving draghead. Mortality most often occurs when turtles are sucked into the dredge draghead, pumped through the intake pipe and then killed as they cycle through the centrifugal pump and into the hopper. Because entrainment is believed to occur primarily while the draghead is operating on the bottom, it is likely that only those species feeding or resting on or near the bottom would be vulnerable to entrainment. Turtles can also be entrained if suction is created in the draghead by current flow while the device is being placed or removed, or if the dredge is operating on an uneven or rocky substrate and rises off the bottom. Recent information from the USACE suggests that the risk of entrainment is highest when the bottom terrain is uneven or when the dredge is conducting "clean up" operations at the end of a dredge cycle when the bottom is trenched and the dredge is working to level out the bottom. In these instances, it is difficult for the dredge operator to keep the draghead buried in the sand and sea turtles near the bottom may be more vulnerable to entrainment.

Sea turtles have been found resting in deeper waters, which could increase the likelihood of interactions with dredging activities. In 1981, observers documented the take of 71 loggerheads by a hopper dredge at the Port Canaveral Ship Channel, Florida (Slay and Richardson 1988). This channel is a deep, low productivity environment in the Southeast Atlantic where sea turtles are known to rest on the bottom, making them extremely vulnerable to entrainment. The large number of turtle mortalities at the Port Canaveral Ship Channel in the early 1980s resulted in part from turtles being buried in the soft bottom mud, a behavior known as brumation. Since 1981, 77 loggerhead sea turtles have been taken by hopper dredge operations in the Port Canaveral Ship Channel, Florida. Chelonid turtles have been found to make use of deeper, less productive channels as resting areas that afford protection from predators because of the low energy, deep water conditions. Habitat conditions in the SBOBA are not consistent with the areas where brumation has been documented; therefore, we do not anticipate that bromating sea turtles would be present in the action area.

Background Information on Entrainment of Sea Turtles in Hopper Dredges

Sea turtles have been killed in hopper dredge operations along the East and Gulf coasts of the US. Documented turtle mortalities during dredging operations in the USACE South Atlantic Division (SAD; i.e., south of the Virginia/North Carolina border) are more common than in the USACE North Atlantic Division (NAD; Virginia-Maine) probably due to the greater abundance of turtles in these waters and the greater frequency of hopper dredge operations. For example, in the USACE SAD, over 400 sea turtles have been entrained in hopper dredges since 1980 and in the Gulf Region over 160 sea turtles have been killed since 1995. Records of sea turtle entrainment in the USACE NAD begin in 1994. Through December 2013, 76 sea turtles deaths (see Table 13) related to hopper dredge activities have been recorded in waters north of the North Carolina/Virginia border (USACE Sea Turtle Database[9]); the majority of these turtles have been entrained in hopper dredges operating in Chesapeake Bay.

Table 13. Sea Turtle Takes in USACE NAD Dredging Operations

Project Location	**Year of Operation**	**Cubic Yardage Removed**	**Observed Takes**
Sandbridge Shoal	2013	Not Available (NA)	1 loggerhead
Cape Henry Channel	2012	NA	1 loggerhead
York Spit	2012	NA	1 Loggerhead

[9] The USACE Sea Turtle Data Warehouse is maintained by the USACE's Environmental Laboratory and contains information on USACE dredging projects conducted since 1980 with a focus on information on interactions with sea turtles.

Thimble Shoal Channel	2009	NA	3 Loggerheads
York Spit	2007	608,000	1 Kemp's Ridley
Cape Henry	2006	NA	3 Loggerheads
Thimble Shoal Channel	2006	300,000	1 loggerhead
Delaware Bay	2005	50,000	2 Loggerheads
Thimble Shoal Channel	2003	1,828,312	7 Loggerheads 1 Kemp's ridley 1 unknown
Cape Henry	2002	1,407,814	6 Loggerheads 1 Kemp's ridley 1 green
VA Beach Hurricane Protection Project (Cape Henry)	2002	NA	1 Loggerhead
York Spit Channel	2002	911,406	8 Loggerheads 1 Kemp's ridley
Cape Henry	2001	1,641,140	2 loggerheads 1 Kemp's ridley
VA Beach Hurricane Protection Project (Thimble Shoals)	2001	NA	5 loggerheads 1 unknown
Thimble Shoal Channel	2000	831,761	2 loggerheads 1 unknown
York River Entrance Channel	1998	672,536	6 loggerheads
Atlantic Coast of NJ	1997	1,000,000	1 Loggerhead
Thimble Shoal Channel	1996	529,301	1 loggerhead
Delaware Bay	1995	218,151	1 Loggerhead
Cape Henry	1994	552,671	4 loggerheads 1 unknown
York Spit Channel	1994	61,299	4 loggerheads
Delaware Bay	1994	NA	1 Loggerhead
Delaware Bay	1993	NA	2 Loggerheads
Off Ocean City MD	1992	1,592,262	3 Loggerheads
			TOTAL = 76 Turtles

Before 1994, endangered species observers were not required on board hopper dredges and dredge baskets were not inspected for sea turtles or sea turtle parts. The majority of sea turtle takes in the NAD have occurred in the Norfolk District. This is largely a function of the large number of loggerhead and Kemp's ridley sea turtles that occur in the Chesapeake Bay each summer and the intense dredging operations that are conducted to maintain the Chesapeake Bay entrance channels and for beach nourishment projects at Virginia Beach. Since 1992, the take of 10 sea turtles (all loggerheads) has been recorded during hopper dredge operations in the Philadelphia, Baltimore, and New York Districts. Hopper dredging is relatively rare in New England waters where sea turtles are known to occur, with most hopper dredge operations being completed by the specialized Government owned dredge Currituck which operates at low suction and has been demonstrated to have a very low likelihood of entraining or impinging sea turtles.

It should be noted that the observed takes may not be representative of all the turtles killed during dredge operations. Typically, endangered species observers are required to observe a total of 50% of the dredge activity (i.e., 6 hours on watch, 6 hours off watch). As such, if the observer was off watch or the cage was emptied and not inspected or the dredge company either did not report or was unable to identify the turtle incident, there is the possibility that a turtle could be taken by the dredge and go unnoticed. Additionally, in older Opinions (i.e., prior to 1995), NMFS frequently only required 25% observer coverage and monitoring of the overflows which has since been determined to not be as effective as monitoring of the intakes. These conditions may have led to sea turtle takes going undetected.

NMFS raised this issue to the USACE during the 2002 season, after several turtles were taken in the Cape Henry and York Spit Channels, and expressed the need for 100% observer coverage. On September 30, 2002, the USACE informed the dredge contractor that when the observer was not present, the cage should not be opened unless it is clogged. This modification was to ensure that any sea turtles that were taken and on the intake screen (or in the cage area) would remain there until the observer evaluated the load. The USACE's letter further stated "Crew members will only go into the cage and remove wood, rocks, and man-made debris; any aquatic biological material is left in the cage for the observer to document and clear out when they return on duty. In addition, the observer is the only one allowed to clean off the overflow screen. This practice provides us with 100% observation coverage and shall continue." Theoretically, all sea turtle parts were observed under this scheme, but the frequency of clogging in the cage is unknown at this time. Obviously, the most effective way to ensure that 100% observer coverage is attained is to have a NMFS-approved endangered species observer monitoring all loads at all times. This level of observer coverage would document all turtle interactions and better quantify the impact of dredging on turtle populations. More recently issued Opinions have required 100% observer coverage which increases the likelihood of takes being detected and reported. However, some actions require the use of UXO screens on the dragheads. If there is an interaction with a draghead equipped with a UXO screen and a listed species, it would likely occur entirely underwater and all interactions would not be observed by an on-board observer. Due to the limited ability to observe an interaction from on deck, requiring the presence of an ESA observer on hopper dredges operating with a UXO screen is an impractical means to monitor interactions. Therefore, some hopper dredging projects (involving UXO screens) are not required to have an observer on board.

It is likely that not all sea turtles killed by dredges are observed onboard the hopper dredge. Several sea turtles stranded on Virginia shores with crushing type injuries from May 25 to October 15, 2002. The Virginia Marine Science Museum (VMSM) found 10 loggerheads, 2 Kemp's ridleys, and 1 leatherback exhibiting injuries and structural damage consistent with what they have seen in animals that were known dredge takes. While it cannot be conclusively determined that these strandings were the result of dredge interactions, the link is possible given the location of the strandings (e.g., in the southern Chesapeake Bay near ongoing dredging activity), the time of the documented strandings in relation to dredge operations, the lack of other ongoing activities which may have caused such damage, and the nature of the injuries (e.g., crushed or shattered carapaces and/or flipper bones, black mud in mouth). Additionally, in 1992, three dead sea turtles were found on an Ocean City, Maryland beach while dredging operations were ongoing at a borrow area located 3 miles offshore. Necropsy results indicate that the deaths of all three turtles were dredge related. It is unknown if turtles observed on the beach with these types of injuries were crushed by the dredge and subsequently stranded on shore or whether they were entrained in the dredge, entered the hopper and then were discharged onto the beach with the dredge spoils.

A dredge could crush an animal as it was setting the draghead on the bottom, or if the draghead was lifting on and off the bottom due to uneven terrain, but the actual cause of these crushing injuries cannot be determined at this time. Further analyses need to be conducted to better understand the link between stranded sea turtles with evidence of injury from crushing and dredging activities, and if those strandings need to be factored into an incidental take level. Regardless, it is possible that dredges are taking animals that are not observed on the dredge which may result in strandings on nearby beaches.

Due to the nature of interactions between listed species and dredge operations, it is difficult to predict the number of interactions that are likely to occur from a particular dredging operation. Projects that occur in an identical location with the same equipment year after year may result in interactions in some years and none in other years as noted above in the examples of sea turtle takes. Dredging operations may go on for months, with sea turtle takes occurring intermittently throughout the duration of the action. For example, dredging occurred at Cape Henry over 160 days in 2002 with 8 sea turtle takes occurring over 3 separate weeks while dredging at York Spit in 1994 resulted in 4 sea turtle takes in one week. In Delaware Bay, dredge cycles have been conducted during the May-November period with no observed entrainment and as many as two sea turtles have been entrained in as little as three weeks. Even in locations where thousands of sea turtles are known to be present (e.g., Chesapeake Bay) and where dredges are operating in areas with preferred sea turtle depths and forage items (as evidenced by entrainment of these species in the dredge), the numbers of sea turtles entrained is an extremely small percentage of the likely number of sea turtles in the action area. This is likely due to the distribution of individuals throughout the action area, the relatively small area which is affected at any given moment and the ability of some sea turtles to avoid the dredge even if they are in the immediate area.

The number of interactions between dredge equipment and sea turtles seems to be best associated with the volume of material removed, which is closely correlated to the length of time dredging takes, with a greater number of interactions associated with a greater volume of material removed and a longer duration of dredging. The number of interactions is also heavily influenced by the time of year dredging occurs (with more interactions correlated to times of year when more sea turtles are present in the action area) and the type of dredge plant used (sea turtles are apparently capable of avoiding pipeline and mechanical dredges as no takes of sea turtles have been reported with these types of dredges). The number of interactions may also be influenced by the terrain in the area being dredged, with interactions more likely when the draghead is moving up and off the bottom frequently. Interactions are also more likely at times and in areas when sea turtle forage items are concentrated in the area being dredged, as sea turtles are more likely to be spending time on the bottom while foraging.

Estimating Sea Turtle Entrainment During Deepening of the Ambrose Channel

As noted above, sea turtles are likely to be less concentrated in the action area for this consultation than they are in areas under the jurisdiction of the Norfolk District (e.g., Chesapeake Bay). Based on this information, NMFS believes that hopper dredges operating in the SBOBA are less likely to interact with sea turtles than hopper dredges operating in areas under the jurisdiction of the Norfolk District (e.g., Chesapeake Bay). As a result, all Norfolk District hopper dredging projects will not be considered further in our analysis as they do not accurately reflect the potential rate of entrainment for projects that occur in areas where sea turtles are not as concentrated.

It is most appropriate to look at other hopper dredging projects that have been undertaken in similar environments or with similar geographic characteristics as the SBOBA to determine a comparable level of potential sea turtle entrainment. Some operations in similar environments have, and still are, operated with a UXO screen on the draghead of the hopper. Large pieces of a sea turtle were recently observed entrained within a dredge equipped with a UXO screen at Sandbridge Shoal, VA. The dredge was inspected after the incident and it was determined that the UXO screen was not damaged. Upon closer examination of the engineering design of the draghead and dredge assembly, it is possible that the sea turtle may have entered through ports or "trunions" that surround the draghead itself. The USACE is beginning to discuss a demo or pilot project, sometime during the summer of 2014, off NY. The project will apply different width screens over the ports and trunions, coupled with observers, to investigate the different efficiencies and effectiveness of the screens and any impacts on performance on the draghead itself. This investigation is currently ongoing.

Despite this information, we still believe that UXO screens are likely to preclude an observer from detecting all entrained sea turtle or sea turtle parts (see section 11.0 for further information and clarification). Accordingly past observer records from these projects are not appropriate to use in our assessment as they may not reliably and accurately reflect entrainment in relation to the cubic yards of material removed.

As the SBOBA is located in an “offshore” / nearshore environment in the waters of the Atlantic Ocean, we looked at all hopper dredging projects in the NAD, excluding the Norfolk District, that had comparable environmental or geographic characteristics of this area to use as baseline information on the levels of sea turtle entrainment that have occurred in these areas/environments. The most appropriate projects to consider were those undertaken in offshore/nearshore (i.e., within 10 miles off the U.S. Eastern coastline) environments or open estuarine environments (see Table 14). We did not consider riverine or enclosed to semi-enclosed bays or estuaries in our assessment as we do not feel the environmental characteristics of these areas are comparable to open estuarine or offshore environments and thus, the level of entrainment in these areas would not be comparable to the level of entrainment that may occur in the SBOBA.

We have compiled records for 21 projects occurring during "sea turtle season" (i.e., May – November 15th) in the Baltimore, Philadelphia and New York District. As noted above, all projects listed in Table 14 are located in environments that are comparable to that of the SBOBA and report the cubic yardage removed during a project; however an important caveat is that observer coverage for some of these projects has ranged from 0 to 50% (see Table 14).

As explained above, for projects prior to 1995, observers were only present on the dredge for every other week of dredging. For projects in 1995 to the present, observers were present on board the dredge full time and worked a 6-hour on, 6-hour off shift. The only time that cages (where sea turtle parts are typically observed) were cleaned by anyone other than the observer was when there was a clog. If a turtle or turtle part was observed in such an instance, crew were instructed to inform the observer, even if off-duty. As such, it is reasonable to expect that even though there was only 50% observer coverage, an extremely small amount of biological material went unobserved. To make the data from the 1993 and 1994 dredge events when observers were only on board every other week, comparable to the 1995-2006 data when observers were on board full time, NMFS has assumed that an equal number of turtles were entrained when observers were not present. This calculation is reflected in Table 14 as "adjusted entrainment number."

Table 14. Projects in USACE NAD (with recorded cubic yardage; all Norfolk District projects removed).[10]

Project Location	Year of Operation	Cubic Yards Removed	Observed Entrainment	Adjusted Entrainment Number
Dewey and Bethany Beach (DE)	2009	397,956	0	0
Sandy Hook Channel	2008	23,500	0	0
Dewey Beach/Cape Henlopen (DE Bay)	2005	1,134,329	0	0
Delaware Bay	2005	50,000	2 Loggerhead	2 Loggerhead

[10] All projects were operating during "sea turtle season" (i.e., May to November 15). Additionally, only dredges operating without a UXO screen were included, as these screens, are likely to preclude an observer from detecting entrained sea turtles or sea turtle parts (see section 11.0 for further information and clarification) and thus, do not accurately reflect observed entrainment in relation to the cubic yards of material removed.

Cape May Point, NJ	2005	2,425,268	0	0
Off Ocean City MD	2002	744,827	0	0
East Rockaway Inlet, NY	2002	140,000	0	0
Westhampton, NY (offshore borrow site)	1997	884571	0	0
Offshore New Jersey	1997	3,700,000	1 Loggerhead	1 Loggerhead
Off Ocean City MD	1998	1,289,817	0	0
East Rockaway Inlet, NY	1996	2,685,000	0	0
Westhampton, NY (offshore borrow site)	1996	2518592	0	0
Delaware Bay	1995	218,151	1 Loggerhead	1 Loggerhead
East Rockaway Inlet, NY	1995	412,000	0	0
Bethany Beach (DE Bay)	1994	184,451	0	0
Dewey Beach (DE Bay)	1994	624,869	0	0
Off Ocean City MD	1994	1,245,125	0	0
Westhampton, NY (offshore borrow site)	1993	1455071	0	0
Off Ocean City MD	1992	1,592,262	3 Loggerheads	6 Loggerheads
Off Ocean City MD	1991	1,622,776	0	0
Off Ocean City MD	1990	2,198,987	0	0
	TOTAL	***25,547,552 cy***	***7 Loggerheads***	***10 Loggerheads***

Based on the data presented in Table 14, NMFS has made calculations which indicate that an average of one sea turtle is killed for approximately every 2.6 million cubic yards of material removed by a hopper dredge in environments similar to, or like, the SBOBA. This calculation is based on a number of assumptions including the following: that sea turtles are evenly distributed throughout all open estuarine or "offshore" areas, that all hopper dredges have a similar entrainment rate, and that sea turtles are equally likely to be encountered throughout the April to November time frame.

Sea turtle species likely to be entrained

With the exception of one green turtle entrained in a hopper dredge operating in Chesapeake Bay, all other sea turtles entrained in dredges operating in the USACE NAD have been loggerheads and Kemp's ridley. Of these 76 sea turtles, 66 have been loggerhead, 5 have been Kemp's ridleys, 1 green and 4 unknown. No Kemp's ridleys or greens have been entrained in dredge operations outside of the Chesapeake Bay area. The high percentage of loggerheads is likely due to several factors including their tendency to forage on the bottom where the dredge is operating and the fact that this species is the most numerous of the sea turtle species in Northeast and Mid-Atlantic waters. It is likely that the documentation of only one green sea turtle entrainment in Virginia dredging operations is a reflection of the low numbers of green sea turtles that occur in waters north of North Carolina. The low number of green sea turtles in the action area makes an interaction with a green sea turtle extremely unlikely to occur.

Based on the above information, it is reasonable to expect that 1 sea turtle is likely to be injured or killed for approximately every 2.6 million cy of material removed from the SBOBA. Based on the information outlined above, NMFS anticipates that no more than 1 sea turtle is likely to be entrained during the dredging for the Port Monmouth project (i.e., 391,000 cy of material is removed), no more than 1 sea turtle for the Union Beach project (i.e., 688,000 cy of material is removed), and no more than 6 sea turtles during the dredging for the Elberon to Loch Arbour project (i.e., 14,834,452 cy of material is removed). Due to the nature of the injuries expected to result from entrainment, these turtles are expected to die.

We expect that nearly all of the sea turtles will be loggerheads and that the entrainment of a Kemp's ridley during a dredge cycle will be rare; however, as Kemp's ridleys have been documented in the action area and have been entrained in hopper dredges, it is likely that this species will interact with the dredge over the course of the project life. As explained above, approximately 91% of the sea turtles taken in dredges operating in the USACE North Atlantic Division have been loggerheads.

Based on the ratio of sea turtle entrainment in the USACE NAD, it is likely that entrainments in all projects will involve loggerhead sea turtles. However, given that the data suggests there is a 9% chance that a sea turtle interaction with a hopper dredge will be a Kemp's ridley, it's possible that up to 1 Kemp's ridley sea turtle interaction, per project, will occur. As noted above, interactions with green sea turtles are extremely unlikely. The anticipated number of sea turtle entrainments by project is presented in Table 15.

Table 15. Anticipated number of loggerhead and green sea turtle entrainments by project

Project Name	Total Sea Turle Entrainments	Loggerhead	Kemp's Ridley
Port Monmouth	1	1*	1*
Union Beach	1	1*	1*
Elberon to Loch Arbour	6	5 (up to 6)	1*
Total	8	Up to 8	Up to 3

*Loggerhead or Kemp's ridley

7.1.2.2 Atlantic Sturgeon

Entrainment Risk: Hopper Dredge

Atlantic sturgeon are vulnerable to entrainment in hopper dredges; however, given the large size of adults (greater than 150cm) and the size of the openings on the dragheads, adult Atlantic sturgeon are unlikely to be vulnerable to entrainment. From 1990-2012, the USACE has documented a total of 36 confirmed incidences of entrainment or capture of sturgeon species on monitored projects for all types of dredge plants (mechanical, hydraulic pipeline, and hopper dredge). Of these, 23 were reported as Atlantic sturgeon, with 21 of these entrained in hopper dredges. Of the entrained Atlantic sturgeon for which size is available, all were subadults (larger than 50cm but less than 150cm). Information on these interactions is presented in Table 16. Most of these interactions occurred within harbors; however, to date, few records exist for interactions between hopper dredges and Atlantic sturgeon within offshore environments similar to the SBOBA (see Table 17).

Table 16. USACE Atlantic Sturgeon Entrainment Records from Hopper Dredge Operations 1990-2012

Project Location	Corps Division/District *	Month/Year of Operation	Cubic Yards Removed	Observed** Entrainment
Winyah Bay, Georgetown (SC)	SAD/SAC	Oct-90	517,032	1
Savannah Harbor (GA)	SAD/SAS	Jan-94	2,202,800	1
Savannah Harbor	SAD/SAS	Dec-94	2,239,800	2
Wilmington Harbor, Cape Fear River (NC)	SAD/SAW	Sep-98	196,400	1
Charleston Harbor (SC)	SAD/SAC	Mar-00	5,627,386	1
Brunswick Harbor (GA)	SAD/SAS	Feb-01	1,459,630	1
Charleston Harbor	SAD/SAC	Jan-04	1,449,234	1
Brunswick Harbor	SAD/SAS	Mar-05	966,000	1
Brunswick Harbor	SAD/SAS	Dec-06	1,198,571	1
Savannah Entrance Channel	SAD/SAS	Nov-07	973,463	1
Sandy Hook Channel (NJ)	NAD/NANY	Aug-Nov-08	23,500	1
Savannah Entrance Channel	SAD/SAS	Mar-09	261,780	1
Brunswick Entrance Channel	SAD/SAS	Feb-10	1,728,339	3
Wilmington Harbor	SAD/SAW	Dec-10	857,726	1
York Spit (VA)	NAD/NAN	Apr-11	1,630,713	2
Charleston Harbor	SAD/SAC	**Mar-12**	**1,100,000**	**1**

Ambrose Channel-Contract B	NAD/NANY	**Oct-12**	**1,510,000**	**1**
		Total	**23,942,374**	**21**

* SAD= South Atlantic Division; NAD= North Atlantic Division; SAC=Charleston District; SAS=Savannah District; SAW=Wilmington District; NANY=New York District; NAN=Norfolk District.
** Records based on sea turtle observer reports which record listed species entrained as well as all other organisms entrained during dredge operations.

Table 17: Open Estuarine Channel Deepening projects in USACE NAD since 1998 with recorded cubic yardage[11]

*a: Observed entrainment of Atlantic sturgeon believed to be a result of a damaged UXO screen.
*b: 14 Atlantic sturgeon removed during pre-dredge trawl/relocation trawling (September and November, 2003).
*c: 1 Atlantic sturgeon removed during pre-dredge trawl/relocation trawling on 10/26/02.
*d: 1 Atlantic sturgeon removed during pre-dredge trawl/relocation trawling on 11/02/02.

Project Location	**Year of Operation**	**Cubic Yards Removed**	**Observed Entrainment**	Observed Entrainment
Ambrose Channel-Contract Area B*a	2012	1,510,000	1	1
York Spit Channel, VA	2011	1,630,713	2	2
Cape Henry Channel, VA	2011	2,472,000	0	0
York Spit Channel, VA	2009	372,533	0	0
Sandy Hook Channel, NJ	2008	23,500	1	1
York Spit Channel, VA	2007	608,000	0	0
Atlantic Ocean Channel, VA	2006	1,118,749	0	0
Thimble Shoal	2006	300,000	0	0

[11] Only dredges operating without a UXO screen were included, as these screens, are likely to preclude an observer from detecting entrained sturgeon or sturgeon parts (see section 12.0 for further information and clarification) and thus, may not accurately reflect observed entrainment in relation to the cubic yards of material removed.

Channel, VA				
Thimble Shoal Channel, VA	2004	139,200	0	0
VA Beach Hurricane Protection Project	2004	844,968	0	0
Thimble Shoal Channel (*b)	2003	1,828,312	0	0
Cape Henry Channel, VA (*c)	2002	1,407,814	0	0
York Spit Channel, VA (*d)	2002	911,406	0	0
East Rockaway Inlet, NY	2002	140,000	0	0
Cape Henry Channel, VA	2001	1,641,140	0	0
Thimble Shoal Channel, VA	2000	831,761	0	0
Cape Henry Channel, VA	2000	759,986	0	0
York Spit Channel, VA	1998	296,140	0	0
Cape Henry Channel, VA	1998	740,674	0	0
Thimble Shoal Channel, VA	1996	529,301	0	0
East Rockaway Inlet, NY	1996	2,685,000		
Cape Henry Channel, VA	1995	485,885	0	0
East Rockaway Inlet, NY	1995	412,000	0	0
York Spit Channel, VA	1994	61,299	0	0
Cape Henry Channel , VA	1994	552,671	0	0
	TOTAL	22,303,052	4	4

** Records based on sea turtle observer reports which record listed species entrained as well as all other organisms entrained during dredge operations.*

*** On September 16, 2012, the New York District USACE informed us that the anterior portion of an Atlantic sturgeon was found within the inflow screening of the hopper dredge operating within the Ambrose Channel-Contract B. The sturgeon part was moderately decomposed. It is believed that the animal had died by some other cause(s) and thus, was not attributed as an entrainment incident related to or as a result of the Ambrose Channel deepening, and thus, was not considered in the table above.*

As described above, dredging operations within the SBOBA will be conducted with a UXO screen on the draghead of the hopper. Although an Atlantic sturgeon was recently observed entrained within a dredge operating in the Ambrose Channel, it was concluded that this entrainment was likely due to damage to the screen which permitted the entrainment of the sturgeon. However, without this damage, an interaction with the sturgeon may have still occurred, but would have likely gone unobserved. As some dredges have been operating with a UXO screen since 2006, we cannot discount the possibility that, so long as the screen was undamaged, unobservable interactions may have still occurred with Atlantic sturgeon. As a result, we strongly believe that UXO screens, in undamaged states, are likely to preclude an observer from detecting entrained sturgeon or sturgeon parts (see section 11.0 for further information and clarification). Accordingly, it is not appropriate to use data from dredging operations in which a UXO screen was used in our assessment of Atlantic sturgeon entrainment. In the absence of sufficient information specific to the SBOBA that we can rely on to make our assessment, it is most appropriate to consider other projects that have been conducted in a comparable environment to that of the SBOBA (see Table 17). The most appropriate projects to consider were those in "offshore"/ nearshore (i.e., within 10 miles off the U.S. Eastern coastline) environments or open estuarine environments. We did not consider riverine or enclosed to semi-enclosed bays or estuaries in our assessment as the environmental characteristics of these areas are not comparable to open estuarine or offshore environments. As such, the level of entrainment in these areas would not be comparable to the level of entrainment that may occur in the SBOBA.

As explained above, in the Northeast Region (Maine through Virginia), endangered species observers have been present on all hopper dredges operating between April 1 and November 30 since 1994. While the primary responsibility of observers is to document sea turtle interactions, observers document all biological material entrained in the dredges. As such, they record any observed interactions with sturgeon. Sturgeon interactions have routinely been reported to NMFS. Therefore, we expect that the "observed entrainment" numbers noted above are comprehensive and that any interactions with Atlantic sturgeon would be recorded. While observers have not operated on dredges working from December – March, in the Northeast Region dredging during this time of year is rare (due to weather conditions) and we do not anticipate that there are many undocumented interactions between Atlantic sturgeon and hopper dredges.

In general, entrainment of large mobile animals, such as sturgeon or sea turtles, is relatively rare. Several factors are thought to contribute to the likelihood of entrainment. In areas where animals are present in high density, the risk of an interaction is greater because more animals are exposed to the potential for entrainment. It has also been suggested that the risk of entrainment is highest in areas where the movements of animals are restricted (e.g., in river channels) where there is limited opportunity for animals to move away from the dredge. Because hopper dredging will occur in an offshore environment (i.e., the SBOBA), the movements of Atlantic sturgeon will not be restricted and we anticipate that most Atlantic sturgeon will be able to avoid the dredge. Further, because Atlantic sturgeon are likely to be using the action area as a migration corridor, the density of Atlantic sturgeon in any portion of the action area is likely to be low. In addition, the hopper dredge draghead operates on the bottom and is typically at least partially buried in the sediment. Sturgeon are benthic feeders and are often found at or near the bottom while foraging or while moving within rivers. Information suggests that Atlantic sturgeon migrating in the marine environment do not move along the bottom, but move further up in the water column. If Atlantic sturgeon are up off the bottom while in offshore areas, such as the SBOBA, the potential for interactions with the dredge are further reduced. Based on this information, the likelihood of an interaction of an Atlantic sturgeon with a hopper dredge operating in the SBOBA is expected to be low.

However, because we know that entrainment is possible and that not all mobile animals will be able to escape from the dredge (as evidenced by past entrainment of sea turtles and sturgeon), we anticipate that entrainment is still possible and as such, effects of these interactions on Atlantic sturgeon must be assessed. As noted above, outside of rivers/harbors, only 4 Atlantic sturgeon have been observed entrained in a hopper dredge (see Table 17). The low level of interactions may be due to the use of pre-trawl/dredge relocation trawling (see Table 17. Although no Atlantic sturgeon were entrained in some locations, they were documented in the area prior to dredging operations. Another explanation for the low levels of interactions may be that some interactions were not reported to NMFS; however, based on information that has been provided to NMFS and discussions with observers, under-reporting is likely to be very rare.

As noted above, based on what we know about Atlantic sturgeon behavior in environments comparable to the SBOBA, it is reasonable to consider that the risk of entrainment at this site is similar to that of sites located within open estuarine environments (i.e., see Table 17). Some of the areas considered in this analysis (see Table 17) are closer to shore than the area being dredged with a hopper dredge in the SBOBA and may be more heavily used than this area. Thus, an estimate of interactions derived from this information is likely an overestimate; however, at this time, this is the best available information on the potential for interactions with Atlantic sturgeon.

It is important to note that because observer coverage has been variable, observed interactions may not be representative of all Atlantic sturgeon injured or killed during dredge. As such, we have adjusted the entrainment numbers to account for any instances where observer coverage was less than 100%.

Past experience calculating the likelihood of interactions between hopper dredges and other species (i.e., sea turtles) indicates that there is a relationship between the number of animals entrained and the volume of material removed. The volume of material removed is correlated to the amount of time spent dredging but is a more accurate measure of effort because reports often provide the total days of a project but may not provide information on the actual hours of dredging vs. the number of hours steaming to the disposal site or in port for weather or other delays. Thus, we will use information available for all dredging projects that have been undertaken in open estuarine or offshore environments in the mid-Atlantic for which cubic yards of material removed are available to calculate the number of Atlantic sturgeon likely to be entrained during dredging operations (see Table 17). Using this method, and using the dataset presented in Table 17, we have calculated an entrainment rate of 1 Atlantic sturgeon is likely to be injured or killed for approximately every 5.6 million cy of material removed during hopper dredging operations undertaken at the SBOBA. This calculation is based on a number of assumptions including the following: that adult and subadult Atlantic sturgeon are evenly distributed throughout the action area, that all hopper dredges will have the same entrainment rate, and that Atlantic sturgeon are equally likely to be encountered throughout the time period when dredging will occur. While this estimate is based on several assumptions, it is reasonable because it uses the best available information on entrainment of Atlantic sturgeon from past dredging operations, including dredging operations in the vicinity of the action area, it includes multiple projects over several years, and all of the projects have had observers present which we expect would have documented any entrainment of Atlantic sturgeon.

Based on the information outlined above, NMFS anticipates that while dredging at the SBOBA, no more than 1 Atlantic sturgeon is likely to be entrained during the Port Monmouth project, no more than 1 Atlantic sturgeon is likely to be entrained during the Union Beach project, and no more than 3 Atlantic sturgeon are likely to be entrained during the Elberon to Loch Arbour project. Because we expect that adult Atlantic sturgeon are too large to be vulnerable to entrainment and given the size of other sturgeon that have been entrained in other hopper dredging operations, we expect that these sturgeon will be subadult.

There is evidence that some Atlantic sturgeon, particularly juveniles and small subadults, could be entrained in the dredge and survive. However, as the extent of internal injuries and the likelihood of survival is unknown, and the size of the fish likely to be entrained is impossible to predict, it is reasonable to conclude that any Atlantic sturgeon entrained in the hopper dredge are likely to be killed. Based on the NEFOP mixed-stock analysis, we have determined that Atlantic sturgeon in the action area likely originate from the five DPSs at the following frequencies: NYB 51%; South Atlantic 22%; Chesapeake Bay 13%; Gulf of Maine 11%; and Carolina 2%; we anticipate that entrained Atlantic sturgeon will occur at similar frequencies.

Table 18. Anticipated number of Atlantic sturgeon interactions by project

Project Name	Total Atlantic Sturgeon	NYB DPS	SA DPS	CB DPS	GOM DPS	Carolina DPS
Port Monmouth	1	1*	1*	1*	1*	1*
Union Beach	1	1*	1*	1*	1*	1*
Elberon to Loch Arbour	3	2	1**	1**	1**	1**
Possible Total	5	Up to 4	Up to 3	Up to 3	Up to 3	Up to 3

* NYB, SA, CB, GOM or Carolina DPS Atlantic sturgeon
** SA, CB, GOM or Carolina DPS Atlantic sturgeon

7.1.3 Interactions with the Sediment Plume

7.1.3.1 Hopper Dredge

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

Resuspension of fine-grained dredged material during hopper dredging operations is caused by the dragheads as they are pulled through the sediment, turbulence generated by the vessel and its prop wash, and overflow of turbid water during hopper filling operations. During the filling operation, dredged material slurry is often pumped into the hoppers after they have been filled with slurry in order to maximize the amount of solid material in the hopper. The lower density turbid water at the surface of the filled hoppers overflows and is usually discharged through ports located near the waterline of the dredge. In the vicinity of hopper dredge operations, a near-bottom turbidity plume of resuspended bottom material may extend 2,300 to 2,400 ft down current from the dredge (USACE 1983). In the immediate vicinity of the dredge, a well-defined upper plume is generated by the overflow process. Approximately 1,000 ft behind the dredge, the two plumes merge into a single plume (USACE 1983). Suspended solid concentrations may be as high as several tens of parts per thousand (ppt; grams per liter) near the discharge port and as high as a few parts per thousand near the draghead. In a study done by Anchor Environmental

(2003), nearfield concentrations ranged from 80.0-475.0 mg/l. Turbidity levels in the near-surface plume appear to decrease exponentially with increasing distance from the dredge due to settling and dispersion, quickly reaching concentrations less than 1 ppt. By a distance of 4,000 feet from the dredge, plume concentrations are expected to return to background levels (USACE 1983). Studies also indicate that in almost all cases, the vast majority of resuspended sediments resettle close to the dredge within one hour, and only a small fraction takes longer to resettle (Anchor Environmental 2003).

Total suspended sediment (TSS) is most likely to affect sea turtles, subadult and adult Atlantic sturgeon, or whales if a plume causes a barrier to normal behaviors or if elevated levels of suspended sediment affects prey species. As whales, sturgeon, and sea turtles are highly mobile, individuals are likely to be able to avoid any sediment plume that is present and any effect on their movements or behavior is likely to be insignificant. In addition, the total suspended sediment levels expected (80 – 475 mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical (Breitburg 1988 in Burton 1993; Summerfelt and Moiser 1976 and Combs 1979 in Burton 1993)). TSS may reach levels that can have an adverse effect on benthic communities (390.0 mg/L (EPA 1986)); however, McCauley et al. (1977) observed that while infauna populations declined significantly after dredging, infauna at dredging and placement areas recovered to pre-dredging conditions within 28 and 14 days, respectively. Therefore, the direct and indirect impacts to benthic communities are anticipated to be minimal. Rapid recovery and resettlement of benthic species is expected. Given this information, effects to whales, sturgeon, and sea turtle prey from increased turbidity is extremely unlikely; effects to listed whales, sturgeon and sea turtles will be discountable.

7.1.4 Collisions with vessels
There have not been any reports of dredge vessels colliding with listed species but contact injuries resulting from dredge movements could occur at or near the water surface and could therefore involve any of the listed species present in the area. Because the dredge is unlikely to be moving at speeds greater than three knots during dredging operations, blunt trauma injuries resulting from contact with the hull are unlikely during dredging. It is more likely that contact injuries during actual dredging would involve the propeller of the vessel. Contact injuries with the dredge are more likely to occur when the dredge is moving from the dredging area to port, or between dredge locations. While the distance between these areas is relatively short (12 – 16 miles), the dredge in transit would be moving at faster speeds (9.8 – 10.8 mph) than during dredging operations (2 – 3 mph), particularly when empty while returning to the borrow area.

The dredge vessel may collide with marine mammals and sea turtles when they are at the surface or, in the case of Atlantic sturgeon, in the water column when migrating. These species have been documented with injuries consistent with vessel interactions and it is reasonable to believe that the dredge vessels considered in this Opinion could inflict such injuries on Atlantic sturgeon, marine mammals and sea turtles, should they collide. As mentioned, sea turtles are found distributed throughout the action area in the warmer months, generally from May through November; Right whales primarily from November 1 through April 30; humpback and fin whales, spring, summer, and fall; and, Atlantic sturgeon throughout the year.

Effects of Vessel Collisions on Sea Turtles

Interactions between vessels and sea turtles occur and can take many forms, from the most severe (death or bisection of an animal or penetration to the viscera), to severed limbs or cracks to the carapace which can also lead to mortality directly or indirectly. Sea turtle stranding data for the U.S. Gulf of Mexico and Atlantic coasts, Puerto Rico, and the U.S. Virgin Islands show that between 1986 and 1993, about 9% of living and dead stranded sea turtles had propeller or other boat strike injuries (Lutcavage *et al*. 1997). According to 2001 STSSN stranding data, at least 33 sea turtles (loggerhead, green, Kemp's ridley and leatherbacks) that stranded on beaches within the northeast (Maine through North Carolina) were struck by a boat. This number underestimates the actual number of boat strikes that occur since not every boat struck turtle will strand, every stranded turtle will not be found, and many stranded turtles are too decomposed to determine whether the turtle was struck by a boat. It should be noted, however, that it is not known whether all boat strikes were the cause of death or whether they occurred post-mortem (NMFS SEFSC 2001).

Information is lacking on the type or speed of vessels involved in turtle vessel strikes. However, there does appear to be a correlation between the number of vessel struck turtles and the level of recreational boat traffic (NRC 1990). Although little is known about a sea turtle's reaction to vessel traffic, it is generally assumed that turtles are more likely to avoid injury from slower-moving vessels since the turtle has more time to maneuver and avoid the vessel. The speed of the dredge is not expected to exceed 2.6 knots while dredging or 10 knots while transiting to the pump out site with a full load and it is expected to operate at a maximum speed of 11 knots while empty. In addition, the risk of ship strike will be influenced by the amount of time the animal remains near the surface of the water. For the proposed action, the greatest risk of vessel collision will occur during transit between shore and the areas to be dredged. The presence of an experienced endangered species observer who can advise the vessel operator to slow the vessel or maneuver safely when sea turtles are spotted will further reduce the potential risk for interaction with vessels. The addition of one to two slow moving vessels in the action area have an insignificant effect on the risk of interactions between sea turtles and vessels in the action area.

Effects of Vessel Collisions on Atlantic Sturgeon

Information regarding the risk of vessel strikes to Atlantic sturgeon is discussed in the Status of the Species and Environmental Baseline sections above. As explained there, we have limited information on vessel strikes and many variables likely affect the potential for vessel strikes in a given area. Assuming that the risk of vessel strike increases with an increase in vessel traffic, we have considered whether an increase in vessel traffic in the action area during dredging (one to two slow moving vessels per day) would increase the risk of vessel strike for Atlantic sturgeon in this area. Although little is known about a sturgeon's reaction to vessel traffic, it is generally assumed that sturgeon are more likely to avoid injury from slower-moving vessels since the sturgeon has more time to maneuver and avoid the vessel. The speed of the dredge is not expected to exceed 2.6 knots while dredging or 10 knots while transiting to the pump out site with a full load and it is expected to operate at a maximum speed of 11 knots while empty. In addition, the risk of ship strike will be influenced by the amount of time the animal remains near the surface of the water. For the proposed action, the greatest risk of vessel collision will occur during transit between shore and the areas to be dredged. The presence of an experienced endangered species observer who can advise the vessel operator to slow the vessel or maneuver safely when sturgeon are spotted will further reduce the potential risk for interaction with vessels. Given the large volume of traffic in the area and the wide variability in traffic in any given day, the increase in traffic of one to two vessels per day is negligible and the increased risk to Atlantic sturgeon is insignificant.

Effects of Vessel Collisions on Whales

Large whales, particularly right whales, are vulnerable to injury and mortality from ship strikes. Ship strike injuries to whales take two forms: (1) propeller wounds characterized by external gashes or severed tail stocks; and (2) blunt trauma injuries indicated by fractured skulls, jaws, and vertebrae, and massive bruises that sometimes lack external expression (Laist *et al*. 2001). Collisions with smaller vessels may result in propeller wounds or no apparent injury, depending on the severity of the incident. Laist *et al*. (2001) reports that of 41 ship strike accounts that reported vessel speed, no lethal or severe injuries occurred at speeds below ten knots, and no collisions have been reported for vessels traveling less than six knots. A majority of whale ship strikes seem to occur over or near the continental shelf, probably reflecting the concentration of vessel traffic and whales in these areas (Laist *et al*. 2001). As discussed in the Status of the Species section, all whales are potentially subject to collisions with ships. However, due to their critical population status, slow speed, and behavioral characteristics that cause them to remain at the surface, vessel collisions pose the greatest threat to right whales. From 2003-2007, NMFS confirmed that 7 female right whales have been killed by ship collisions, one of which was carrying a near-term fetus. Because females are more critical to a population’s ability to replace its numbers and grow, the premature loss of even one reproductively mature female could hinder the species’ likelihood of recovering.

Most ship strikes have occurred at vessel speeds of 13-15 knots or greater (Jensen and Silber 2003; Laist *et al*. 2001). An analysis by Vanderlaan and Taggart (2006) showed that at speeds greater than 15 knots, the probability of a ship strike resulting in death increases asymptotically to 100%. At speeds below 11.8 knots, the probability decreases to less than 50%, and at ten knots or less, the probability is further reduced to approximately 30%. As noted above, the speed of the dredge is not expected to exceed 2.6 knots while dredging, 10 knots while transiting to the disposal sites, and no more than 11 knots while empty. In addition, all vessels will have lookouts on board and operators will receive training on prudent vessel operating procedures to avoid vessel strikes with all protected species. Based on this information, the potential interaction of a dredge/vessel and a listed species of whale is likely to be discountable.

7.2 Effects of Beach Nourishment

Dredged material will be used for beach nourishment or shoreline restoration work. As these sites are generally located within shallow, nearshore, waters, listed species of whales are not expected to occur within the vicinity of these sites, and thus, any effects of these operations on whales are expected to be discountable. However, as Atlantic sturgeon and sea turtles could potentially be present in the vicinity of such sites, effects to these species are possible. These effects include alteration of habitat and increases in turbidity.

7.2.1 Alteration of foraging habitat

Placement of material at beach nourishment sites, such as the Port Monmouth, Union Beach, and Elberon to Loch Arbour, can affect Atlantic sturgeon and sea turtles by reducing prey species through the alteration of the existing biotic assemblages (i.e., burying existing subtidal benthic organisms (e.g., crabs, clams, mussels)). As the purpose of placing dredge material at these sites is to restore or replenish the affected area, in general, the environment in which the material is to be placed can be characterized as an area exposed to high wave energy and thus, erosion, and one devoid of high densities or colonies of benthic organisms (e.g., shellfish beds, mollusks, crabs, SAV). Instead, these sites consist primarily of benthic infaunal communities (e.g., polycheates) that can withstand the variable and continually changing environment. Preferred prey items or habitat for Atlantic sturgeon and sea turtles (e.g., shellfish beds, crabs, mollusks, areas of SAV) are therefore, rarely established in these areas. Thus, it is extremely unlikely that the placement of dredged material in the nearshore waters of New Jersey, will result in the removal of critical amounts of prey resources from the area. Should any prey items be removed from the area in which dredged material is to be placed, depending on the species, recolonization of a newly renourished beach can begin in as short as 2-6 months (Burlas *et al*. 2001) when there is a good match between the fill material and the natural beach sediment. As the sand being placed along shorelines is similar in grain size to the indigenous beach sand, it is expected that recolonization of the nearshore benthos will occur within 2-6 months after initial beach renourishment or shoreline restoration cycles are complete. As such, no long term impacts on the numbers of species or community composition of the beach infauna is expected (USACE 1994; Burlas *et al*. 2001). In addition, beach nourishment or shoreline restoration operations in the proposed projects are not likely to alter the habitat in any way that prevents sea turtles or Atlantic sturgeon from using the action area as a migratory pathway to other areas with more suitable foraging habitat. As such, the effects of these operations on foraging or migrating sea turtles or Atlantic sturgeon will be insignificant.

7.2.2 Interactions with the Sediment Plume

The placement of dredged material along beaches or shorelines will cause an increase in localized turbidity in the nearshore environment. Nearshore turbidity impacts from fill placement are directly related to the quantity of fines (silt and clay) in the nourishment material. As the material from the SBOBA to be placed at sites is comprised of medium sized grains of sand, and consists of beach quality sand of similar grain size and composition as indigenous beach sands, short suspension time and containment of sediment during and after placement activities is expected. As such, turbidity impacts are expected to be short-term (i.e., within several hours of the cessation of operations (Greene 2002)) and spatially limited to the vicinity of the dredge outfall pipe, the pump-out station, and dredge anchor points.

The Atlantic States Marine Fisheries Commission (Greene 2002) review of the biological and physical impacts of beach nourishment cites several studies that report that the turbidity plume and elevated total suspended sediment levels drop off rapidly seaward of the sand placement operations. Wilber *et al*. (2006) evaluated the effects of a beach nourishment project along the coast of northern New Jersey and reported that maximum bottom surf zone and nearshore total suspended sediment concentrations related to nourishment activities were 64 mg/L and 34 mg/L, which were only slightly higher than background maximum bottom total suspended sediment concentrations in the surf and nearshore zones on unnourished portions of the beach (i.e., less than 20 mg/L). Additionally, Wilber *et al*. (2006) reported that elevated total suspended sediment concentrations associated with the active beach nourishment site were limited to within 400 m (1,310 feet) of the discharge pipe in the swash zone (defined as the area of the nearshore that is intermittently covered and uncovered by waves), while other studies found that the turbidity plume and elevated total suspended sediment levels are expected to be limited to a narrow area of the swash zone up to 500 m (1,640 feet) down current from the discharge pipe (Schubel *et al*. 1978; Burlas *et al*. 2001). Based on this and the best available information, turbidity levels created by the beach fill operations along the shoreline are expected to be between 34-64 mg/l; limited to an area approximately 500 meters down current from the discharge pipe, with dissipation occurring within several hundred meters along the shore; and, are expected to be short term, only lasting several hours.

Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). Total suspended sediment concentrations are most likely to affect Atlantic sturgeon and sea turtles if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle prey. As Atlantic sturgeon and sea turtles are highly mobile they are likely to be able to avoid any sediment plume and any effect on Atlantic sturgeon or sea turtle movements is likely to be insignificant. Additionally, the total suspended sediment levels expected (i.e., 34-64 mg/l) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical (Breitburg 1988 in Burton 1993; Summerfelt and Moiser 1976 and Combs 1979 in Burton 1993)) and benthic communities (390.0 mg/L (EPA 1986)); therefore, effects to benthic resources that sturgeon and sea turtles may eat are extremely unlikely. While the increase in suspended sediments may cause Atlantic sturgeon and sea turtles to alter their normal movements, any change in behavior is likely to be insignificant as it will only involve movements to alter course out of the sediment plume and is not likely to affect the migration ability of Atlantic sturgeon and sea turtles. Based on this information, it is likely that the effect of the suspension of sediment resulting from beach nourishment or shoreline restoration operations, such as those to occur at Port Monmouth, Union Beach, and Elberon to Loch Arbour, on sea turtles and Atlantic sturgeon will be insignificant. As listed species of whales will not be present in the shallow, nearshore environments where beach nourishment or shoreline restoration activities will be undertaken, listed species of whales will not be exposed to any elevated levels of suspended sediment that may be produced from these activities.

7.3 Groin Construction

Groins will be constructed for shoreline stabilazation work. As these sites are generally located within shallow, nearshore, waters, listed species of whales are not expected to occur within the vicinity of these sites, and thus, no effects of these operations on whales are expected. However, as Atlantic sturgeon and sea turtles could potentially be present in the vicinity of such sites, effects to these species are possible. These effects include alteration of habitat and increases in turbidity.

7.3.1 Alteration of foraging habitat

The placement of stone can cause effects on sea turtles and sturgeon by reducing prey species through the alteration of the existing biotic assemblages and habitat. The footprint of the groin being constructed at Port Monmouth will affect approximately 0.57 acres of seafloor. At Union Beach, the construction of the groins will affect approximately .09 acres of seafloor. The groin construction at Elberon to Loch Arbour will not affect any new area of seafloor as it involves removing rocks from existing groins and placing them along different areas of the groins.

Shallow waters (<10 feet) where the groins will be located are not known to provide optimal foraging for sea turtles (16-49 feet is preferred), and may or may not provide adequate opportunistic foraging for Atlantic sturgeon. In general, minor disruptions or removal of small proportions of benthic habitat associated with these projects that may provide opportunistic foraging habitat will have minimal impacts on the overall availability of suitable foraging habitat for both Atlantic sturgeon and sea turtles throughout Raritan Bay and the Atlantic Ocean off of New Jersey. These structures will take up well less than one acre in size. Less than 1 acre is minor in comparison to the size of the surrounding area of Sandy Hook Bay and Raritan Bay (more than 50,000 acres). As such, ample habitat will remain available for both sea turtles and Atlantic sturgeon to opportunistically forage. Additionally, the proposed stone placement operations are not likely to alter the habitat in any way that prevents sturgeon and sea turtles from using any portion of the action area as a migratory pathway and therefore, would not disrupt any essential behaviors such as migrating or foraging. Based on this information, the effects of stone placement on Atlantic sturgeon and sea turtle migration and foraging are expected to be insignificant and discountable.

7.3.2 *Interactions with the Sediment Plume*

The placement of stone (bedding, armor, and underlayer) during the construction of the groins will disturb shoreline sediments and may cause a temporary increase in suspended sediment in the nearshore area. If any sediment plume does occur, it is expected to be small, and is expected to settle out of the water column within a few hours. Turbidity levels associated with any sediment plume are expected to be only slightly elevated above background levels (< 5mg/L). Based on this information, it is likely that effects of stone placement to sea turtles and sturgeon will be discountable.

7.4 Installation of Piles

7.4.1 Installation of Timber Piles via Jetting

Approximately 40 timber piles, one foot in diameter will be installed to modify an existing timber pier. The method for placing the wood piles supporting the pier will be to water jet/push the piles into place. As the site is located in shallow, nearshore, waters, listed species of whales are not expected to occur within the vicinity of these sites, and thus, any effects of this operation on whales are expected to be discountable. However, as Atlantic sturgeon and sea turtles could potentially be present in the vicinity of such sites, effects to these species are possible. These effects include alteration of habitat and increases in turbidity.

Jetting is a method of forcing water around and under a pile to loosen and displace the surrounding soils resulting in the disturbance of bottom sediments. The operation does have the potential to result in an increase in suspended sediment levels in the area immediately surrounding the pile; however, suspended sediment is expected to settle out of the water column rapidly with both lateral and vertical distance from the operating jet plow. Within 100 meters of the jet plow, both maximum and mean suspended sediment concentrations are predicted to be less than 200.0 mg/L and after 24 hours, the suspended sediment concentration level above ambient is predicted to be below 50.0 mg/L, with the concentration dropping to less than 20.0 mg/L above ambient after 48 hours (ESS Group, Inc., 2008). In addition, under all tidal conditions, suspended sediment concentrations >100.0 mg/L are predicted to remain in the bottom 2 to 3 meters of the water column and concentrations are predicted to decrease rapidly to approximately 10.0 mg/L or less 5 to 7 meters above the bottom (ESS Group, Inc., 2008).

7.4.1.1 Alteration of foraging habitat
Some disturbance or removal of benthic invertebrates, which may serve as Atlantic sturgeon or sea turtle prey, may occur in the area where the piles will be installed via jetting. Depending on the species, recolonization of a dredged/jetted channel can begin in as short as a month (Guerra-Garcia *et al.* 2003), with the area expected to be completely recolonized by benthic organisms within approximately 12 months (USACE, 2001; US DOI, 2000). Some reduction in the amount of potential Atlantic sturgeon and sea turtle prey in the area to be jetted is likely; however, the action will not result in the permanent removal of forage items, as prey species will continually recolonize the area following a disturbance. In summary, as the area affected by jetting is small and recolonization of the benthic community will be rapid, we have determined that any effects of jetting to foraging Atlantic sturgeon and sea turtles will be insignificant.

7.4.1.2 Interactions with sediment plume
No information is available on the effects of total suspended solids (TSS) on juvenile and adult sea turtles. Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). TSS is most likely to affect sturgeon and sea turtles if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle or sturgeon prey. As Atlantic sturgeon and sea turtles are highly mobile, they are likely to be able to avoid any sediment plume and any effect on sturgeon and sea turtle movements is likely to be insignificant. Additionally, the TSS levels expected for jetting (20.0 to 200.0 mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (390.0 mg/L (EPA 1986)); therefore, effects to benthic resources that sturgeon or sea turtles may eat are unlikely. Additionally, while the increase in suspended sediments may cause Atlantic sturgeon or sea turtles to alter their normal movements, any change in behavior is likely to be insignificant as it will only involve movements to alter course out of the sediment plume and is not likely to affect the overall movement or migration ability of sturgeon and sea turtles. Based on this information, the effect of suspended sediment resulting from jetting on Atlantic sturgeon or sea turtles will be insignificant.

7.4.2 Pile Driving
Steel sheet piles will be driven in Flat Creek, East Creek, and Pews Creek. No ESA-listed species are present in any of these creeks; therefore, there will be no effect to ESA-listed species as a result of driving steel sheet piles in these creeks.

The Elberon to Loch Arbour project will involve the installation of timber piles to support the outfall extensions. Piles will be installed with an impact or vibratory hammer depending on substrate conditions in the area. In general vibratory hammers are quieter than impact hammers, and the larger the pile, the greater the noise level (Illingworth and Rodkin Inc. and Jones and Stoke 2009). Therefore, for the purpose of this consultation, we will analyze the sound levels from 12 inch timber piles driven via an impact hammer.

As the site is located in shallow, nearshore waters, listed species of whales are not expected to occur within the vicinity of these sites, and thus, any effects of this operation on whales are expected to be discountable. However, as Atlantic sturgeon and sea turtles could potentially be present in the vicinity of such sites, effects to these species are possible.

The installation of piles can produce underwater sound pressure waves that can affect aquatic species. The available literature indicates that the the driving of 12 inch timber piles via an impact hammer produces underwater noise levels of approximately 170 dB_{RMS} within 10 meters of the pile being driven (Illingworth and Rodkin Inc. and Jones and Stoke 2009).

As the distance from the source increases, underwater sound levels produced by pile driving are known to attenuate rapidly. Using data from Illingworth and Rodkin, Inc. and Jones and Stoke (2009), underwater noise levels produced from the driving of timber piles will attenuate approximately 10 dB every 10 meters. This is based on a conservative estimate of attenuation rates for the driving of piles (Illingworth and Rodkin, Inc. 2007, 2009).

As a source of underwater noise, pile driving produces underwater sound pressure waves of varying intensity (*i.e*., sound attenuates over distance so noise levels are greater closer to the source) that can cause behavioral and/or physiological effects to aquatic species, such as whales, sea turtles, and Atlantic sturgeon. The intensity of the underwater noise and the ability of the animal to detect the sound may result in behavioral modification of the animal (*e.g*., temporary avoidance of an area; Richardson *et al*. 1995). The physical nature of the sound (*i.e.,* pressure waves and particle motion) produced by pile driving; however, may result in physiological effects to an animal. Pressure waves, generated from particle motion, cause fields of compression and rarefaction to move through the water, as well as through any object that contains air or gas filled chambers (*e.g*., swim bladders of fish), thereby causing injury to internal organs of the organism. The latter can result in a range of physiological effects on fish ranging from those that are not likely to affect the survival of the species (*e.g.,* small ruptures of capillaries in fins) to those that result in mortality (*e.g*., rupturing of the swimbladder) (Reyff 2003; Abbott and Bing-Sawyer 2002; Caltrans 2001; Longmuir and Lively 2001; Stotz and Colby 2001; Stephensen *et al.* 2010). These characteristics, as well as many other factors (*e.g*., the type and size of pile; installation method; type and size of fish (smaller fish are more often impacted); fish hearing sensitivity; received distance), contribute to the likelihood of behavioral and physiological effects to an individual fish.

Sea Turtles
The hearing capabilities of sea turtles are poorly known, and there is little available information on the effects of noise on sea turtles. Some studies have demonstrated that sea turtles have fairly

limited capacity to detect sound, although all results are based on a limited number of individuals and must be interpreted cautiously. Most recently, McCauley *et al*. (2000) noted that decibel levels of 166 dB re 1μPa$_{RMS}$ were required before any behavioral reaction (e.g., increased swimming speed) was observed, and decibel levels above 175 dB re 1μPa$_{RMS}$ elicited avoidance behavior of sea turtles. The study done by McCauley *et al*. (2000), as well as other studies done to date, used impulsive sources of noise (*e.g.,* air gun arrays) to ascertain the underwater noise levels that produce behavioral modifications in sea turtles. As no other studies have been done to assess the effects of noise sources on sea turtles, McCauley *et al*. (2000) serves as the best available information on the levels of underwater noise that may produce a startle, avoidance, and/or other behavioral or physiological response in sea turtles. Based on this information, we believe that any underwater noise level at or above 166 re 1μPa$_{RMS}$ has the potential to adversely affect sea turtles (*e.g.,* injury, temporary threshold shifts).

As described in above, sound levels may be as high as 170 dB re 1μPa$_{RMS}$ within 10 meters of the timber pile being driven with an impact hammer and thus, at a distance beyond approximately 15 meters from the timber piles being driven, noise levels will be below 166 dB re 1μPa$_{RMS}$. The nearshore area where the timber piles will be installed is not known to be a high use area for sea turtles and as such, it is extremely unlikely that sea turtles will occur within 0 to15 meters of the piles being driven and therefore, be exposed to adverse elevated under water noise levels at or above 166 dB re 1μPa$_{RMS.}$ Based on this information, the noise effects of pile driving on sea turtles is discountable.

Atlantic sturgeon

An interagency work group, including the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), has reviewed the best available scientific information and developed criteria for assessing the potential of pile driving activities to cause injury to fish (Fisheries Hydroacoustic Working Group (FHWG) 2008). The workgroup established dual sound criteria for injury, measured 10 meters away from the pile, of 206 dB re 1 μPa$_{Peak}$ and 187 dB accumulated sound exposure level (dBcSEL; re: 1μPa^{2}•sec) (183 dB accumulated SEL for fish less than 2 grams). While this work group is based on the US West coast, species similar to shortnose and Atlantic sturgeon were considered in developing this guidance (green sturgeon). As these species are biologically similar to the species being considered herein, it is reasonable to use the criteria developed by the FHWG to assess the potential for injury to Atlantic sturgeon from pile driving operations.

No studies have been undertaken to determine the noise levels that would result in behavioral disturbance to Atlantic sturgeon. Given the available information from studies on other fish species (*i.e*., Anderson *et al.* 2007; Purser and Radford 2011; Wysocki *et al.* 2007), we consider 150 dB re 1 μPa$_{RMS}$ to be a reasonable estimate of the noise level at which exposure may result in behavioral modifications. These behaviors could range from a temporary startle to avoidance of the noisy area.

Based on the best available information, the driving of timber piles, via an impact hammer, will produce underwater noise levels below 206 dB re 1 μPa$_{Peak}$ and 187cSEL. As such, even if sturgeon were present in the area where piles were being installed, no injury would occur.

Based on attenuation rates and the information presented above, underwater noise levels are expected to be below 150 dB re 1 μPa $_{RMS}$ at a distance beyond 30 meters from the timber pile being driven. In the worst case, sturgeon would avoid the area where noise levels are above 150 dB re 1 μPa $_{RMS}$. Given the small size of the area where noise levels will be elevated at any one time, (*i.e.,* an area with a radius of no more than 30 meters), and the open ocean that will provide a large area for a zone of passage, temporary avoidance of the noisy area would involve small changes in the movements of individual sturgeon. These small behavioral changes are not expected to result in any increased energy expenditure or cause any disruption to essential behaviors such as foraging, migrating or resting. As such, all effects to Atlantic sturgeon from pile driving will be insignificant and discountable.

7.4.2.1 Alteration of foraging habitat
The installation of piles will disturb bottom sediments. However, little increase in sedimentation or turbidity is expected to result from these construction activities. If any sediment plume does occur, it is expected to be small and suspended sediment is expected to settle out of the water column within a few hours and any increase in turbidity will be short term. Additionally, sea turtles and Atlantic sturgeon are expected to be able to temporarily avoid the area and continue normal behaviors in nearby portions of the bay. Therefore, there would not be any disruption of essential behaviors such as migrating or foraging. As such, any effects of pile driving are expected to be discountable.

8.0 CUMULATIVE EFFECTS
Cumulative effects as defined in 50 CFR § 402.02 to include the effects of future State or private activities, which are reasonably certain to occur within the action area. Future Federal actions are not considered in the definition of “cumulative effects.”

Sources of human-induced mortality, injury, and/or harassment of Atlantic sturgeon, whales, or sea turtles resulting from future State, tribal, local or private actions in the action area that are reasonably certain to occur in the future include incidental takes in state-regulated fishing activities, pollution, global climate change, and vessel collision. While the combination of these activities may affect Atlantic sturgeon, whales, or sea turtles, preventing or slowing the species’ recovery, the magnitude of these effects in the action area is currently unknown. However, this Opinion assumes effects in the future, with the exception of climate change, would be similar to those in the past and are therefore reflected in the anticipated trends described in the status of the species/environmental baseline section.

State Water Fisheries- Fishing activities are considered one of the most significant causes of death and serious injury for sea turtles. A 1990 National Research Council report estimated that 550 to 5,500 sea turtles (juvenile and adult loggerheads and Kemp’s ridleys) die each year from all other fishing activities besides shrimp fishing. Fishing gear in state waters, such as bottom trawls, gillnets, trap/pot gear, and pound nets, take sea turtles each year. NMFS is working with state agencies to address the take of sea turtles in state-water fisheries within the action area of this consultation where information exists to show that these fisheries take sea turtles. Action has been taken by some states to reduce or remove the likelihood of sea turtle takes in one or more gear types. However, given that state managed commercial and recreational fisheries along the Atlantic coast are reasonably certain to occur within the action area in the foreseeable future, additional takes of sea turtles in these fisheries are anticipated. There is insufficient information by which to quantify the number of sea turtle takes presently occurring as a result of state water fisheries as well as the number of sea turtles injured or killed as a result of such takes. While actions have been taken to reduce sea turtle takes in some state water fisheries, the overall effect of these actions on reducing the take of sea turtles in state water fisheries is unknown, and the future effects of state water fisheries on sea turtles cannot be quantified.

Right and humpback whale entanglements in gear set for state fisheries are also known to have occurred (e.g., Waring *et al.* 2007; Glass *et al.* 2008). Actions have been taken to reduce the risk of entanglement to large whales, although more information is needed on the effectiveness of these actions. State water fisheries continue to pose a risk of entanglement to large whales to a level that cannot be quantified.

Information on interactions with Atlantic sturgeon with state fisheries operating in the action area is not available, and it is not clear to what extent these future activities will affect listed species differently than the current activities described in the Status of the Species/Environmental Baseline section. However, this Opinion assumes effects in the future would be similar to those in the past and are, therefore, reflected in the anticipated trends described in the status of the species/environmental baseline section.

***State PDES Permits* –** The states of New Jersey, Delaware and Pennsylvania have been delegated authority to issue NPDES permits by the EPA. These permits authorize the discharge of pollutants in the action area. Permitees include municipalities for sewage treatment plants and other industrial users. The states will continue to authorize the discharge of pollutants through the SPDES permits. However, this Opinion assumes effects in the future would be similar to those in the past and are therefore reflected in the anticipated trends described in the status of the species/environmental baseline section.

Vessel Interactions- As noted in the Environmental Baseline section, private vessel activities in the action area may adversely affect listed species in a number of ways, including entanglement, boat strike, or harassment. As vessel activities will continue in the future, the potential for a vessel to interact with a listed species exists; however, the frequency with which these interactions will occur in the future is unknown and thus, the level of impact to sea turtle, whale, or Atlantic sturgeon populations cannot be projected. However, this Opinion assumes effects in the future would be similar to those in the past and are, therefore, reflected in the anticipated trends described in the status of the species/environmental baseline section.

Pollution and Contaminants – Human activities in the action area causing pollution are reasonably certain to continue in the future, as are impacts from them on Atlantic sturgeon, sea turtles, or whales. However, the level of impacts cannot be projected. Sources of contamination in the action area include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, and industrial development. Chemical contamination may have an effect on listed species reproduction and survival. However, this Opinion assumes effects in the future would be similar to those in the past and are therefore reflected in the anticipated trends described in the status of the species/environmental baseline section.

9.0 INTEGRATION AND SYNTHESIS OF EFFECTS

NMFS has estimated that over the life of the 3 projects (i.e., through 2064), up to 8 sea turtles will be entrained in hopper dredging operations; these sea turtles could either be Kemp's ridley or loggerhead sea turtles. Additionally, NMFS has estimated that over the life of the 3 projects, up to 5 subadult Atlantic sturgeon will be entrained in hopper dredging operations. As explained in the "Effects of the Action" section, effects of habitat alteration, suspended sediment, increased underwater noise, and vessel interactions on sea turtles, whales, or Atlantic sturgeon as a result of the projects will be insignificant and/or discountable. In addition, as explained above, no whales or green or leatherback sea turtles are likely to be entrained in any dredge operating within the SBOBA, and thus, NMFS has determined that the likelihood of an interaction (i.e., entrainment) between a green or leatherback sea turtle or a whale and a hopper dredge is discountable.

In the discussion below, we consider whether the effects of the proposed actions reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the listed species in the wild by reducing the reproduction, numbers, or distribution of the listed species that will be adversely affected by the actions. The purpose of this analysis is to determine whether the proposed actions, in the context established by the status of the species, environmental baseline, and cumulative effects, would jeopardize the continued existence of any listed species. In the NMFS/USFWS Section 7 Handbook, for the purposes of determining jeopardy, survival is defined as, "the species' persistence as listed or as a recovery unit, beyond the conditions leading to its endangerment, with sufficient resilience to allow for the potential recovery from endangerment. Said in another way, survival is the condition in which a species continues to exist into the future while retaining the potential for recovery. This condition is characterized by a species with a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, which exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter."

Recovery is defined as, "Improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in Section 4(a)(1) of the Act." Below, for the listed species that may be affected by the proposed actions, we summarize the status of the species and consider whether the proposed action will result in reductions in reproduction, numbers or distribution of these species and then consider whether any reductions in reproduction, numbers or distribution resulting from the proposed actions would reduce appreciably the likelihood of both the survival and recovery of these species, as those terms are defined for purposes of the federal Endangered Species Act.

9.1 Atlantic sturgeon

As explained above, the proposed actions are likely to result in the mortality of a total of five Atlantic sturgeon from the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina and/or South Atlantic DPSs through 2064 during the dredging at SBOBA. We expect that the Atlantic sturgeon killed will be all be subadults. No mortality of any adults is anticipated. All other effects to Atlantic sturgeon, including effects to habitat and prey due to dredging and fill placement, and elevated underwater noise, will be insignificant and discountable.

9.1.1 Determination of DPS Composition

We have considered the best available information to determine from which DPSs individuals that will be killed are likely to have originated. Using mixed stock analysis explained above, we have determined that Atlantic sturgeon in the action area likely originate from the five DPSs at the following frequencies: NYB 51%; South Atlantic 22%; Chesapeake Bay 13%; Gulf of Maine 11%; and Carolina 2%. Given these percentages, of the five sturgeon likely to be killed during the dredging operations, up to 4 will originate from the NYB DPS and up to 3 from the South Atlantic, Cheasapeake Bay, Carolina, and the Gulf of Maine DPSs.

9.2.2 Gulf of Maine DPS

We expect that 11% of the Atlantic sturgeon in the action area will originate from the GOM DPS. Most of these fish are expected to be subadults, with few adults from the GOM DPS expected to be present in the action area. No mortality of adult Atlantic sturgeon is anticipated to result from the proposed actions. We expect that no more than three GOM DPS Atlantic sturgeon will be killed during dredging. These mortalities will occur between now and the end of 2064.

While Atlantic sturgeon occur in several rivers in the GOM DPS, recent spawning has only been documented in the Kennebec and Androscoggin rivers. No total population estimates are available for any river population or the DPS as a whole. As discussed in section 4.3, we have estimated a total of 7,544 GOM DPS adults and subadults in the ocean (1,864 adults and 5,591 subadults). This estimate is the best available at this time and represents only a percentage of the total GOM DPS population as it does not include young of the year or juveniles and does not include all adults and subadults. GOM origin Atlantic sturgeon are affected by numerous sources of human induced mortality and habitat disturbance throughout the riverine and marine portions of their range. While there are some indications that the status of the GOM DPS may be improving, there is currently not enough information to establish a trend for any life stage or for the DPS as a whole.

The number of subadult GOM DPS Atlantic sturgeon we expect to be killed due to the dredging of the SBOBA represents an extremely small percentage of the GOM DPS. While the death of three subadult GOM DPS Atlantic sturgeon over the next 50 years will reduce the number of GOM DPS Atlantic sturgeon compared to the number that would have been present absent the proposed actions, it is not likely that this reduction in numbers will change the status of this species. Even if there were only 5,591 subadults in the GOM DPS, this loss would represent only 0.05% of the subadults in the DPS. The percentage would be much less if we also considered the number of young of the year, juveniles, adults, and other subadults not included in the NEAMAP-based oceanic population estimate.

Because there will be no loss of adults, the reproductive potential of the GOM DPS will not be affected in any way other than through a reduction in numbers of individual future spawners as opposed to current spawners. The loss of three female subadults would have the effect of reducing the amount of potential reproduction as any dead GOM DPS Atlantic sturgeon would have no potential for future reproduction. This small reduction in potential future spawners is expected to result in an extremely small reduction in the number of eggs laid or larvae produced in future years and similarly, an extremely small effect on the strength of subsequent year classes. Even considering the potential future spawners that would be produced by the individuals that would be killed as a result of the proposed action, any effect to future year classes is anticipated to be extremely small and would not change the status of this species. The loss of male subadults may have less of an impact on future reproduction as other males are expected to be available to fertilize eggs in a particular year. Additionally, we have determined that any impacts to behavior will be minor and temporary and that there will not be any delay or disruption of any normal behavior including spawning. The proposed actions will also not affect the spawning grounds within the rivers where GOM DPS fish spawn.

The proposed actions are not likely to reduce distribution because the action will not impede GOM DPS Atlantic sturgeon from accessing any seasonal concentration areas, including foraging, spawning or overwintering grounds. Any effects to distribution will be minor and temporary and limited to the temporary avoidance of the area of increased sediment around the working dredge.

Based on the information provided above, the death of no more than three subadult GOM DPS Atlantic sturgeon over 50 years, will not appreciably reduce the likelihood of survival of the GOM DPS (*i.e.*, it will not decrease the likelihood that the species will continue to persist into the future with sufficient resilience to allow for the potential recovery from endangerment). The actions will not affect GOM DPS Atlantic sturgeon in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, and it will not result in effects to the environment which would prevent Atlantic sturgeon from completing their entire life cycle or completing essential behaviors including reproducing, foraging and sheltering. This is the case because: (1) the death of three subadult GOM DPS Atlantic sturgeon represents an extremely small percentage of the species; (2) the death of these GOM DPS Atlantic sturgeon will not change the status or trends of the species as a whole; (3) the loss of these GOM DPS Atlantic sturgeon is not likely to have an effect on the levels of genetic heterogeneity in the population; (4) the loss of these subadult GOM DPS Atlantic sturgeon is likely to have such a small effect on reproductive output that the loss of these individuals will not change the status or trends of the species; (5) the actions will have only a minor and temporary effect on the distribution of GOM DPS Atlantic sturgeon in the action area and no effect on the distribution of the species throughout its range; and, (6) the actions will have only an insignificant effect on individual foraging or sheltering GOM DPS Atlantic sturgeon.

In rare instances, an action that does not appreciably reduce the likelihood of a species' survival might appreciably reduce its likelihood of recovery. As explained above, we have determined that the proposed actions will not appreciably reduce the likelihood that the GOM DPS of Atlantic sturgeon will survive in the wild. Here, we consider whether the action will appreciably reduce the likelihood of recovery from the perspective of ESA Section 4. As noted above, recovery is defined as the improvement in status such that listing under Section 4(a) as "in danger of extinction throughout all or a significant portion of its range" (endangered) or "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range…" (threatened) is no longer appropriate. Thus, we have considered whether the proposed actions will appreciably reduce the likelihood that the GOM DPS of Atlantic sturgeon can rebuild to a point where it is no longer in danger of becoming endangered within the foreseeable future throughout all or a significant portion of its range.

No Recovery Plan for the GOM DPS has been published. The Recovery Plan will outline the steps necessary for recovery and the demographic criteria which once attained would allow the species to be delisted. We know that in general, to recover, a listed species must have a sustained positive trend of increasing population over time. To allow that to happen for GOM Atlantic sturgeon, individuals must have access to enough habitat in suitable condition for foraging, resting and spawning. Conditions must be suitable for the successful development of early life stages. Mortality rates must be low enough to allow for recruitment to all age classes so that successful spawning can continue over time and over generations. There must be enough suitable habitat for spawning, foraging, resting and migrations of all individuals. For Atlantic sturgeon, habitat conditions must be suitable both in the natal river and in other rivers and estuaries where foraging by subadults and adults will occur and in the ocean where subadults and adults migrate, overwinter and forage. Habitat connectivity must also be maintained so that individuals can migrate between important habitats without delays that impact their fitness. Here, we consider whether these proposed actions will affect the GOM DPS likelihood of recovery.

These actions will not change the status or trend of the GOM DPS as a whole. The proposed actions will result in a small amount of mortality (three subadults from a population estimated to have at least 5,000 subadults) and a subsequent small reduction in future reproductive output. This reduction in numbers will be small and the impact on reproduction and future year classes will also be small enough not to affect the trend of the population. The proposed actions will have only insignificant effects on habitat and forage and will not impact the area in a way that makes additional growth of the population less likely. This is because the area that sturgeon may avoid is small and any avoidance will be temporary and limited to the period of time when increased suspended sediment is experienced or increased underwater noise. The proposed actions will not affect GOM DPS of Atlantic sturgeon outside of the action area or affect habitats outside of the action area. Therefore, it will not affect estuarine or oceanic habitats that are important for sturgeon. For these reasons, the actions will not reduce the likelihood that the GOM DPS can recover. Therefore, the proposed actions will not appreciably reduce the likelihood that the GOM DPS of Atlantic sturgeon can be brought to the point at which they are no longer listed as threatened. Based on the analysis presented herein, the proposed actions, are not likely to appreciably reduce the survival and recovery of this species.

9.2.3 New York Bight DPS

The NYB DPS is listed as endangered. We expect that 51% of the Atlantic sturgeon in the action area will originate from the NYB DPS. No mortality of adult Atlantic sturgeon is anticipated. We anticipate the mortality of up to four NYB DPS Atlantic sturgeon as a result of entrainment in a hopper dredge. These fish are expected to be subadults originating from the

Delaware or Hudson River. While it is possible that entrained fish could survive, we assume here that these fish will be killed.

While Atlantic sturgeon occur in several rivers in the NYB DPS, recent spawning has only been documented in the Hudson and Delaware rivers. No total population estimates are available for any river population or the DPS as a whole. As discussed in section 4.3, we have estimated a total of 34,566 NYB DPS adults and subadults in the ocean (8,642 adults and 25,925 subadults). This estimate is the best available at this time and represents only a percentage of the total NYB DPS population as it does not include young of the year or juveniles and does not include all adults and subadults. NYB origin Atlantic sturgeon are affected by numerous sources of human induced mortality and habitat disturbance throughout the riverine and marine portions of their range. There is currently not enough information to establish a trend for any life stage or for the DPS as a whole.

We have limited information from which to determine the percentage of NYB DPS fish in the SBOBA that are likely to originate from the Delaware vs. the Hudson River. The overall ratio of Delaware River to Hudson River fish in the DPS as a whole is unknown. Some Delaware River fish have a unique genetic haplotype (the A5 haplotype); however, whether there is any evolutionary significance or fitness benefit provided by this genetic makeup is unknown. Genetic evidence indicates that while spawning continued to occur in the Delaware River and in some cases Delaware River origin fish can be distinguished genetically from Hudson River origin fish, there is free interchange between the two rivers. This relationship is recognized by the listing of the New York Bight DPS as a whole and not separate listings of a theoretical Hudson River DPS and Delaware River DPS. Thus, while we can consider the loss of Delaware River fish on the Delaware River population and the loss of Hudson River fish on the Hudson River population, it is more appropriate, because of the interchange of individuals between these two populations, to consider the effects of this mortality on the New York Bight DPS as a whole.

The mortality of up to four subadult Atlantic sturgeon from the NYB DPS over a 50-year period represents a very small percentage of the subadult population. While the death of four subadult Atlantic sturgeon will reduce the number of NYB DPS Atlantic sturgeon compared to the number that would have been present absent the proposed action, it is not likely that this reduction in numbers will change the status of this species as these losses represents a very small percentage of the subadult population and an even smaller percentage of the overall population of the DPS (juveniles, subadults and adults combined).

The reproductive potential of the NYB DPS will not be affected in any way other than through a reduction in numbers of individuals. The loss of four female subadults over a 50 year period (average of one per 12.5 years) would have the effect of reducing the amount of potential reproduction as any dead NYB DPS Atlantic sturgeon would have no potential for future reproduction. This small reduction in potential future spawners is expected to result in an extremely small reduction in the number of eggs laid or larvae produced in future years and similarly, an extremely small effect on the strength of subsequent year classes. Even considering the potential future spawners that would be produced by the individuals that would be killed as a result of the proposed action, any effect to future year classes is anticipated to be extremely small and would not change the status of this species. The loss of four male subadult sturgeon may have less of an impact on future reproduction as other males are expected to be available to fertilize eggs in a particular year. Additionally, we have determined that any impacts to behavior will be minor and temporary and that there will not be any delay or disruption of any normal behavior including spawning. The proposed actions will also not affect the spawning grounds within the Delaware River or the Hudson River where most NYB DPS fish spawn. There will be no effects to spawning adults and therefore no reduction in individual fitness or any future reduction in spawning by these individuals.

The proposed actions are not likely to reduce distribution because the actions will not impede NYB DPS Atlantic sturgeon from accessing any seasonal concentration areas, including foraging, spawning or overwintering grounds. Any effects to distribution will be minor and temporary and limited to the temporary avoidance of a small ensonified area and sediment plumes. Further, the action is not expected to reduce the river by river distribution of Atlantic sturgeon.

Based on the information provided above, the death of four NYB DPS Atlantic sturgeon over a 50-year period, will not appreciably reduce the likelihood of survival of the New York Bight DPS (*i.e.*, it will not decrease the likelihood that the species will continue to persist into the future with sufficient resilience to allow for the potential recovery from endangerment). The actions will not affect NYB DPS Atlantic sturgeon in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, and it will not result in effects to the environment which would prevent Atlantic sturgeon from completing their entire life cycle or completing essential behaviors including reproducing, foraging and sheltering. This is the case because: (1) the death of these subadult NYB DPS Atlantic sturgeon represents an extremely small percentage of the species; (2) the death of these NYB DPS Atlantic sturgeon will not change the status or trends of the species as a whole; (3) the loss of these NYB DPS Atlantic sturgeon is not likely to have an effect on the levels of genetic heterogeneity in the population; (4) the loss of these subadults will not result in the loss of any age class; (5) the loss of these NYB DPS Atlantic sturgeon is likely to have such a small effect on reproductive output that the loss of these individuals will not change the status or trends of the species; (6) the actions will have only a minor and temporary effect on the distribution of NYB DPS Atlantic sturgeon in the action area and no effect on the distribution of the species throughout its range; and, (7) the actions will have no effect on the ability of NYB DPS Atlantic sturgeon to shelter and only an insignificant effect on individual foraging NYB DPS Atlantic sturgeon.

In rare instances, an action that does not appreciably reduce the likelihood of a species' survival might appreciably reduce its likelihood of recovery. As explained above, we have determined that the proposed actions will not appreciably reduce the likelihood that the NYB DPS of Atlantic sturgeon will survive in the wild,. Here, we consider whether the action will appreciably reduce the likelihood of recovery from the perspective of ESA Section 4. As noted above, recovery is defined as the improvement in status such that listing under Section 4(a) as "in danger of extinction throughout all or a significant portion of its range" (endangered) or "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range…” (threatened) is no longer appropriate. Thus, we have considered whether the proposed action will appreciably reduce the likelihood that the NYB DPS of Atlantic sturgeon can rebuild to a point where it is no longer in danger of extinction throughout all or a significant part of its range.

No Recovery Plan for the NYB DPS has been published. The Recovery Plan will outline the steps necessary for recovery and the demographic criteria which once attained would allow the species to be delisted. We know that in general, to recover, a listed species must have a sustained positive trend of increasing population over time. To allow that to happen for sturgeon, individuals must have access to enough habitat in suitable condition for foraging, resting and spawning. Conditions must be suitable for the successful development of early life stages. Mortality rates must be low enough to allow for recruitment to all age classes so that successful spawning can continue over time and over generations. There must be enough suitable habitat for spawning, foraging, resting and migrations of all individuals. For Atlantic sturgeon, habitat conditions must be suitable both in the natal river and in other rivers and estuaries where foraging by subadults and adults will occur and in the ocean where subadults and adults migrate, overwinter and forage. Habitat connectivity must also be maintained so that individuals can migrate between important habitats without delays that impact their fitness. Here, we consider whether these proposed actions will affect the NYB DPS likelihood of recovery.

These actions will not change the status or trend of the Hudson or Delaware River population of Atlantic sturgeon or the status and trend of the NYB DPS as a whole. The proposed actions will result in a small amount of mortality (no more than four individuals over a 50 year period) and a subsequent small reduction in future reproductive output. This reduction in numbers will be small and the impact on reproduction and future year classes will also be small enough not to affect the trend of the population. Any effects to habitat will be insignificant and discountable and will not affect the ability of Atlantic sturgeon to carry out any necessary behaviors or functions. Any impacts to available forage will also be insignificant. The proposed projects will result in a small reduction in future reproductive output. For these reasons, it is not expected to affect the persistence of the NYB DPS of Atlantic sturgeon. These actions will not change the status or trend of the NYB DPS of Atlantic sturgeon. The very small reduction in numbers and future reproduction resulting from the proposed projects will not reduce the likelihood of improvement in the status of the NYB DPS of Atlantic sturgeon. The effects of the proposed projects will not delay the recovery timeline or otherwise decrease the likelihood of recovery. The effects of the proposed actions will also not reduce the likelihood that the status of the species can improve to the point where it is recovered and could be delisted. Therefore, the proposed projects will not appreciably reduce the likelihood that the NYB DPS of Atlantic sturgeon can be brought to the point at which they are no longer listed as endangered. Based on the analysis presented herein, the proposed actions, are not likely to appreciably reduce the survival and recovery of this species.

9.2.4 Chesapeake Bay DPS

Individuals originating from the CB DPS are likely to occur in the action area. The CB DPS has been listed as endangered. We expect that 13% of the Atlantic sturgeon in the action area will originate from the CB DPS. No mortality of adult Atlantic sturgeon is anticipated. We anticipate the mortality of up to three subadult CB DPS Atlantic sturgeon as a result of entrainment in a hopper dredge. While it is possible that entrained fish could survive, we assume here that these fish will be killed.

While Atlantic sturgeon occur in several rivers in the CB DPS, recent spawning has only been documented in the James River. No total population estimates are available for any river population or the DPS as a whole. As discussed in section 4.3, we have estimated a total of 8,811 CB DPS adults and subadults in the ocean (2,203 adults and 6,608 subadults). This estimate is the best available at this time and represents only a percentage of the total CB DPS population as it does not include young of the year or juveniles and does not include all adults and subadults. CB origin Atlantic sturgeon are affected by numerous sources of human induced mortality and habitat disturbance throughout the riverine and marine portions of their range. There is currently not enough information to establish a trend for any life stage or for the DPS as a whole.

The number of subadult CB DPS Atlantic sturgeon that may be killed due to the proposed projects (three over a 50-year period) represents an extremely small percentage of the CB DPS. While the death of three subadult CB DPS Atlantic sturgeon over the next 50 years will reduce the number of CB DPS Atlantic sturgeon compared to the number that would have been present absent the proposed action, it is not likely that this reduction in numbers will change the status of this species Even if there were only 6,608 subadults in the CB DPS, this loss would represent only 0.04% of the subadults in the DPS. The percentage would be much less if we also considered the number of young of the year, juveniles, adults, and other subadults not included in the NEAMAP-based oceanic population estimate.

Because there will be no loss of adults, the reproductive potential of the CB DPS will not be affected in any way other than through a reduction in numbers of individual future spawners as opposed to current spawners. The loss of three female subadults would have the effect of reducing the amount of potential reproduction as any dead CB DPS Atlantic sturgeon would have no potential for future reproduction. This small reduction in potential future spawners is expected to result in an extremely small reduction in the number of eggs laid or larvae produced in future years and similarly, an extremely small effect on the strength of subsequent year classes. Even considering the potential future spawners that would be produced by the individuals that would be killed as a result of the proposed action, any effect to future year classes is anticipated to be extremely small and would not change the status of this species. The loss of three male subadults may have less of an impact on future reproduction as other males are expected to be available to fertilize eggs in a particular year. Additionally, we have determined that any impacts to behavior will be minor and temporary and that there will not be any delay or disruption of any normal behavior including spawning; there will also be no reduction in individual fitness or any future reduction in numbers of individuals with the exception of three individual and their progeny. The proposed actions will also not affect the spawning grounds within the rivers where CB DPS fish spawn.

The proposed actions are not likely to reduce distribution because the action will not impede CB

DPS Atlantic sturgeon from accessing any seasonal concentration areas, including foraging, spawning or overwintering grounds. Any effects to distribution will be minor and temporary and limited to the temporary avoidance of the area of increased sediment and increased underwater noise levels.

Based on the information provided above, the death of no more than three subadult CB DPS Atlantic sturgeon over 50 years, will not appreciably reduce the likelihood of survival of the CB DPS (*i.e.*, it will not decrease the likelihood that the species will continue to persist into the future with sufficient resilience to allow for the potential recovery from endangerment). The actions will not affect CB DPS Atlantic sturgeon in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, and it will not result in effects to the environment which would prevent Atlantic sturgeon from completing their entire life cycle or completing essential behaviors including reproducing, foraging and sheltering. This is the case because: (1) the death of these subadult CB DPS Atlantic sturgeon represents an extremely small percentage of the species; (2) the death of these CB DPS Atlantic sturgeon will not change the status or trends of the species as a whole; (3) the loss of these CB DPS Atlantic sturgeon is not likely to have an effect on the levels of genetic heterogeneity in the population; (4) the loss of these subadult CB DPS Atlantic sturgeon is likely to have such a small effect on reproductive output that the loss of these individuals will not change the status or trends of the species; (5) the actions will have only a minor and temporary effect on the distribution of CB DPS Atlantic sturgeon in the action area and no effect on the distribution of the species throughout its range; and, (6) the actions will have only an insignificant effect on individual foraging or sheltering CB DPS Atlantic sturgeon.

In rare instances, an action that does not appreciably reduce the likelihood of a species' survival might appreciably reduce its likelihood of recovery. As explained above, we have determined that the proposed action will not appreciably reduce the likelihood that the CB DPS of Atlantic sturgeon will survive in the wild. Here, we consider whether the action will appreciably reduce the likelihood of recovery from the perspective of ESA Section 4. As noted above, recovery is defined as the improvement in status such that listing under Section 4(a) as "in danger of extinction throughout all or a significant portion of its range" (endangered) or "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range…" (threatened) is no longer appropriate. Thus, we have considered whether the proposed actions will appreciably reduce the likelihood that the CB DPS of Atlantic sturgeon can rebuild to a point where it is no longer in danger of extinction through all or a significant part of its range.

No Recovery Plan for the CB DPS has been published. The Recovery Plan will outline the steps necessary for recovery and the demographic criteria which once attained would allow the species to be delisted. We know that in general, to recover, a listed species must have a sustained positive trend of increasing population over time. To allow that to happen for sturgeon, individuals must have access to enough habitat in suitable condition for foraging, resting and spawning. Conditions must be suitable for the successful development of early life stages. Mortality rates must be low enough to allow for recruitment to all age classes so that successful spawning can continue over time and over generations. There must be enough suitable habitat for spawning, foraging, resting and migrations of all individuals. For Atlantic sturgeon, habitat conditions must be suitable both in the natal river and in other rivers and estuaries where foraging by subadults and adults will occur and in the ocean where subadults and adults migrate, overwinter and forage. Habitat connectivity must also be maintained so that individuals can migrate between important habitats without delays that impact their fitness. Here, we consider whether these proposed actions will affect the CB DPS likelihood of recovery.

These actions will not change the status or trend of the CB DPS as a whole. The proposed actions will result in a small amount of mortality (up to three subadults from a population estimated to have at least 6,000 subadults) and a subsequent small reduction in future reproductive output. This reduction in numbers will be small and the impact on reproduction and future year classes will also be small enough not to affect the trend of the population. The proposed action will have only insignificant effects on habitat and forage. This is because the area that sturgeon may avoid is small and any avoidance will be temporary and limited to the period of time when increased suspended sediment is experienced or increased underwater noise. The proposed actions will not affect CB DPS of Atlantic sturgeon outside of the action area or affect habitats outside of the action area. Therefore, it will not affect estuarine or oceanic habitats that are important for sturgeon. For these reasons, the actions will not reduce the likelihood that the CB DPS can recover. Therefore, the proposed actions will not appreciably reduce the likelihood that the CB DPS of Atlantic sturgeon can be brought to the point at which they are no longer listed as endangered. Based on the analysis presented herein, the proposed actions, are not likely to appreciably reduce the survival and recovery of this species.

9.2.6 South Atlantic DPS
Individuals originating from the SA DPS are likely to occur in the action area. The SA DPS has been listed as endangered. We expect that 22% of the Atlantic sturgeon in the action area will originate from the SA DPS. No mortality of adult Atlantic sturgeon is anticipated. We expect that no more than three subadult SA DPS Atlantic sturgeon will be killed during the hopper dredging at SBOBA. While it is possible that the entrained fish could survive, we assume here that these fish will be killed.

No total population estimates are available for any river population or the SA DPS as a whole. As discussed in section 4.3, NMFS has estimated a total of 14,911 SA DPS adults and subadults in the ocean (3,728 adults and 11,183 subadults). This estimate is the best available at this time and represents only a percentage of the total SA DPS population as it does not include young of the year or juveniles and does not include all adults and subadults. SA origin Atlantic sturgeon are affected by numerous sources of human induced mortality and habitat disturbance throughout the riverine and marine portions of their range. There is currently not enough information to establish a trend for any life stage or for the DPS as a whole.

The number of subadult SA DPS Atlantic sturgeon that may be killed due to the proposed projects (up to three over a 50-year period) represents an extremely small percentage of the SA DPS. While the death of three subadult SA DPS Atlantic sturgeon over the next 50 years will reduce the number of SA DPS Atlantic sturgeon compared to the number that would have been present absent the proposed action, it is not likely that this reduction in numbers will change the status of this species. Even if there were only 11,183 subadults in the SA DPS, this loss would represent 0.02% of the subadults in the DPS. The percentage would be much less if we also considered the number of young of the year, juveniles, adults, and other subadults not included in the NEAMAP-based oceanic population estimate.

Because there will be no loss of adults, the reproductive potential of the SA DPS will not be affected in any way other than through a reduction in numbers of individual future spawners as opposed to current spawners. The loss of three female subadult would have the effect of reducing the amount of potential reproduction as any dead SA DPS Atlantic sturgeon would have no potential for future reproduction. This small reduction in potential future spawners is expected to result in an extremely small reduction in the number of eggs laid or larvae produced in future years and similarly, an extremely small effect on the strength of subsequent year classes. Even considering the potential future spawners that would be produced by the individual that would be killed as a result of the proposed action, any effect to future year classes is anticipated to be extremely small and would not change the status of this species. The loss of male subadults may have less of an impact on future reproduction as other males are expected to be available to fertilize eggs in a particular year. Additionally, we have determined that any impacts to behavior will be minor and temporary and that there will not be any delay or disruption of any normal behavior including spawning; there will also be no reduction in individual fitness or any future reduction in numbers of individuals with the exception of three individuals and their progeny. The proposed actions will also not affect the spawning grounds within the rivers where SA DPS fish spawn.

The proposed actions are not likely to reduce distribution because the actions will not impede SA DPS Atlantic sturgeon from accessing any seasonal concentration areas, including foraging, spawning or overwintering grounds. Any effects to distribution will be minor and temporary and limited to the temporary avoidance of the area of increased sediment around the working dredge.

Based on the information provided above, the death of three subadult SA DPS Atlantic sturgeon over 50 years, will not appreciably reduce the likelihood of survival of the SA DPS (*i.e.*, it will not decrease the likelihood that the species will continue to persist into the future with sufficient resilience to allow for the potential recovery from endangerment). The actions will not affect SA DPS Atlantic sturgeon in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, and it will not result in effects to the environment which would prevent Atlantic sturgeon from completing their entire life cycle or completing essential behaviors including reproducing, foraging and sheltering. This is the case because: (1) the death of these subadult SA DPS Atlantic sturgeon represents an extremely small percentage of the species; (2) the death of these SA DPS Atlantic sturgeon will not change the status or trends of the species as a whole; (3) the loss of these SA DPS Atlantic sturgeon is not likely to have an effect on the levels of genetic heterogeneity in the population; (4) the loss of these subadult SA DPS Atlantic sturgeon is likely to have such a small effect on reproductive output that the loss of these individuals will not change the status or trends of the species; (5) the actions will have only a minor and temporary effect on the distribution of SA DPS Atlantic sturgeon in the action area and no effect on the distribution of the species throughout its range; and, (6) the actions will have only an insignificant effect on individual foraging or sheltering SA DPS Atlantic sturgeon.

In rare instances, an action that does not appreciably reduce the likelihood of a species' survival might appreciably reduce its likelihood of recovery. As explained above, we have determined that the proposed action will not appreciably reduce the likelihood that the SA DPS of Atlantic sturgeon will survive in the wild. Here, we consider whether the actions will appreciably reduce the likelihood of recovery from the perspective of ESA Section 4. As noted above, recovery is defined as the improvement in status such that listing under Section 4(a) as "in danger of extinction throughout all or a significant portion of its range" (endangered) or "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range…" (threatened) is no longer appropriate. Thus, we have considered whether the proposed actions will appreciably reduce the likelihood that SA DPS of Atlantic sturgeon can rebuild to a point where it is no longer in danger of extinction through all or a significant part of its range.

No Recovery Plan for the SA DPS has been published. The Recovery Plan will outline the steps necessary for recovery and the demographic criteria which once attained would allow the species to be delisted. We know that in general, to recover, a listed species must have a sustained positive trend of increasing population over time. To allow that to happen for sturgeon, individuals must have access to enough habitat in suitable condition for foraging, resting and spawning. Conditions must be suitable for the successful development of early life stages. Mortality rates must be low enough to allow for recruitment to all age classes so that successful spawning can continue over time and over generations. There must be enough suitable habitat for spawning, foraging, resting and migrations of all individuals. For Atlantic sturgeon, habitat conditions must be suitable both in the natal river and in other rivers and estuaries where foraging by subadults and adults will occur and in the ocean where subadults and adults migrate, overwinter and forage. Habitat connectivity must also be maintained so that individuals can migrate between important habitats without delays that impact their fitness. Here, we consider whether these proposed actions will affect the SA DPS likelihood of recovery.

This action will not change the status or trend of the SA DPS as a whole. The proposed actions will result in a small amount of mortality (up to three subadults from a population estimated to have at least 11,000 subadults) and a subsequent small reduction in future reproductive output. This reduction in numbers will be small and the impact on reproduction and future year classes will also be small enough not to affect the trend of the population. The proposed actions will have only insignificant effects on habitat and forage. This is because the area that sturgeon may avoid is small and any avoidance will be temporary and limited to the period of time when increased suspended sediment is experienced or increased underwater noise. The proposed actions will not affect SA DPS of Atlantic sturgeon outside of the action area or affect habitats outside of the action area. Therefore, it will not affect estuarine or oceanic habitats that are important for sturgeon. For these reasons, the action will not reduce the likelihood that the SA DPS can recover. Therefore, the proposed action will not appreciably reduce the likelihood that the SA DPS of Atlantic sturgeon can be brought to the point at which they are no longer listed as endangered. Based on the analysis presented herein, the proposed actions, are not likely to appreciably reduce the survival and recovery of this species.

9.2.5 Carolina DPS

Individuals originating from the CA DPS are likely to occur in the action area. The CA DPS has been listed as endangered. We expect that 2% of the Atlantic sturgeon in the action area will originate from the CA DPS. No mortality of adult Atlantic sturgeon is anticipated. We expect that no more than three subadult CA DPS Atlantic sturgeon will be killed during the hopper dredging at SBOBA. While it is possible that the entrained fish could survive, we assume here that these fish will be killed.

No total population estimates are available for any river population or the CA DPS as a whole. As discussed in section 4.3, NMFS has estimated a total of 1,356 CA DPS adults and subadults in the ocean (339 adults and 1,017 subadults). This estimate is the best available at this time and represents only a percentage of the total CA DPS population as it does not include young of the year or juveniles and does not include all adults and subadults. CA origin Atlantic sturgeon are affected by numerous sources of human induced mortality and habitat disturbance throughout the riverine and marine portions of their range. There is currently not enough information to establish a trend for any life stage or for the DPS as a whole.

The number of subadult CA DPS Atlantic sturgeon that may be killed due to the proposed projects (up to three over a 50-year period) represents an extremely small percentage of the CA DPS. While the death of three subadult CA DPS Atlantic sturgeon over the next 50 years will reduce the number of CA DPS Atlantic sturgeon compared to the number that would have been present absent the proposed action, it is not likely that this reduction in numbers will change the status of this species. Even if there were only 1,017 subadults in the CA DPS, this loss would represent 0.02% of the subadults in the DPS. The percentage would be much less if we also considered the number of young of the year, juveniles, adults, and other subadults not included in the NEAMAP-based oceanic population estimate.

Because there will be no loss of adults, the reproductive potential of the CA DPS will not be affected in any way other than through a reduction in numbers of individual future spawners as opposed to current spawners. The loss of three female subadult would have the effect of reducing the amount of potential reproduction as any dead CA DPS Atlantic sturgeon would have no potential for future reproduction. This small reduction in potential future spawners is expected to result in an extremely small reduction in the number of eggs laid or larvae produced in future years and similarly, an extremely small effect on the strength of subsequent year classes. Even considering the potential future spawners that would be produced by the individual that would be killed as a result of the proposed actions, any effect to future year classes is anticipated to be extremely small and would not change the status of this species. The loss of male subadults may have less of an impact on future reproduction as other males are expected to be available to fertilize eggs in a particular year. Additionally, we have determined that any impacts to behavior will be minor and temporary and that there will not be any delay or disruption of any normal behavior including spawning; there will also be no reduction in individual fitness or any future reduction in numbers of individuals with the exception of three individuals and their progeny. The proposed actions will also not affect the spawning grounds within the rivers where CA DPS fish spawn.

The proposed actions are not likely to reduce distribution because the action will not impede CA DPS Atlantic sturgeon from accessing any seasonal concentration areas, including foraging, spawning or overwintering grounds. Any effects to distribution will be minor and temporary and limited to the temporary avoidance of the area of increased sediment is experienced or increased underwater noise.

Based on the information provided above, the death of three subadult CA DPS Atlantic sturgeon over 50 years, will not appreciably reduce the likelihood of survival of the CA DPS (*i.e.*, it will not decrease the likelihood that the species will continue to persist into the future with sufficient resilience to allow for the potential recovery from endangerment). The actions will not affect CA DPS Atlantic sturgeon in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, and it will not result in effects to the environment which would prevent Atlantic sturgeon from completing their entire life cycle or completing essential behaviors including reproducing, foraging and sheltering. This is the case because: (1) the death of these subadult CA DPS Atlantic sturgeon represents an extremely small percentage of the species; (2) the death of these CA DPS Atlantic sturgeon will not change the status or trends of the species as a whole; (3) the loss of these CA DPS Atlantic sturgeon is not likely to have an effect on the levels of genetic heterogeneity in the population; (4) the loss of these subadult CA DPS Atlantic sturgeon is likely to have such a small effect on reproductive output that the loss of these individuals will not change the status or trends of the species; (5) the actions will have only a minor and temporary effect on the distribution of CA DPS Atlantic sturgeon in the action area and no effect on the distribution of the species throughout its range; and, (6) the actions will have only an insignificant effect on individual foraging or sheltering CA DPS Atlantic sturgeon.

In rare instances, an action that does not appreciably reduce the likelihood of a species' survival might appreciably reduce its likelihood of recovery. As explained above, we have determined that the proposed actions will not appreciably reduce the likelihood that the CA DPS of Atlantic sturgeon will survive in the wild. Here, we consider whether the actions will appreciably reduce the likelihood of recovery from the perspective of ESA Section 4. As noted above, recovery is defined as the improvement in status such that listing under Section 4(a) as "in danger of extinction throughout all or a significant portion of its range" (endangered) or "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range…" (threatened) is no longer appropriate. Thus, we have considered whether the proposed actions will appreciably reduce the likelihood that CA DPS of Atlantic sturgeon can rebuild to a point where it is no longer in danger of extinction through all or a significant part of its range.

No Recovery Plan for the CA DPS has been published. The Recovery Plan will outline the steps necessary for recovery and the demographic criteria which once attained would allow the species to be delisted. We know that in general, to recover, a listed species must have a sustained positive trend of increasing population over time. To allow that to happen for sturgeon, individuals must have access to enough habitat in suitable condition for foraging, resting and spawning. Conditions must be suitable for the successful development of early life stages. Mortality rates must be low enough to allow for recruitment to all age classes so that successful spawning can continue over time and over generations. There must be enough suitable habitat for spawning, foraging, resting and migrations of all individuals. For Atlantic sturgeon, habitat conditions must be suitable both in the natal river and in other rivers and estuaries where foraging by subadults and adults will occur and in the ocean where subadults and adults migrate, overwinter and forage. Habitat connectivity must also be maintained so that individuals can migrate between important habitats without delays that impact their fitness. Here, we consider whether this proposed actions will affect the CA DPS likelihood of recovery.

These actions will not change the status or trend of the CA DPS as a whole. The proposed actions will result in a small amount of mortality (up to three subadults from a population estimated to have at least 1,017 subadults) and a subsequent small reduction in future reproductive output. This reduction in numbers will be small and the impact on reproduction and future year classes will also be small enough not to affect the trend of the population. The proposed actions will have only insignificant effects on habitat and forage. This is because the area that sturgeon may avoid is small and any avoidance will be temporary and limited to the period of time when increased suspended sediment is experienced or increased underwater noise. The proposed actions will not affect CA DPS of Atlantic sturgeon outside of the action area or affect habitats outside of the action area. Therefore, it will not affect estuarine or oceanic habitats that are important for sturgeon. For these reasons, the action will not reduce the likelihood that the CA DPS can recover. Therefore, the proposed actions will not appreciably reduce the likelihood that the CA DPS of Atlantic sturgeon can be brought to the point at which they are no longer listed as endangered. Based on the analysis presented herein, the proposed actions, are not likely to appreciably reduce the survival and recovery of this species.

9.2 Kemp's Ridley Sea Turtle

In the "Effects of the Action" section above, we determined that Kemp's ridleys could be entrained in a hopper dredge working in the SBOBA. Based on a calculated entrainment rate of sea turtles for projects using hopper dredges in areas comparable to the SBOBA, we estimate that 1 sea turtle is likely to be entrained for every 2.6 million cy of material removed with a hopper dredge. Also, based on the ratio of loggerhead and Kemp's ridleys entrained in other hopper dredge operations in the USACE North Atlantic Division, we estimate that no more than 10% of the sea turtles entrained during each project operation were likely to be Kemp's ridleys with the remainder loggerheads. As it is possible that each project may take a Kemp's ridley, we determined that one Kemp's ridley may be entrained by each dredge project, resulting in up to 3 Kemp's ridley entrainments due to the proposed actions.

Kemp's Ridley sea turtles are listed as a single species classified as "endangered" under the ESA. Kemp's ridleys occur in the Atlantic Ocean and Gulf of Mexico. The only major nesting site for Kemp's ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963; USFWS and NMFS 1992; NMFS and USFWS 2007c).

Nest count data provides the best available information on the number of adult females nesting each year. As is the case with the other sea turtle species discussed above, nest count data must be interpreted with caution given that these estimates provide a minimum count of the number of nesting Kemp's ridley sea turtles. In addition, the estimates do not account for adult males or juveniles of either sex. Without information on the proportion of adult males to females, and the age structure of the Kemp's ridley population, nest counts cannot be used to estimate the total population size (Meylan 1982; Ross 1996; Zurita *et al.* 2003; Hawkes *et al.* 2005; letter to J. Lecky, NMFS Office of Protected Resources, from N. Thompson, NMFS Northeast Fisheries Science Center, December 4, 2007). Nevertheless, the nesting data does provide valuable information on the extent of Kemp's ridley nesting and the trend in the number of nests laid. Estimates of the adult female nesting population reached a low of approximately 250-300 in 1985 (USFWS and NMFS 1992; TEWG 2000). From 1985 to 1999, the number of nests observed at Rancho Nuevo and nearby beaches increased at a mean rate of 11.3% per year (TEWG 2000). Current estimates suggest an adult female population of 7,000-8,000 Kemp's ridleys (NMFS and USFWS 2007c).

The most recent review of the Kemp's ridleys suggests that this species is in the early stages of recovery (NMFS and USFWS 2007b). Nest count data indicate increased nesting and increased numbers of nesting females in the population. NMFS also takes into account a number of recent conservation actions including the protection of females, nests, and hatchlings on nesting beaches since the 1960s and the enhancement of survival in marine habitats through the implementation of TEDs in the early 1990s and a decrease in the amount of shrimping off the coast of Tamaulipas and in the Gulf of Mexico in general (NMFS and USFWS 2007b). We expect this increasing trend to continue over the time period considered in this Opinion.

The mortality of up to three Kemp's ridley sea turtles over a 50 year time period represents a very small percentage of the Kemp's ridleys worldwide. Even taking into account just nesting females, the death of three Kemp's ridleys represents less than 0.01% of the population. While the death of a Kemp's ridley will reduce the number of Kemp's ridleys compared to the number that would have been present absent the proposed actions, it is not likely that this reduction in numbers will change the status of this species or its stable to increasing trend as this loss represents a very small percentage of the population (less than 0.01%). Reproductive potential of Kemp's ridleys is not expected to be affected in any other way other than through a reduction in numbers of individuals. A reduction in the number of Kemp's ridleys would have the effect of reducing the amount of potential reproduction as any dead Kemp's ridleys would have no potential for future reproduction. In 2006, the most recent year for which data is available, there were an estimated 7-8,000 nesting females. While the species is thought to be female biased, there are likely to be several thousand adult males as well. Given the number of nesting adults, it is unlikely that the loss of three Kemp's ridleys would affect the success of nesting in any year. Additionally, this small reduction in potential nesters is expected to result in a small reduction in the number of eggs laid or hatchlings produced in future years and similarly, a very small effect on the strength of subsequent year classes. Even considering the potential future nesters that would be produced by the individuals that would be killed as a result of the proposed actions, any effect to future year classes is anticipated to be very small and would not change the stable to increasing trend of this species. Additionally, the proposed actions will not affect nesting beaches in any way or disrupt migratory movements in a way that hinders access to nesting beaches or otherwise delays nesting.

The proposed actions are not likely to reduce distribution because the actions will not impede Kemp's ridleys from accessing foraging grounds or cause more than a temporary disruption to other migratory behaviors. Additionally, given the small percentage of the species that will be killed as a result of the dredging, there is not likely to be any loss of unique genetic haplotypes and no loss of genetic diversity.

While generally speaking, the loss of a small number of individuals from a subpopulation or species may have an appreciable reduction on the numbers, reproduction and distribution of the species, this is likely to occur only when there are very few individuals in a population, the individuals occur in a very limited geographic range or the species has extremely low levels of genetic diversity. This situation is not likely in the case of Kemp's ridleys because: the species is widely geographically distributed, it is not known to have low levels of genetic diversity, there are several thousand individuals in the population and the number of Kemp's ridleys is likely to be increasing and, at worst, is stable.

Based on the information provided above, the death of three Kemp's ridley sea turtles between now and 2064 will not appreciably reduce the likelihood of survival (i.e., it will not decrease the likelihood that the species will continue to persist into the future with sufficient resilience to allow for the potential recovery from endangerment). The action will not affect Kemp's ridleys in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring and it will not result in effects to the environment which would prevent Kemp's ridleys from completing their entire life cycle, including reproduction, sustenance, and shelter. This is the case because: (1) the species' nesting trend is increasing; (2) the death of three Kemp's ridleys represents an extremely small percentage of the species as a whole; (3) the death of three Kemp's ridleys will not change the status or trends of the species as a whole; (4) the loss of these Kemp's ridleys is not likely to have an effect on the levels of genetic heterogeneity in the population; (5) the loss of these Kemp's ridleys is likely to have such a small effect on reproductive output that the loss of these individuals will not change the status or trends of the species; (6) the actions will have only a minor and temporary effect on the distribution of Kemp's ridleys in the action area and no effect on the distribution of the species throughout its range; and, (7) the actions will have no effect on the ability of Kemp's ridleys to shelter and only an insignificant effect on individual foraging Kemp's ridleys.

In rare instances, an action may not appreciably reduce the likelihood of a species survival (persistence) but may affect its likelihood of recovery or the rate at which recovery is expected to occur. As explained above, we have determined that the proposed actions will not appreciably reduce the likelihood that Kemp's ridley sea turtles will survive in the wild. Here, we consider the potential for the actions to reduce the likelihood of recovery. As noted above, recovery is defined as the improvement in status such that listing is no longer appropriate. Thus, we have considered whether the proposed actions will affect the likelihood that Kemp's ridleys can rebuild to a point where listing is no longer appropriate. In 2011, NMFS and the USFWS issued a recovery plan for Kemp's ridleys (NMFS and USFWS 2011). The plan includes a list of criteria necessary for recovery. These include:

1. An increase in the population size, specifically in relation to nesting females[12];

[12] A population of at least 10,000 nesting females in a season (as measured by clutch frequency per female per

2. An increase in the recruitment of hatchlings[13];
3. An increase in the number of nests at the nesting beaches;
4. Preservation and maintenance of nesting beaches (i.e. Rancho Nuevo, Tepehuajes, and Playa Dos); and,
5. Maintenance of sufficient foraging, migratory, and inter-nesting habitat.

Kemp's ridleys have an increasing trend; as explained above, the loss of three Kemp's ridleys during the duration of the proposed actions (50 years) will not affect the population trend. The number of Kemp's ridleys likely to die as a result of the proposed actions is an extremely small percentage of the species. This loss will not affect the likelihood that the population will reach the size necessary for recovery or the rate at which recovery will occur. As such, the proposed actions will not affect the likelihood that criteria one, two or three will be achieved or the timeline on which they will be achieved. The action area does not include nesting beaches; therefore, the proposed actions will have no effect on the likelihood that recovery criteria four will be met. All effects to habitat will be insignificant and discountable; therefore, the proposed actions will have no effect on the likelihood that criteria five will be met.

The effects of the proposed actions will not hasten the extinction timeline or otherwise increase the danger of extinction. Further, the actions will not prevent the species from growing in a way that leads to recovery and the actions will not change the rate at which recovery can occur. This is the case because while the actions may result in a small reduction in the number of Kemp's ridleys and a small reduction in the amount of potential reproduction due to the loss of three individuals, the actions are not expected to have long term impacts on the future growth of the population or its potential for recovery. Therefore, based on the analysis presented above, the proposed actions will not appreciably reduce the likelihood that Kemp's ridley sea turtles can be brought to the point at which they are no longer listed as endangered or threatened.

Despite the threats faced by individual Kemp's ridley sea turtles inside and outside of the action area, the proposed actions will not increase the vulnerability of individual sea turtles to these additional threats and exposure to ongoing threats will not increase susceptibility to effects related to the proposed actions. We have considered the effects of the proposed actions in light of cumulative effects explained above, including climate change, and have concluded that even in light of the ongoing impacts of these activities and conditions; the conclusions reached above do not change. Based on the analysis presented herein, the proposed actions, resulting in the mortality of up to three Kemp's ridley sea turtles between now and 2064, is not likely to appreciably reduce the survival and recovery of this species.

9.3 Northwest Atlantic DPS of Loggerhead Sea Turtles

In the "Effects of the Action" section above, we determined that loggerheads could be entrained in a hopper dredge working in the SBOBA. Based on a calculated entrainment rate of sea turtles

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season) distributed at the primary nesting beaches in Mexico (Rancho Nuevo, Tepehuajes, and Playa Dos) is attained in order for downlisting to occur; an average of 40,000 nesting females per season over a 6-year period by 2024 for delisting to occur.

[13] Recruitment of at least 300,000 hatchlings to the marine environment per season at the three primary nesting beaches in Mexico (Rancho Nuevo, Tepehuajes, and Playa Dos).

for projects using hopper dredges in areas comparable to the SBOBA, we estimate that 1 sea turtle is likely to be entrained for every 2.6 million cy of material removed with a hopper dredge. Also, based on the ratio of loggerhead and Kemp's ridleys entrained in other hopper dredge operations in the USACE North Atlantic Division, we estimate that 90% of the sea turtles entrained during project operations were likely to be loggerheads. Based on this, we determined that of the eight sea turtles likely to be entrained during lifetime of the projects (through 2064), all eight may be loggerheads. All entrained loggerheads are expected to be juveniles. We determined that all other effects of the actions on this species will be insignificant and discountable.

The Northwest Atlantic DPS of loggerhead sea turtles is listed as "threatened" under the ESA. It takes decades for loggerhead sea turtles to reach maturity. Once they have reached maturity, females typically lay multiple clutches of eggs within a season, but do not typically lay eggs every season (NMFS and USFWS 2008). There are many natural and anthropogenic factors affecting the survival of loggerheads prior to their reaching maturity as well as for those adults who have reached maturity. As described in the Status of the Species, Environmental Baseline and Cumulative Effects sections above, loggerhead sea turtles in the action area continue to be affected by multiple anthropogenic impacts including bycatch in commercial and recreational fisheries, habitat alteration, dredging, power plant intakes and other factors that result in mortality of individuals at all life stages. Negative impacts causing death of various age classes occur both on land and in the water. Many actions have been taken to address known negative impacts to loggerhead sea turtles. However, many remain unaddressed, have not been sufficiently addressed, or have been addressed in some manner but whose success cannot be quantified.

The SEFSC (2009) estimated the number of adult females in the NWA DPS at 30,000, and if a 1:1 adult sex ratio is assumed, the result is 60,000 adults in this DPS. Based on the reviews of nesting data, as well as information on population abundance and trends, NMFS and USFWS determined in the September 2011 listing rule that the NWA DPS should be listed as threatened. They found that an endangered status for the NWA DPS was not warranted given the large size of the nesting population, the overall nesting population remains widespread, the trend for the nesting population appears to be stabilizing, and substantial conservation efforts are underway to address threats. This stable trend is expected to continue over the time period considered in this Opinion.

As stated above, we expect the lethal entrainment of up to eight loggerheads over the 50 year time period. The lethal removal of up to eight loggerhead sea turtles from the action area over this time period would be expected to reduce the number of loggerhead sea turtles from the recovery unit of which they originated as compared to the number of loggerheads that would have been present in the absence of the proposed actions (assuming all other variables remained the same). However, this does not necessarily mean that these recovery units will experience reductions in reproduction, numbers or distribution in response to these effects to the extent that survival and recovery would be appreciably reduced. The final revised recovery plan for loggerheads compiled the most recent information on mean number of loggerhead nests and the approximated counts of nesting females per year for four of the five identified recovery units (i.e., nesting groups). They are: (1) for the NRU, a mean of 5,215 loggerhead nests per year with approximately 1,272 females nesting per year; (2) for the PFRU, a mean of 64,513 nests per year with approximately 15,735 females nesting per year; (3) for the DTRU, a mean of 246 nests per year with approximately 60 females nesting per year; and (4) for the NGMRU, a mean of 906 nests per year with approximately 221 females nesting per year. For the GCRU, the only estimate available for the number of loggerhead nests per year is from Quintana Roo, Yucatán, Mexico, where a range of 903-2,331 nests per year was estimated from 1987-2001 (NMFS and USFWS 2007a). There are no annual nest estimates available for the Yucatán since 2001 or for any other regions in the GCRU, nor are there any estimates of the number of nesting females per year for any nesting assemblage in this recovery unit.

It is likely that the loggerhead sea turtles in the action area originate from several of the recovery units. Limited information is available on the genetic makeup of sea turtles in the mid-Atlantic, where the majority of sea turtle interactions are expected to occur. Cohorts from each of the five western Atlantic subpopulations are expected to occur in the action area. Genetic analysis of samples collected from immature loggerhead sea turtles captured in pound nets in the Pamlico-Albemarle Estuarine Complex in North Carolina from September-December of 1995-1997 indicated that cohorts from all five western Atlantic subpopulations were present (Bass *et al.* 2004). In a separate study, genetic analysis of samples collected from loggerhead sea turtles from Massachusetts to Florida found that all five western Atlantic loggerhead subpopulations were represented (Bowen *et al.* 2004). Bass *et al.* (2004) found that 80 percent of the juveniles and sub-adults utilizing the foraging habitat originated from the south Florida nesting population, 12 percent from the northern subpopulation, 6 percent from the Yucatan subpopulation, and 2 percent from other rookeries. The previously defined loggerhead subpopulations do not share the exact delineations of the recovery units identified in the 2008 recovery plan. However, the PFRU encompasses both the south Florida and Florida panhandle subpopulations, the NRU is roughly equivalent to the northern nesting group, the Dry Tortugas subpopulation is equivalent to the DTRU, and the Yucatan subpopulation is included in the GCRU.

Based on the genetic analysis presented in Bass *et al.* (2004) and the small number of loggerheads from the DTRU or the NGMRU likely to occur in the action area it is extremely unlikely that the loggerheads likely to be killed during dredging projects will originate from either of these recovery units. The majority, at least 80% of the loggerheads killed, are likely to have originated from the PFRU, with the remainder from the NRU and GCRU. As such, of the eight loggerheads likely to be killed, seven are expected to be from the PFRU, with the other one from the NRU or from the GCRU. Below, we consider the effects of these mortalities on these three recovery units and the species as a whole.

As noted above, the most recent population estimates indicate that there are approximately 15,735 females nesting annually in the PFRU and approximately 1,272 females nesting per year in the NRU. For the GCRU, the only estimate available for the number of loggerhead nests per year is from Quintana Roo, Yucatán, Mexico, where a range of 903-2,331 nests per year was estimated from 1987-2001 (NMFS and USFWS 2007a). There are no annual nest estimates available for the Yucatán since 2001 or for any other regions in the GCRU, nor are there any estimates of the number of nesting females per year for any nesting assemblage in this recovery unit; however, the 2008 recovery plan indicates that the Yucatan nesting aggregation has at least

1,000 nesting females annually. As the numbers outlined here are only for nesting females, the total number of loggerhead sea turtles in each recovery unit is likely significantly higher.

The loss of eight loggerheads over a 50 year period represents an extremely small percentage of the number of sea turtles in the PFRU. Even if the total population was limited to 15,735 loggerheads, the loss of seven individuals would represent approximately 0.04% of the population. Similarly, the loss of one loggerhead from the NRU represents an extremely small percentage of the recovery unit. Even if the total population was limited to 1,272 sea turtles, the loss of one individual would represent approximately 0.1% of the population. The loss of one loggerhead from the GCRU, which is expected to support at least 1,000 nesting females, represents less than 0.1% of the population. The loss of such a small percentage of the individuals from any of these recovery units represents an even smaller percentage of the species as a whole. The impact of these losses is even less when considering that these losses will occur over a span of 50 years. Considering the extremely small percentage of the populations that will be killed, it is unlikely that these deaths will have a detectable effect on the numbers and population trends of loggerheads in these recovery units or the number of loggerheads in the population as a whole.

All of the loggerheads that are expected to be killed will be juveniles. Thus, any effects on reproduction are limited to the loss of these individuals on their year class and the loss of future reproductive potential. Given the number of nesting adults in each of these populations, it is unlikely that the expected loss of loggerheads would affect the success of nesting in any year. Additionally, this small reduction in potential nesters is expected to result in a small reduction in the number of eggs laid or hatchlings produced in future years and similarly, a very small effect on the strength of subsequent year classes. Even considering the potential future nesters that would be produced by the individuals that would be killed as a result of the proposed actions, any effect to future year classes is anticipated to be very small and would not change the stable trend of this species. Additionally, the proposed actions will not affect nesting beaches in any way or disrupt migratory movements in a way that hinders access to nesting beaches or otherwise delays nesting.

The proposed actions are not likely to reduce distribution because the actions will not impede loggerheads from accessing foraging grounds or cause more than a temporary disruption to other migratory behaviors. Additionally, given the small percentage of the species that will be killed as a result of the dredging, there is not likely to be any loss of unique genetic haplotypes and no loss of genetic diversity.

While generally speaking, the loss of a small number of individuals from a subpopulation or species may have an appreciable reduction on the numbers, reproduction and distribution of the species this is likely to occur only when there are very few individuals in a population, the individuals occur in a very limited geographic range or the species has extremely low levels of genetic diversity. This situation is not likely in the case of loggerheads because: the species is widely geographically distributed, it is not known to have low levels of genetic diversity, there are several thousand individuals in the population and the number of loggerheads is likely to be stable or increasing over the time period considered here.

Based on the information provided above, the death of up to eight loggerheads between now and 2064 will not appreciably reduce the likelihood of survival (i.e., it will not decrease the likelihood that the species will continue to persist into the future with sufficient resilience to allow for the potential recovery from endangerment). The actions will not affect loggerheads in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring and it will not result in effects to the environment which would prevent loggerheads from completing their entire life cycle, including reproduction, sustenance, and shelter. This is the case because: (1) the species' nesting trend is stabilizing; (2) the death of eight loggerheads represents an extremely small percentage of the species as a whole; (3) the death of eight loggerheads will not change the status or trends of the species as a whole; (4) the loss of these loggerheads is not likely to have an effect on the levels of genetic heterogeneity in the population; (5) the loss of these loggerheads is likely to have such a small effect on reproductive output that the loss of these individuals will not change the status or trends of the species; (5) the actions will have only a minor and temporary effect on the distribution of loggerheads in the action area and no effect on the distribution of the species throughout its range; and, (6) the actions will have no effect on the ability of loggerheads to shelter and only an insignificant effect on individual foraging loggerheads.

In rare instances, an action may not appreciably reduce the likelihood of a species survival (persistence) but may affect its likelihood of recovery or the rate at which recovery is expected to occur. As explained above, we have determined that the proposed actions will not appreciably reduce the likelihood that loggerhead sea turtles will survive in the wild. Here, we consider the potential for the actions to reduce the likelihood of recovery. As noted above, recovery is defined as the improvement in status such that listing is no longer appropriate. Thus, we have considered whether the proposed actions will affect the likelihood that the NWA DPS of loggerheads can rebuild to a point where listing is no longer appropriate. In 2008, NMFS and the USFWS issued a recovery plan for the Northwest Atlantic population of loggerheads (NMFS and USFWS 2008). The plan includes demographic recovery criteria as well as a list of tasks that must be accomplished. Demographic recovery criteria are included for each of the five recovery units. These criteria focus on sustained increases in the number of nests laid and the number of nesting females in each recovery unit, an increase in abundance on foraging grounds, and ensuring that trends in neritic strandings are not increasing at a rate greater than trends in in-water abundance. The recovery tasks focus on protecting habitats, minimizing and managing predation and disease, and minimizing anthropogenic mortalities.

Loggerheads have an increasing trend; as explained above, the loss of eight loggerheads over 50-years as a result of the proposed actions will not affect the population trend. The number of loggerheads likely to die as a result of the proposed actions is an extremely small percentage of any recovery unit or the DPS as a whole. This loss will not affect the likelihood that the population will reach the size necessary for recovery or the rate at which recovery will occur. As such, the proposed actions will not affect the likelihood that the demographic criteria will be achieved or the timeline on which they will be achieved. The action area does not include nesting beaches; all effects to habitat will be insignificant and discountable; therefore, the proposed actions will have no effect on the likelihood that habitat based recovery criteria will be achieved. The proposed actions will also not affect the ability of any of the recovery tasks to be accomplished.

In summary, the effects of the proposed actions will not hasten the extinction timeline or otherwise increase the danger of extinction; further, the actions will not prevent the species from growing in a way that leads to recovery and the actions will not change the rate at which recovery can occur.

This is the case because while the actions may result in a small reduction in the number of loggerheads and a small reduction in the amount of potential reproduction due to the loss of these individuals, the actions are not expected to have long term impacts on the future growth of the population or its potential for recovery. Therefore, based on the analysis presented above, the proposed actions will not appreciably reduce the likelihood that loggerhead sea turtles can be brought to the point at which they are no longer listed as endangered or threatened.

Despite the threats faced by individual loggerhead sea turtles inside and outside of the action area, the proposed actions will not increase the vulnerability of individual sea turtles to these additional threats and exposure to ongoing threats will not increase susceptibility to effects related to the proposed actions. We have considered the effects of the proposed actions in light of other threats, including climate change, and have concluded that even in light of the ongoing impacts of these activities and conditions, the conclusions reached above do not change. Based on the analysis presented herein, the proposed actions are not likely to appreciably reduce the survival and recovery of the NWA DPS of loggerhead sea turtles.

10.0 CONCLUSION

After reviewing the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is NMFS' biological opinion that the proposed actions may adversely affect but are not likely to jeopardize the continued existence of any DPS of Atlantic sturgeon, Kemp's ridley and loggerhead sea turtles and is not likely to adversely affect leatherback or green sea turtles or right, humpback or fin whales. Because no critical habitat is designated in the action area, none will be affected by the action.

11.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA prohibits the take of endangered species of fish and wildlife. "Fish and wildlife" is defined in the ESA "as any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, non-migratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof." 16 U.S.C. § 1532(8). "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. "Otherwise lawful activities" are those actions that meet all State and Federal legal requirements except for the prohibition against taking in ESA Section 9 (51 FR 19936, June 3, 1986). Section 9(g) makes it unlawful for any person "to attempt to commit, solicit another to commit, or cause to be committed, any offense defined [in the ESA.]" 16 U.S.C. 1538(g). See also 16 U.S.C. § 1532(13)(definition of "person"). Under the terms of ESA section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not the purpose of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS). In issuing ITSs, NMFS takes no position on whether an action is an "otherwise lawful activity."

The measures described below are non-discretionary, and must be undertaken by USACE so that they become binding conditions for the exemption in section 7(o)(2) to apply. USACE has a continuing duty to regulate the activity covered by this Incidental Take Statement. If USACE (1) fails to assume and implement the terms and conditions or (2) fails to require any contractors to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to contracts or other documents as appropriate, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, USACE must report the progress of the action and its impact on the species to us as specified in the Incidental Take Statement [50 CFR §402.14(i)(3)] (See U.S. Fish and Wildlife Service and National Marine Fisheries Service's Joint Endangered Species Act Section 7 Consultation Handbook (1998) at 4-49).

Amount or Extent of Take

The proposed actions have the potential to result in the mortality of loggerhead and Kemp's ridley sea turtles and individuals from the New York Bight, Gulf of Maine, Chesapeake Bay, Carolina and South Atlantic DPSs of Atlantic sturgeon due to entrainment in hopper dredges. These interactions are likely to cause injury and/or mortality to the affected sea turtles and sturgeon. This level of take is expected to occur over the entire 50 year period and is not likely to jeopardize the continued existence of listed species. While we have completed one Biological Opinion, the actions considered here consist of three independent actions carried out by the USACE and their contractors. As such, we have organized the ITS for dredging by project. This ITS exempts the following take:

Port Monmouth
Lethal or non-lethal take of up to 1 loggerhead or Kemp's ridley sea turtle
Lethal or non-lethal take of up to 1 Atlantic sturgeon from the NYB, CB, GOM, CA or SA DPS

Union Beach
Lethal or non-lethal take of up to 1 loggerhead or Kemp's ridley sea turtle
Lethal or non-lethal take of up to 1 Atlantic sturgeon from the NYB, CB, GOM, CA or SA DPS

Elberon to Loch Arbour
Lethal or non-lethal take of up to 6 sea turtles
- ***5 loggerhead sea turtles***
- ***1 loggerhead or Kemp's ridley sea turtle***

Lethal or non-lethal take of up to 3 Atlantic sturgeon
- ***2 from the NYB***
- ***1 from the CB, GOM, CA or SA DPS***

While collecting decomposed animals or parts there of in federal operations is considered to be a take, based on the definition of "take" in Section 3 of the ESA and "wildlife" at 50CFR§222.102, NMFS recognizes that decomposed sea turtles or Atlantic sturgeon may be taken in dredging operations that may not necessarily be related to the dredging activity itself. Theoretically, if dredging operations are conducted properly, no takes of sea turtles or Atlantic sturgeon should occur as the turtle draghead defector should push the turtles and Atlantic sturgeon to the side and the suction pumps should be turned off whenever the dredge draghead is away from the substrate. However, due to certain environmental conditions (e.g., rocky bottom, uneven substrate), the dredge draghead may periodically lift off the bottom and entrain, through the high level of suction, previously dead sea turtle or Atlantic sturgeon parts (as well as live turtles or Atlantic sturgeon) that may be on the bottom.

Thus, the aforementioned anticipated level of take refers to those turtles or sturgeon which NMFS confirms as freshly dead. While this definition is subject to some interpretation by the observer, a fresh dead animal may exhibit the following characteristics: little to no odor; fresh blood present; fresh (not necrotic, pink/healthy color) tissue, muscle, or skin; no bloating; color consistent with live animal; and live barnacles. A previously (non-fresh) dead animal may exhibit the following characteristics: foul odor; necrotic, dark or decaying tissues; sloughing of scutes; pooling of old blood; atypical coloration; and opaque eyes. NMFS recognizes that decomposed sea turtles or Atlantic sturgeon may be taken in dredging operations that may not necessarily be related to the dredging activity itself. NMFS expects that dredging may take an additional unquantifiable number of previously dead sea turtle or Atlantic sturgeon parts.

NMFS believes this level of incidental take is reasonable given the seasonal distribution and abundance of these species in the action area and the historic level of take recorded during other dredging operations in the USACE NAD. In the accompanying Opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to loggerhead or Kemp's ridley sea turtles or to any DPS of Atlantic sturgeon.

Measures have been undertaken by the USACE to reduce the takes of sea turtles in dredging activities; however, no measures have been undertaken to date for Atlantic sturgeon as the species wasn't listed until April 6, 2012. Measures developed to reduce the take of sea turtles that have been successful in other dredging operations included reevaluating all dredging procedures to assure that the operation of the dragheads and turtle deflectors were in accordance with the project specifications; modifying dredging operations per the recommendation of Mr. Glynn Banks of the USACE Engineering Research and Development Center; training the dredge crew and all inspectors in proper operation of the dragpipe and turtle deflector systems; and, initiating sea turtle relocation trawling. Proper use of draghead deflectors prevent a substantial number of sea turtles from being entrained and killed in dredging operations. Tests conducted by the USACE's Jacksonville District using fake turtles and draghead deflectors showed convincingly that the sea turtle deflecting draghead is useful in reducing entrainments. Based on a discussion with Dana Dickerson and Jenine Gallo of the USACE on January 30, 2014, it was concluded that two new measures be put in place for dredges operating with UXO screens to possibly reduce the take of Atlantic sturgeon and sea turtles. These measures will require the use of a checklist for proper deployment of UXO screens and will require a field validation to ensure the UXO screens are properly in place. As the use of draghead deflectors and other modifications to hopper dredge operations have been demonstrated to be effective at minimizing the number of sea turtles taken in dredging operations and we expect the UXO screen measures may also be effective, NMFS has determined that the use of draghead deflectors, the UXO measures, and certain operating guidelines (as outlined below) are necessary and appropriate to minimize the take of sea turtles and Atlantic sturgeon during the dredging of the SBOBA. In addition to these measures, NMFS has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles or Atlantic sturgeon.

Reasonable and Prudent Measures (RPMs)

As described in the Opinion, we are able to estimate the likely number of sea turtles and Atlantic sturgeon taken as a result of the proposed actions. However, it is unlikely that all (or even most) interactions would be observed by on-board ESA observers. Hopper dredges used in the proposed action are outfitted with UXO screens, comprised of longitudinal bars with openings/spacings of 1.25/ 1.5-inches by 6 inches (see section 3.0). These dimensions will prevent the whole animal and large parts from being brought on-board the hopper dredge. Rather, it is likely that only internal soft tissue (e.g., intestine) or small, fragmented, external parts (e.g., pieces of shell) of the crushed/impinged animal would be entrained. These parts are extremely unlikely to be detected by ESA observers, and if detected, are likely to be too small to be identifiable as a particular species (pers. comm. Chris Slay, Coast Wise Consulting, Inc.; Trish Bargo, East Coast Observers, Inc.; April 4, 2012). Additionally, animals may impinge on the UXO screens. Animals impinged on the UXO screen may free or dislodge themselves from the screen once the suction of the dredge has been turned off. Animals that free themselves may suffer severe injuries that may result in death. As the entire interaction occurs underwater, it would not be observed by an on-board observer. Due to the limited ability to observe an interaction from on deck, requiring the presence of an ESA observer on all hopper dredges operating under the proposed actions is an ineffective means to monitor take. As there is no practical way to monitor the impingement/entrainment of listed species during hopper dredging operations under the proposed action through ESA observers, we explored several alternatives, including proxies, for monitoring the interactions as described below.

In 2012, the USACE and NMFS considered the following alternatives to monitor take of listed species during hopper dredge operations with a UXO screen in place:

1. Install a camera near the draghead: A camera installed on a draghead would allow users at the surface to observe underwater interactions. However, there are technical challenges to using video, including visibility due to water clarity and available light, improper focus, inappropriate camera angle, and the range of the viewing field. The use of video would require additional resources, and it is unlikely that it would be effective for monitoring this type of dredge work. For these dredges, turbidity levels (i.e., up to 450 mg/l) near the draghead while dredging operations are underway are too high to visually detect any animal impinged on or within the vicinity of the draghead. Therefore, we concluded this would be an ineffective means of monitoring take.

2. Use of sonar/fish finder: Sonar can be used to detect animals within the water and within the vicinity of the dredge. We concluded that sonar alone could not indicate the take of an individual animal or identify the species potentially being taken. As such, we concluded that the use of such devices would be ineffective in monitoring for take.

3. Placement of observers on the shoreline: Observers placed on the shoreline may be able to detect stranded animals either in the water or on the shore. However, animals may not strand in the direct vicinity of the operation, and injured or deceased animal may not float to the surface immediately (i.e., it may take days for this to occur) or may drift far from the incident where the injury occurred. Therefore, an injured or deceased stranded animal often cannot be definitively attributed to a specific action. As such, we concluded that this is not a reasonable way to monitor take.

4. Relocation trawling: Relocation trawling is a method to remove sea turtles from an area before an activity such as dredging occurs. In considering relocation trawling, you must also consider that animals can be injured/entrained in the trawl, and animals can return to the site depending on the length of time between dredging and trawling. While relocation trawling may potentially reduce take it does not provide a means for monitoring take. Therefore, we concluded that this is not a reasonable alternative.

5. Time of year restriction: In dredging operations, time of year restrictions may be used to reduce or eliminate take. Moving the dredge operations outside an area when the animals are present reduces the likelihood of interaction. Time of year restrictions have been suggested for sea turtles in New Jersey waters, based on the best available information. However, Atlantic sturgeon may be in the project area year round. In addition, time of year restrictions do not provide a method for monitoring take, but rather reducing the take level. As sturgeon are present year-round, we did not think this was a reasonable alternative.

Both agencies agreed that none of these monitoring methods were reasonable or appropriate for this action. In situations where individual takes cannot be observed, a proxy must be considered. This proxy must be rationally connected to the taking and provide an obvious threshold of exempted take that, if exceeded, provides a basis for reinitiating consultation. In considering an appropriate proxy for these actions, we evaluated USACE records from 1990 to 2011 of hopper dredging operations occurring in similar habitats to the SBOBA. These records show that one sea turtle is entrained during dredging of 2.6 million cubic yards, and one Atlantic sturgeon in dredging of 5.6 million cubic yards (see section 7.1.2). This estimate provides a proxy for monitoring the amount of incidental take during hopper dredging and will be used as the primary method of determining whether incidental take has occurred. That is, we will consider that one sea turtle (Kemp's ridley or loggerhead) has been taken for every 2.6 million cubic yards material removed during hopper dredging operations. Similarly, we will consider that one subadult Atlantic sturgeon has been taken for every 5.6 million cubic yards of material removed during hopper dredging operations. In addition, there is a possibility that a sea turtle or an Atlantic sturgeon may remain impinged on UXO screens after the dredge has been turned off. These animals can be visually observed, via a lookout, when the draghead is lifted above the water. Animals documented by the lookout on the draghead will be considered a take. This monitoring method (i.e., proxy and/or observed) will be used for the proposed hopper dredging projects.

The amount of material the USACE expects to remove from the SBOBA is a total of approximately 391,000 cy for the Port Monmouth project, 688,000 for the Union beach project, and 14,834,452 cy for the Elberon to Loch Arbour project. Based on the information presented above, this may result in the take of 1 sea turtle (Kemp's ridley or loggerhead) and 1 Atlantic sturgeon (one turtle per 2.6 million cubic yards of material removed; one Atlantic sturgeon per 5.6 million cubic yards of material removed) during the Port Monmouth project, 1 sea turtle (Kemp's ridley or loggerhead) and 1 Atlantic sturgeon during the Union beach project, and 6 sea turtles (5 loggerheads plus 1 loggerhead or Kemp's ridley) and 3 Atlantic sturgeon during the Elberon to Loch Arbour project. In addition, observed animals impinged on the draghead will be considered as take.

As soon as the estimated number of sea turtles or Atlantic sturgeon are observed or believed to be taken (e.g., one take via proxy; or one observed impinged), any additional take of a sea turtle species or Atlantic sturgeon will be considered excess of the exempted level.[14] We expect exceedance of this take unlikely given the RMPs and Terms and Conditions described below. Lookouts will be present on the vessel and volumes of material removed will be continuously monitored during hopper dredge operations. Therefore, take levels can be detected and assessed early in the project and, if needed, consultation can be reinitiated.

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[14] Please note, under the scenario of take observed via proxy and take physically observed, take will not be counted more than once. That is, should 2.6 million cy of material be removed and no sea turtles were observed impinged on the draghead, then the first take will be considered via the proxy. Alternatively, if during dredging of 2.6 million cy, a sea turtle is observed impinged, this will be considered take and no other take will be attributed to this round of dredging once it is complete (i.e., 2.6 cy of material removed); that is the proxy will not be applied.

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles and Atlantic sturgeon resulting from the proposed actions.

RPMs

1. NMFS must be contacted prior to the commencement of hopper dredging and again upon the completion of the dredging activity.

2. The USACE shall ensure that all hopper dredges are outfitted with state-of-the-art sea turtle deflectors on the draghead and operated in a manner that will reduce the risk of interactions with sea turtles or Atlantic sturgeon.

3. The USACE shall obtain and implement a checklist to ensure UXO screens are properly in place and in a manner that will reduce the risk of interactions with sea turtles or Atlantic sturgeon.

4. Hopper dredges must undergo a field inspection prior to being used to ensure the checklist has been implemented and UXO screens are appropriately deployed in a manner that will reduce the risk of interactions with sea turtles or Atlantic sturgeon.

5. A lookout/bridge watch, knowledgeable in listed species identification, will be present on board the hopper dredge at all times to inspect the draghead/UXO screen each time it is removed from the water.

6. The USACE shall provide monthly reports to NMFS regarding the status of dredging and interactions or observations of listed species of sea turtles and Atlantic sturgeon.

7. The USACE shall ensure that all measures are taken to protect any turtles that survive impingement on the hopper dredge. All sea turtles captured must be retained until further coordination with NMFS.

8. The USACE shall ensure that all measures are taken to protect any sturgeon that survive impingement on the hopper dredge.

9. Any dead sturgeon must be transferred to NMFS or an appropriately permitted research facility identified by NMFS so that fin clips and a necropsy can be undertaken to attempt to determine the cause of death. Sturgeon should be held in cold storage.

10. Any dead sea turtles must be held until proper disposal procedures can be discussed with NMFS. Turtles should be held in cold storage.

11. All sturgeon and turtle captures, injuries or mortalities associated with any dredging activities or any other aspect of the project must be reported to NMFS within 24 hours.

Terms and conditions
In order to be exempt from prohibitions of section 9 of the ESA, USACE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

To implement RPM #1, the USACE must contact NMFS (Dan Marrone: by email (Daniel.Marrone@noaa.gov) or phone (978)-282-8465) within 3 days of commencement of dredging and again within 3 days of completion of dredging activity. This correspondence will serve both to alert NMFS of the commencement and cessation of dredging activities, to give NMFS an opportunity to provide the USACE with any updated contact information or reporting forms, and to provide NMFS with information of any incidences with listed species.

To implement RPM #2, hopper dredges must be equipped with the rigid deflector draghead as designed by the USACE Engineering Research and Development Center, formerly the Waterways Experimental Station (WES), or if that is unavailable, a rigid sea turtle deflector attached to the draghead. Deflectors must be checked and/or adjusted by a designated expert prior to a dredge operation to insure proper installment and operation during dredging. The deflector must be checked after every load throughout the dredge operation to ensure that proper installation is maintained. Since operator skill is important to the effectiveness of the WES-developed draghead, operators must be properly instructed in its use. Dredge inspectors must ensure that all measures to protect sea turtles are being followed during dredge operations.

To implement RPM #3 the USACE will develop a checklist that decribes in detail the process that must be followed and the equipment that must be checked to ensure that the UXO screen is properly in place. Should the screen not be able to be properly placed, the necessary steps should be taken to resolve any problems with the UXO screen before any dredging begins.

To implement RPM #4 UXO screens must be inspected and/or adjusted by a designated expert (someone with experience deploying and operating the draghead) prior to a dredge operation to ensure proper installment and operation during the dredging. The UXO screen must be checked after every load throughout the dredge operation to ensure that proper installation is maintained. Dredge inspectors must ensure that all measures to protect sea turtles and Atlantic sturgeon are being followed during dredge operations.

To implement RPM #5, the Corps will require the lookout to inspect the draghead/UXO screen for impinged sea turtles or Atlantic sturgeon each time it is brought up from completing a dredge cycle. Should a sea turtle or Atlantic sturgeon be found impinged on the draghead, the incident should be recorded (Appendix D and/or E and F) and NMFS contacted.

To implement RPM #5, the Corps will require the lookout to inspect the UXO screen each time the draghead is lifted from the water to inspect for damages on the screen. Condition of the UXO screen should be recorded on the "Dredge Observer Form" (See Appendix C). Should the screen be damaged, prior to continuing dredging, the Corps will ensure that repairs to the screen are made as soon as possible to avoid possible unintentional entrainment of large objects.

To implement RPM #6, the Corps will provide NMFS reports every 45 days, via email (Daniel.Marrone@noaa.gov) or mail (Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930), recording the days that dredging occurred, and summarizing the lookout/bridge watch reports on draghead inspection, the volume of material removed during the previous month for a 30 day period, and any observations of listed species of sea turtles and Atlantic sturgeon. This information will be used in our assessment of take of sea turtles and/or Atlantic sturgeon. Only those monthly reports that occur within "sea turtle" season in New Jersey waters (i.e., May 1-November 15) will be considered in our assessment of sea turtle take. As Atlantic sturgeon may be present in New Jersey waters throughout the year, it is necessary we receive monthly reports for every month dredging operations will be undertaken.

To implement RPM #7, the procedures for handling live sea turtles must be followed in the unlikely event that a sea turtle survives impingement on the dredge (Appendix B). NMFS should be contacted immediately to discuss the transfer of the animal to an appropriate permitted rehabilitation facility.

To implement RPM #8, any live sturgeon impinged on the draghead of a hopper dredge must be photographed and measured (if possible), and released immediately overboard while the dredge is not operating.

To implement RPM #9, in the event of any lethal takes of Atlantic sturgeon, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS. The form included as Appendix F (sturgeon salvage form) must be completed and submitted to NMFS.

To implement RPM #9, if a decomposed Atlantic sturgeon or Atlantic sturgeon body part is entrained/impinged during any dredging operations, the USACE must ensure that an incident report is completed and the specimen is photographed. Any sturgeon or sturgeon body parts that are considered "not fresh" (i.e., they were obviously dead prior to the dredge take (e.g., foul odor; necrotic dark or decaying tissue; sloughing of scutes; atypical coloration; and/or opaque eyes) and that the USACE anticipates that will not be counted towards the ITS, must be frozen. The USACE must submit an incident report for the decomposed sturgeon part, as well as photographs, to NMFS within 24 hours of the take (see Appendix E and Appendix F) and request concurrence that this take should not be attributed to the Incidental Take Statement. NMFS has sole discretion in determining if the take should count towards the Incidental Take Statement.

To implement RPM #10, in the event of any lethal takes of sea turtles, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS. The form included as Appendix D must be completed and submitted to NMFS.

To implement RPM #10, if a decomposed turtle or turtle part is impinged or entrained during any dredging operations, an incident report must be completed and the specimen must be photographed. Any turtle parts that are considered "not fresh" (i.e., they were obviously dead prior to the dredge take and the USACE anticipates that they will not be counted towards the ITS) must be frozen and transported to a nearby stranding or rehabilitation facility for review. The USACE must ensure that the observer or lookout submits the incident report for the decomposed turtle or turtle part, as well as photographs, to NMFS within 24 hours of the take (see Appendix D) and request concurrence that this take should not be attributed to the Incidental Take Statement. NMFS shall have sole discretion in determining if the take should count towards the Incidental Take Statement.

To implement RPM #11, the USACE must contact NMFS within 24 hours of any interactions with Atlantic sturgeon or sea turtles, including non-lethal and lethal takes. NMFS will provide contact information annually when alerted of the start of dredging activity. Until alerted otherwise, the USACE should contact Dan Marrone: by email (Daniel.Marrone@noaa.gov) or phone (978) 282-8465 or the Section 7 Coordinator by phone (978) 281-9328 or fax 978-281-9394). Take information should also be reported by e-mail to: incidental.take@noaa.gov.

To implement RPM #11, the USACE must ensure that any Atlantic sturgeon or sea turtles observed during project operations (including whole sturgeon or sea turtles or body parts observed at the disposal location or on board the hopper) are photographed and measured and the corresponding form (Appendix D and/or E and F) must completed and submitted to NMFS within 24 hours by fax (978-281-9394) or e-mail (incidental.take@noaa.gov).

To implement RPM #11, any time a take occurs, the USACE must immediately contact NMFS to review the situation. At that time, the USACE must provide NMFS with information on the amount of material dredged thus far and the amount remaining to be dredged during that cycle. Also at that time, the USACE should discuss with NMFS whether any new management measures could be implemented to prevent the total incidental take level from being exceeded, with emphasis on determing whether this take represents new information revealing effects of the action that may not have been previously considered.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize and monitor the impact of incidental take that might otherwise result from the action. Specifically, these RPMs and Terms and Conditions will keep NMFS informed of when and where dredging activities are taking place and will require the USACE to report any take in a reasonable amount of time, as well as implement measures to monitor for impingement/entrainment during dredging. The USACE has reviewed the RPMs and Terms and Conditions outlined above and has agreed to implement all of these measures as described herein and in the referenced Appendices. The discussion below explains why each of these RPMs and Terms and Conditions are necessary and appropriate to minimize or monitor the level of incidental take associated with the action and how they represent only a minor change to the action as proposed by the USACE.

RPM #1, #6, and #11 and Term and Condition #1, #7, and #14-16, are necessary and appropriate because they will serve to ensure that NMFS is aware of the dates and locations of all dredging activities as well as serve to monitor take via the proxy or via other incidences of interactions with listed species. This will also allow NMFS to monitor the duration and seasonality of dredging activities as well as give NMFS an opportunity to provide the USACE with any updated contact information for NMFS staff. These RPMs and Terms and Conditions will help us determine whether and when reinitiation may be required due to changes in the action, or exceedances of incidental take. This is only a minor change because it is not expected to result in any delay to the project and will merely involve an occasional telephone call or e-mail between the USACE and NMFS staff.

RPM #2 and Terms and Conditions #2, are necessary and appropriate as the use of draghead deflectors is accepted standard practice for hopper dredges operating in places and at times of year when sea turtles are known to be present and has been documented to reduce the risk of entrainment for sea turtles, thereby minimizing the potential for take of these species. It is believed that this holds true for Atlantic sturgeon as well. This represents only a minor change as all of the hopper dredges likely to be used for this project already have draghead deflectors, dredge operators are already familiar with their use, and the use will not affect the efficiency of the dredging operation. Additionally, maintenance of the existing channel is conducted with draghead deflectors in place.

RPMs #3 and #4 and Terms and Conditions #3 and #4 are necessary and appropriate to ensure that the UXO screen is placed properly on the dredge, thereby minimizing the potential risk of entrainment to Atlantic sturgeon and sea turtles. This represents only a minor change as it will require an inspection of the UXO screens on hopper dredges that will already be equipped with the screens. These procedures will not result in an increase in cost or any delays to the project.

RPM #5 and Terms and Conditions #5 and #6, are necessary and appropriate to ensure the proper monitoring of listed species that may be taken via impingement on the draghead, as well as to ensure the proper monitoring of listed species that may occur in the vicinity of the project areas and thus, the proper operation of the vessel in the presence of these species. This RPM and its Terms and Conditions will also ensure proper documentation of any interactions with listed species as well as requiring that these interactions are reported to NMFS in a timely manner with all of the necessary information. This is essential for monitoring the level of incidental take associated with the actions. In addition, this RPM and its Terms and Conditions are also necessary and appropriate to ensure that any damage to the UXO screen are repaired to prevent the entrainment of listed species. The inclusion of these RPMs and Terms and Conditions is only a minor change as the lookout can be a member of the vessel crew that is knowledgeable in listed species identification and will not result in any delays. These also represent only a minor change as in many instances, they serve to clarify the duties of the inspectors or lookouts.

RPM #7, #8 and Terms and Conditions #8, and #9, are necessary and appropriate to ensure that any sea turtles or Atlantic sturgeon that survive impingement or entrainment in dredging operations are given the maximum probability of remaining alive and not suffering additional injury or subsequent mortality through inappropriate handling. This represents only a minor change as following these procedures will not result in an increase in cost or any delays to the project.

RPM #9 and Term and Condition #10-11, are necessary and appropriate to determine the cause of death of any dead sturgeon observed during the proposed actions. This is necessary for the monitoring of the level of take associated with the action. This represents only a minor change, as following these procedures will have an insignificant impact on the cost of the project and will not result in any delays.

RPM #10 and Terms and Condition #12-13, are necessary and appropriate as future analysis may be needed on the dead sea turtle. Additional analysis will be dependent on available freezer space, availability of organizations capable of conducting the analysis, and the size/condition of the sample. NMFS will provide guidance on this matter upon the USACE's notification of take. If NMFS determines that the animal is not necessary to save for future analysis, dead sea turtle species (loggerhead, leatherback, Kemp's ridley, or green turtles) taken either whole or in parts should be disposed of (after a photograph is taken and a reporting form has been completed) by attaching a weight to the animal and dumping the specimen away from the areas being dredged (e.g., between the shore and the site of dredging operations). This represents only a minor change as following these procedures will have an insignificant impact on the cost of the project and will not result in any delays.

12.0 CONSERVATION RECOMMENDATIONS

In addition to Section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, Section 7(a)(1) of the ESA places a responsibility on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species." Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. As such, NMFS recommends that the USACE consider the following Conservation Recommendations:

1. To the extent practicable, the USACE should avoid dredging during times of year when listed species are likely to be present.

2. To facilitate future management decisions on listed species occurring in the action area, the USACE should maintain a database mapping system to: a) create a history of use of the geographic areas affected; and, b) document endangered/threatened species presence/interactions with project operations.

3. The USACE should support ongoing and/or future research to determine the abundance and distribution of sea turtles and Atlantic sturgeon in New Jersey waters.

4. The USACE should investigate, support, and/or develop additional technological solutions to further reduce the potential for sea turtle or Atlantic sturgeon takes in hopper dredges as well to monitor for take of listed species when a UXO screen is placed on a dredge. For instance, NMFS recommends that the USACE coordinate with other Southeast Districts, the Association of Dredge Contractors of America, and dredge operators regarding additional reasonable measures they may take to further reduce the likelihood of sea turtle or strugeon

takes. The diamond-shaped pre-deflector, or other potentially promising pre-deflector designs such as tickler chains, water jets, sound generators, etc., should be developed and tested and used where conditions permit as a means of alerting sea turtles and sturgeon of approaching equipment. New technology or operational measures that would minimize the amount of time the dredge is spent off the bottom in conditions of uneven terrain should be explored. Pre-deflector use should be noted on observer daily log sheets, and annual reports to NMFS should note what progress has been made on deflector or pre-deflector technology and the benefits of, or problems associated with, their usage.

5. New approaches to sampling for turtle or sturgeon parts should be investigated. Project proponents should seek continuous improvements in detecting takes and should determine, through research and development, a better method for monitoring and estimating sea turtle or Atlantic sturgeon takes by hopper dredges. Observation of overflow and inflow screening appears to be only partially effective and may provide only minimum estimates of total sea turtle or Atlantic sturgeon mortality; however, if a UXO screen is used, this method is ineffective and as such, appropriate methods for observing take in these cases needs to be developed. NMFS believes that some listed species taken by hopper dredges may go undetected because body parts are forced through the sampling screens by the water pressure (as seen in 2002 Cape Henry dredging) and are buried in the dredged material, or animals are crushed or killed, but not entrained by the suction and consequently, the takes may go unnoticed (or may subsequently strand on nearby beaches). The only mortalities that are documented are those where body parts float, are large enough to be caught in the screens, or can be identified to species.

6. NMFS recommends that all sea turtles and Atlantic sturgeon impinged/entrained in hopper dredge dragheads be sampled for genetic analysis by a NMFS laboratory. Any genetic samples from live sea turtles or Atlantic sturgeon must be taken by trained and permitted personnel.

7. The USACE should consider devising and implementing some method of significant economic incentives to hopper dredge operators, such as financial reimbursement based on their satisfactory completion of dredging operations, or a certain number of cubic yards of material removed, or hours of dredging performed, *without taking turtles or sturgeon*. This may encourage dredging companies to research and develop "turtle or sturgeon friendly" dredging methods, more effective deflector dragheads, pre-deflectors, top-located water ports on dragarms, etc.

13.0 REINITIATION OF CONSULTATION

This concludes formal consultation on the USACE's beach nourishment projects utilizing the SBOBA. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) a new species is listed or critical habitat designated that may be affected by the action; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered. If the amount or extent of incidental take is exceeded, the USACE must immediately request reinitiation of formal consultation.

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APPENDIX A

MONITORING SPECIFICATIONS FOR HOPPER DREDGES

I. EQUIPMENT SPECIFICATIONS

A. Draghead

The draghead of the dredge shall remain on the bottom **at all times** during a pumping operation, except when:

1) the dredge is not in a pumping operation, and the suction pumps are turned completely off;
2) the dredge is being re-oriented to the next dredge line during borrow activities; or
3) the vessel's safety is at risk (i.e., the dragarm is trailing too far under the ship's hull).

At initiation of dredging, the draghead shall be placed on the bottom during priming of the suction pump. If the draghead and/or dragarm become clogged during dredging activity, the pump shall be shut down, the dragarms raised, whereby the draghead and/or dragarm can be flushed out by trailing the dragarm along side the ship. If plugging conditions persist, the draghead shall be placed on deck, whereby sufficient numbers of water ports can be opened on the draghead to prevent future plugging.

Upon completion of a dredge track line, the drag tender shall:

1) throttle back on the RPMs of the suction pump engine to an idling speed (e.g., generally less than 100 RPMs) **prior to** raising the draghead off the bottom, so that no flow of material is coming through the pipe into the dredge hopper. Before the draghead is raised, the vacuum gauge on the pipe should read zero, so that no suction exists both in the dragarm and draghead, and no suction force exists that can impinge a turtle on the draghead grate;

2) hold the draghead firmly on the bottom with no flow conditions for approximately 10 to 15 seconds before raising the draghead; then, raise the draghead quickly off the bottom and up to a mid-water column level, to further reduce the potential for any adverse interaction with nearby turtles;

3) re-orient the dredge quickly to the next dredge line; and

4) re-position the draghead firmly on the bottom prior to bringing the dredge pump to normal pumping speed, and re-starting dredging activity.

II. LOOKOUT PROTOCOL

A. Basic Requirement

A lookout with the ability to identify sea turtles and Atlantic sturgeon must be placed aboard the dredge(s) being used, starting immediately upon project commencement to monitor for the presence of listed species impinged on the draghead or present in the vicinity of dredge operations.

B. Information to be Collected

For each sighting of any endangered or threatened marine species, record the following information on the Dredge Observation Form (Appendix C):

1) Date, time, coordinates of vessel
2) Visibility, weather, sea state
3) Vector of sighting (distance, bearing)
4) Duration of sighting
5) Species and number of animals
6) Observed behaviors (feeding, diving, breaching, etc.)
7) Description of interaction with the operation

4.2.4 For any listed species observed impinged on the draghead, an incident report needs to be filled out and submitted to NMFS (fax (978-281-9394) or e-mail (incidental.take@noaa.gov) within 24 hours of the incident.

C. Disposition of Parts

If any whole sea turtles or Atlantic sturgeon (alive or dead, decomposed or fresh) or turtle or sturgeon parts are taken incidental to the project(s), Danielle Palmer (978) 282-8468 must be contacted within 24 hours of the take. All whole dead sea turtles or Atlantic sturgeon, or turtle or sturgeon parts, must be photographed and described in detail on the Incident Report of Sea Turtle or Atlantic Sturgeon Mortality (Appendix D (sea turtles) or Appendix E and F (Atlantic sturgeon)). The photographs and reports should be submitted to Danielle Palmer, NMFS, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930-2298. After NMFS is notified of the take, observers may be required to retain turtles for future analysis. Additional analysis will dependent on available freezer space, availability of organizations capable of conducting the analysis, and the size/condition of the sample. NMFS will provide guidance on this matter upon the USACEs notification of take. If NMFS determines that the animal is not necessary to save for future analysis, disposition of dead sea turtle species (loggerhead, leatherback, Kemp's ridley, or green turtles) taken either whole or in parts, or any Atlantic sturgeon should be disposed of (after a photograph is taken and a reporting form has been completed) by attaching a weight to the animal and dumping the specimen away from the areas being dredged (e.g., between the shore and the site of dredging operations). If possible, a mark or tag (e.g., Inconel tag) should be placed on the carcass or part in the event that the animal is recaptured or stranded. If the species is unidentifiable or if there are entrails that may have come from a turtle, the subject should be photographed, placed in plastic bags, labeled with location, load number, date and time taken, and placed in cold storage. Unidentifiable species or parts will be collected by NMFS or NMFS-approved personnel (contact Danielle Palmer at (978) 282-8468). Live turtles (both injured and uninjured) should be held onboard the dredge until transported as soon as possible to the appropriate stranding network personnel for rehabilitation (Appendix B). No live turtles should be released back into the water without first being checked by a qualified veterinarian or a rehabilitation facility.

APPENDIX B

Sea Turtle Handling and Resuscitation

It is unlikely that sea turtles will survive impingment in a hopper dredge, as the turtles found in the dragheads are usually dead, dying, or dismantled. However, the procedures for handling live sea turtles follow in case the unlikely event should occur.

Please photograph all turtles (alive or dead) and turtle parts found during dredging activities and complete the Incident Report of Sea Turtle Take (Appendix D).

Handling:
Do not assume that an inactive turtle is dead. The onset of rigor mortis and/or rotting flesh are often the only definite indications that a turtle is dead. Releasing a comatose turtle into any amount of water will drown it, and a turtle may recover once its lungs have had a chance to drain. There are three methods that may elicit a reflex response from an inactive animal:

- Nose reflex. Press the soft tissue around the nose which may cause a retraction of the head or neck region or an eye reflex response.

- Cloaca or tail reflex. Stimulate the tail with a light touch. This may cause a retraction or side movement of the tail.

- Eye reflex. Lightly touch the upper eyelid. This may cause an inward pulling of the eyes, flinching or blinking response.

General handling guidelines:

- Keep clear of the head.

- Adult male sea turtles of all species other than leatherbacks have claws on their fore flippers. Keep clear of slashing fore flippers.

- Pick up sea turtles by the front and back of the top shell (carapace). Do not pick up sea turtles by flippers, the head or the tail.

- If the sea turtle is actively moving, it should be retained at the OCNGS until transported by stranding/rehabilitation personnel to the nearest designated stranding/rehabilitation facility. The rehabilitation facility should eventually release the animal in the appropriate location and habitat for the species and size class of the turtle.

Live sea turtles within dredge gear
When a sea turtle is found in the dredge gear, observe it for activity and potential injuries.

If the turtle is actively moving, it should be retained onboard until evaluated for injuries by a permitted rehabilitation facility. Due to the potential for internal injuries associated with hopper entrainment, it is necessary to transport the live turtle to the nearest rehabilitation facility as soon as possible, following these steps:

Contact the nearest rehabilitation facility to inform them of the incident. If the rehabilitation personnel cannot be reached immediately, please contact NMFS stranding hotline at 866-755-6622 or NMFS Sea Turtle Stranding Coordinate (Kate Sampson) at 978-282-8470.

Keep the turtle shaded and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers), and in a confined location free from potential injury.

Contact the crew boat to pick up the turtle as soon as possible from the dredge (within 12 to 24 hours maximum). The crew boat should be aware of the potential for such an incident to occur and should develop an appropriate protocol for transporting live sea turtles.

4) Transport the live turtle to the closest permitted rehabilitation facility able to handle such a case.

Sea Turtle Resuscitation Regulations: (50 CFR 223.206(d)(1))

If a turtle appears to be comatose (unconscious), contact the designated stranding/rehabilitation personnel immediately. Once the rehabilitation personnel has been informed of the incident, attempts should be made to revive the turtle at once. Sea turtles have been known to revive up to 24 hours after resuscitation procedures have been followed.

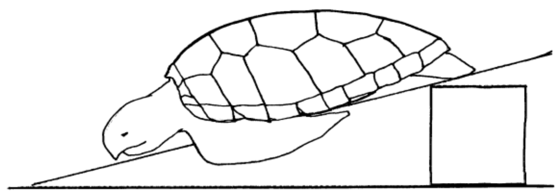
- Place the animal on its bottom shell (plastron) so that the turtle is right side up and elevate the hindquarters at least 6 inches for a period of 4 up to 24 hours. The degree of elevation depends on the size of the turtle; greater elevations are required for larger turtles.

- Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches then alternate to the other side.

- Periodically, gently conduct one of the above reflex tests to see if there is a response.

- Keep the turtle in a safe, contained place, shaded, and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers) and observe it for up to 24 hours.

- If the turtle begins actively moving, retain the turtle until the appropriate rehabilitation personnel can evaluate the animal. The rehabilitation facility should eventually release the animal in a manner that minimizes the chances of re-impingement and potential harm to the animal (i.e., from cold stunning).



- Turtles that fail to move within several hours 24) should be transported to a suitable facility for necropsy (if the condition of the sea turtle allows).

<u>Dead sea turtles</u>
The procedures for handling dead sea turtles and parts are described in Appendix A-II-C.

<u>Stranding/rehabilitation contacts</u>

- ***NMFS Stranding Hotline at (866)-755-6622***
- ***New York: Riverhead Foundation for Marine Research and Preservation, hotline:*** 631-369-9829
- ***New Jersey: Marine Mammal Stranding Center, hotline: 609-266-0538***

APPENDIX C

DREDGE OBSERVER FORM

~~HDP~~

Daily Report

Date: ________________________________ Time:_______________________________
Geographic Site:____
Location: Lat/Long ____________________ Vessel Name: ___________________________

Weather conditions:____
____
Sea State:____
Water temperature: Surface ____________ Below midwater (if known) ____________

Condition of UXO screening apparatus (e.g., any damages, any changes in screen dimensions, etc..): ____
____
____
Incidents involving endangered or threatened species? (Circle) Yes No
(*If yes, fill out Incident Report of Sea Turtle/Shortnose Sturgeon Mortality*)

Comments (type of material, biological specimens, duration of sighting, observed behaviors, description of interaction, etc:)____
____
____
____

Lookout's Name: ____
Lookout's Signature: ____

Species	# of Sightings	# of Animals	Comments

APPENDIX D

Incident Report of Sea Turtle Take

Species ______________ Date ________________ Time (specimen found) _________________

Geographic Site ____
Location: Lat/Long ____
Vessel Name ___________________________ Load # ________________________________
Begin load time _________________________ End load time__________________________
Begin dump time ________________________ End dump time _________________________

Sampling method ____
Condition of screening ____
Location where specimen recovered____
____
Draghead deflector used? YES NO Rigid deflector draghead? YES NO
Condition of deflector ____
____
Weather conditions____
____
Water temp: Surface _________________ Below midwater (if known) ______________________

Species Information: *(please designate cm/m or inches.)*
Head width ____________________________ Plastron length ____________________________
Straight carapace length _________________ Straight carapace width______________________
Curved carapace length __________________ Curved carapace width ______________________

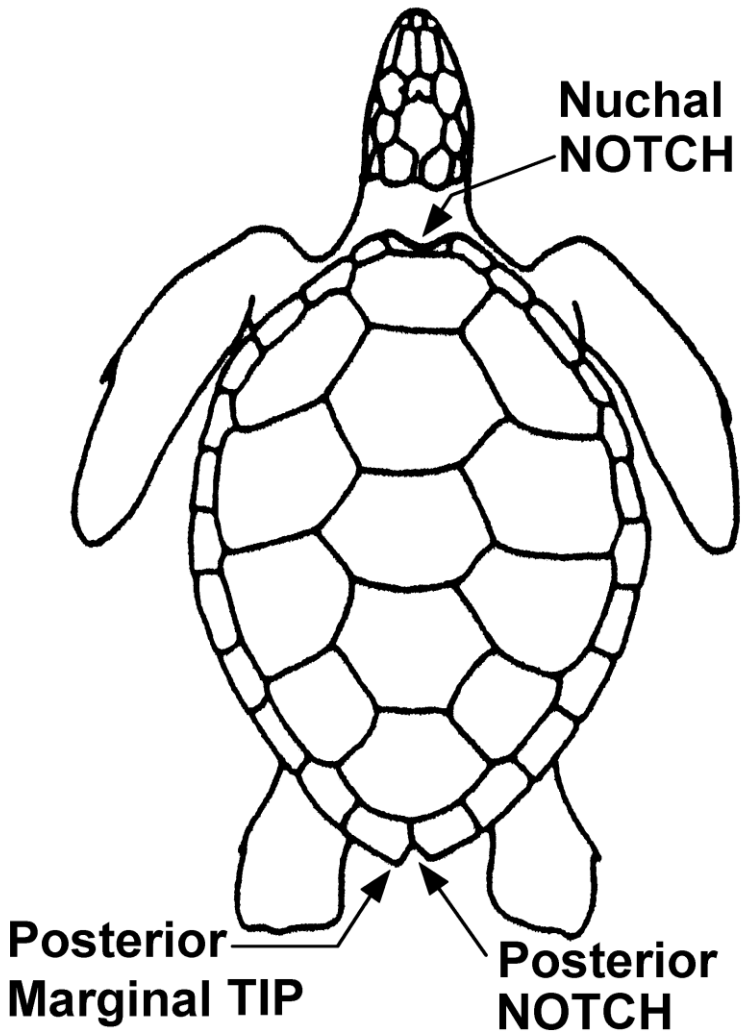
Condition of specimen/description of animal (please complete attached diagram)
____
____
____

Turtle Decomposed: NO SLIGHTLY MODERATELY SEVERELY

Turtle tagged: YES NO *Please record all tag numbers.* Tag # ________________________
Genetic sample taken: YES NO
Photograph attached: YES NO
(please label *species, date, geographic site* and *vessel name* on back of photograph)
Comments/other (include justification on how species was identified) ______________________
____
____
Lookout's/Observer's Name ____
Lookout's/Oberver's Signature _______________________________________

APPENDIX D, Continued
Incident Report of Sea Turtle Take

Draw wounds, abnormalities, tag locations on diagram and briefly describe below.



Description of animal:

APPENDIX E

Incident Report of Atlantic Sturgeon Take

Photographs should be taken and the following information should be collected from all sturgeon (alive and dead) found in association with the HDP.

Date _______________ Time (specimen found) ________________

Geographic Site____
Location: Lat/Long____
Vessel Name _________________________ Load # ___________________________
Begin load time _______________________ End load time_______________________
Begin dump time ______________________ End dump time _____________________

Sampling method ____
Condition of screening ____
Location where specimen
recovered____
____
Draghead deflector used? YES NO Rigid deflector draghead? YES NO
Condition of deflector ____
____
Weather conditions____
____
Water temp: Surface ________________ Below midwater (if known) _______________

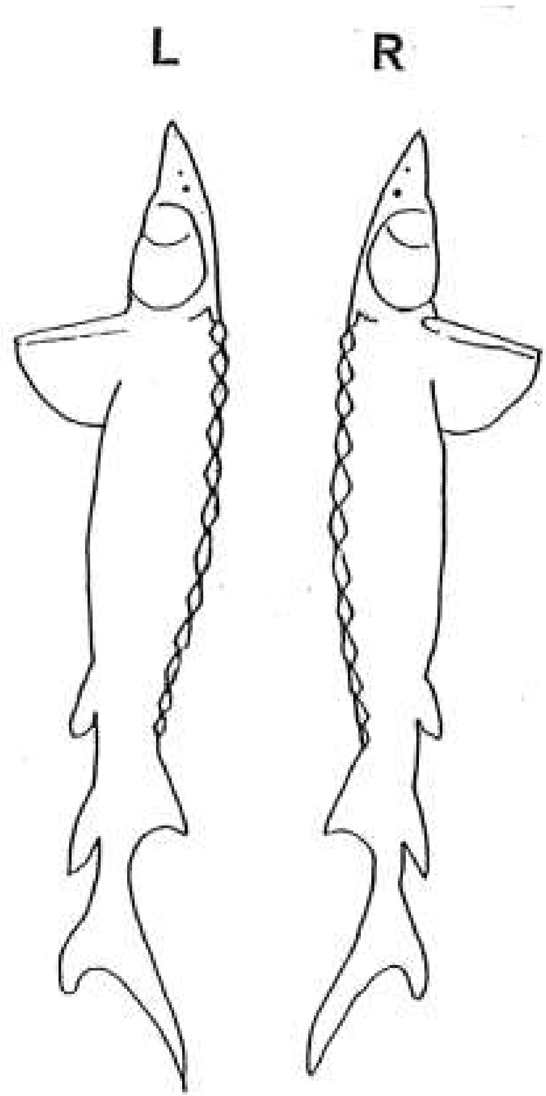
Species Information: *(please designate cm/m or inches.)*
Fork length (or total length) _____________________ Weight _____________________

Condition of specimen/description of animal
____
____
____
____

Fish Decomposed: NO SLIGHTLY MODERATELY SEVERELY
Fish tagged: YES / NO *Please record all tag numbers.* Tag # ________________
Genetic sample taken: YES NO
Photograph attached: YES / NO
(please label *species, date, geographic site* and *vessel name* on back of photograph)
Comments/other (include justification on how species was identified)
____
____
Lookout's/Observer's Name ____
Lookout's/Observer's Signature____

Appendix E, continued

Draw wounds, abnormalities, tag locations on diagram and briefly describe below



Description of fish condition:

STURGEON DATA COLLECTION FORM

For use in documenting sturgeon injury or mortality incidental to a federal action and exempted pursuant to a NMFS issued incidental take statement

OBSERVER'S CONTACT INFORMATION

Name: First ________________ Last ________________________

Agency Affiliation ________________ Email________________________

Address ____

____

Area code/Phone number ______________________________________

SEC 7 UNIQUE IDENTIFIER (PCTS No. Assigned by NMFS)

DATE REPORTED:

Month ☐☐ Day☐☐ Year 20☐☐

DATE EXAMINED:

Month ☐☐ Day☐☐ Year 20☐☐

SPECIES: (check one)

☐ shortnose sturgeon
☐ Atlantic sturgeon
☐ Unidentified *Acipenser* species

Check "Unidentified" if uncertain **.**

See reverse side of this form for aid in identification.

LOCATION FOUND: ☐Offshore (Atlantic) ☐Inshore (bay, river, sound, inlet, etc)

River/Body of Water________________ City________________________ State ____

Descriptive location (be specific)____

____

____

Latitude ______________N (Dec. Degrees) Longitude ______________ W (Dec. Degrees)

CARCASS CONDITION at time examined: (check one)

☐ 1 = Fresh dead
☐ 2 = Moderately decomposed
☐ 3 = Severely decomposed
☐ 4 = Dried carcass
☐ 5 = Skeletal, scutes & cartilage

SEX:

☐ Undetermined
☐ Female ☐ Male

How was sex determined?

☐ Necropsy
☐ Eggs/milt present when pressed
☐ Borescope

MEASUREMENTS: **Circle unit**

Fork length ________ cm / in

Total length ________ cm / in

Length ☐ actual ☐ estimate

Mouth width (inside lips, see reverse side) ________ cm / in

Interorbital width (see reverse side) ________ cm / in

Weight ☐ actual ☐ estimate ________ kg / lb

TAGS PRESENT? Examined for external tags including fin clips? ☐ **Yes** ☐ **No** **Scanned for PIT tags?** ☐ **Yes** ☐ **No**

Tag #	**Tag Type**	**Location of tag on carcass**

CARCASS DISPOSITION: (check one or more)

☐1 = Left where found
☐2 = Buried
☐3 = Collected for necropsy/salvage
☐4 = Frozen for later examination
☐5 = Other (describe) ________________________

Carcass Necropsied?

☐Yes ☐No

Date Necropsied:____________

Necropsy Lead:

____

PHOTODOCUMENTATION:

Photos/vide taken? ☐ Yes ☐ No

Disposition of Photos/Video:__________

____

____

SAMPLES COLLECTED? ☐ **Yes** ☐ **No**

Sample	**How preserved**	**Disposition (person, affiliation, use)**

Comments:

____

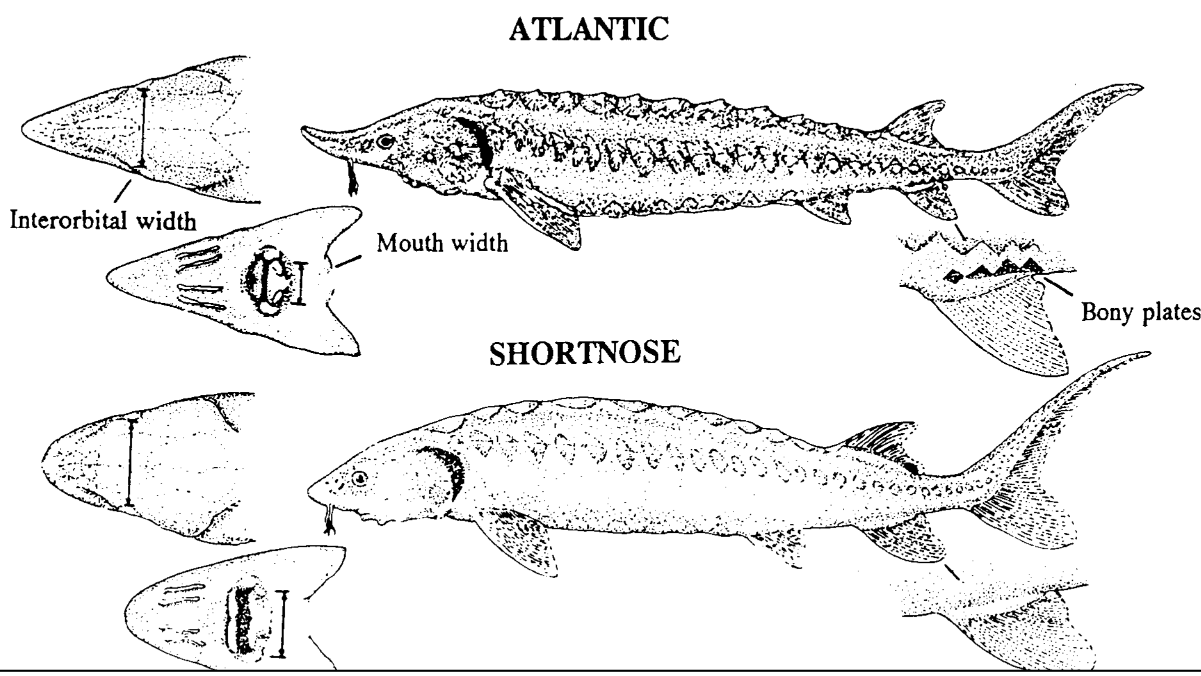
____

____

Distinguishing Characteristics of Atlantic and Shortnose Sturgeon

Characteristic	Atlantic Sturgeon, *Acipenser oxyrinchus*	Shortnose Sturgeon, *Acipenser brevirostrum*
Maximum length	> 9 feet/ 274 cm	4 feet/ 122 cm
Mouth	Football shaped and small. Width inside lips < 55% of bony interorbital width	Wide and oval in shape. Width inside lips > 62% of bony interorbital width
*Pre-anal plates	Paired plates posterior to the rectum & anterior to the anal fin.	1-3 pre-anal plates almost always occurring as median structures (occurring singly)
Plates along the anal fin	Rhombic, bony plates found along the lateral base of the anal fin (see diagram below)	No plates along the base of anal fin
Habitat/Range	Anadromous; spawn in freshwater but primarily lead a marine existence	Freshwater amphidromous; found primarily in fresh water but does make some coastal migrations

* From Vecsei and Peterson, 2004



Describe any wounds / abnormalities (note tar or oil, gear or debris entanglement, propeller damage, etc.). **Please note if no wounds / abnormalities are found.**

____

____

____

____

____

Data Access Policy: Upon written request, information submitted to National Marine Fisheries Service (NOAA Fisheries) on this form will be released to the requestor provided that the requestor credit the collector of the information and NOAA Fisheries. NOAA Fisheries will notify the collector that these data have been requested and the intent of their use.

Submit completed forms (within 24 hours of observation of fish): by email to Incidental.Take@noaa.gov or by fax (978-281-9394). Questions can be directed to NMFS Protected Resources Division at 978-281-9328.

Batched BO (Port Monmouth, Union Beach, Elberon to Loch Arbour)

Date Issued: 7 March 2014

Notes:

*A Proxy Take Statement was issued for this BO based on dredged volume. Under the scenario of take observed via proxy and take physically observed, take will not be counted more than once. That is, should 2.6 million cy of material be removed and no sea turtles were observed impinged on the draghead, then the first take will be considered via the proxy. Alternatively, if during dredging of 2.6 million cy, a sea turtle is observed impinged, this will be considered take and no other take will be attributed to this round of dredging once it is complete (i.e., 2.6 cy of material removed); that is the proxy will not be applied.

** Level of take is expected to occur over the entire 50 year period of the project

***Even though there is one BO for all three projects, actions are considered independent

Sea Turtles (BO page 129)

Project Name	**Total Sea Turle Entrainments**	**Loggerhead**	**Kemp's Ridley**	***1 turtle likely to be injured or killed for approx. every 2.6 million cy of material removed***
Port Monmouth	1	1*	1*	
Union Beach	1	1*	1*	
Elberon to Loch Arbour	6	5 (up to 6)	1*	
Total	**8**	**Up to 8**	**Up to 3**	

*Loggerhead or Kemp's ridley

Atlantic Sturgeon (BO page 136)

Project Name	**Total Atlantic Sturgeon**	**NYB DPS**	**SA DPS**	**CB DPS**	**GOM DPS**	**Carolina DPS**	***1 sturgeon likely to be injured or killed for approx. every 5.6 million cy of material removed***
Port Monmouth	1	1*	1*	1*	1*	1*	
Union Beach	1	1*	1*	1*	1*	1*	
Elberon to Loch Arbour	3	2	1**	1**	1**	1**	
Possible Total	**5**	**Up to 4**	**Up to 3**	**Up to 3**	**Up to 3**	**Up to 3**	

* NYB, SA, CB, GOM or Carolina DPS Atlantic sturgeon

** SA, CB, GOM or Carolina DPS Atlantic sturgeon

Port Monmouth Phase I - Summary of Endangered Species Act Consultation Requirements				
Species	**Timeframe**	**Potential Impacts/Concerns**	**Monitoring Requirements**	**Comments**
Sturgeon				
Atlantic Sturgeon (endangered/ threateneed depending on Distinct Population Segment)	January - December	Entrainment, loss of forage, & vessel collision.	1. Endangered Species Observer required to provide 100% coverage of total dredging time. 2. Sea Turtle Deflector required year round; must be properly deployed prior to commencement of dredging; must be checked/repaired after every load to reduce risk of interactions with sea turtles. (note condition/repairs on form). 3. Inspect baskets, draghead, and UXO screen for endangered species/fragments each time draghead removed from water. (Form) 4. UXO screen must be properly deployed/in good condition prior to commencement of dredging (inspection); UXO screen must be inspected after each load and condition recorded on checklist; any adjustments/repairs to be made ASAP. 5. Contact USACE District Biologist immediately if an endangered species /parts are found. Follow instructions in section 3.1.7 of Spec, Section 01 56 10.00 18. FILL OUT APPROPRIATE FORM.	
Sea Turtles				
Kemp's Ridley (endangered)	May 1 - November 7	Entrainment & the potential for effects to foraging.	1. Endangered Species Observer required to provide 100% coverage of total dredging time (due to presence of Atlantic sturgeon). 2. Sea Turtle Deflector required year round; must be properly deployed prior to commencement of dredging; must be checked/repaired after every load to reduce risk of interactions with sea turtles. (note condition/repairs on form). 3. Inspect baskets, draghead, and UXO screen for endangered species/fragments each time draghead removed from water. (Form) 4. UXO screen must be properly deployed/in good condition prior to commencement of dredging (inspection); UXO screen must be inspected after each load and condition recorded on checklist; any adjustments/repairs to be made ASAP. 5. Contact USACE District Biologist immediately if an endangered species /parts are found. Follow instructions in section 3.1.7 of Spec, Section 01 56 10.00 18. FILL OUT APPROPRIATE FORM.	Largest numbers of all turtles present June - October. Sea turtles present in project waters are typically small juveniles; most abundant is loggerhead followed by the Kemp's ridley. Leatherbacks are typically found further offshore, but may occur in nearshore waters while pursuing jellyfish (preferred prey).
Loggerhead (threatened)	May 1 - November 7			
Green (endangered)	June - November			
Leatherback (endangered)	May 1 - November 7	Vessel Collisions		
Whales				
Right Whales	November 1 – April 30; could be present year round	Due to their large size, whales are not vulnerable to entrainment in dredges; primary concern is the potential for vessel collisions.	Endangered Species Observers: 1. look out for whales 2. record presence of whales within/around the entire project site (form) 3. alert dredge crew of sighting and ensure vessel is slowed to 10 knots or less; and ensure dredge is manuevered safely to reduce the risk of ship strike.	Individual transient right, humpback, & fin whales could be present in the action area outside of these time frames since the Sea Bright Borrow Area may be used by whales moving b/w calving/mating grounds and foraging grounds.
Fin Whales	Spring/Summer/Fall; could be present year round			
Humpback Whales	Spring/Summer/Fall; could be present year round			

APPENDIX C: *DREDGE OBSERVER FORM*

Cycle Report

Date: ______________________________ **Time:** ______________________________
Geographic Site: ______________________________
Location: Lat/Long ____________________ **Vessel Name:** ____________________
Load Number: __________________ **Dredged Volume this cycle (cy):** __________________

Weather conditions: ______________________________

____

Sea State: ______________________________
Water temperature: Surface ____________ **Below midwater (if known)** ____________

UXO Screen:
Dimension of screen opening: ______________________________
Damage to bars? If yes, describe damage & time repairs were made (e.g. # of missing bars or bent bars, & dimension of opening; was screen repaired before next cycle - if not, why?):

____

____

Describe any items stuck to UXO screen, or between UXO screen and sea turtle deflector:

____

____

Sea Turtle Deflector:
Structural soundness: ______________________________
Is deflector leading edge angle 90 degrees or less? If not, describe when repairs were made:

____

Is there a 4X4 opening between deflector and draghead? ______________________________
Aft rigid deflector attachment to draghead (hinged or trunnion): ______________________________
Forward deflector attachment point (adjustable pinned or cable/chain with stop): ____________________

Incidents involving endangered or threatened species? (Circle) Yes No
(*If yes, fill out Incident Report of Sea Turtle/Shortnose Sturgeon Mortality*)

Comments: (type of material, biological specimens, duration of sighting, observed behaviors, description of interaction, etc:) ______________________________

____

____

Lookout's Name: ______________________________
Lookout's Signature: ______________________________

Species	**# of Sightings**	**# of Animals**	**Comments**

APPENDIX H

Cultural Resources Programmatic Agreement

PROGRAMMATIC AGREEMENT
AMONG
THE U. S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
AND
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICE
REGARDING
THE UNION BEACH
COASTAL STORM RISK MANAGEMENT PROJECT
BOROUGH OF UNION BEACH
MONMOUTH COUNTY, NEW JERSEY

WHEREAS, the U.S. Army Corps of Engineers, New York District, (New York District) was authorized to conduct a feasibility study for the Raritan Bay and Sandy Hook Bay by a resolution of the Committee of Public Works and Transportation of the U.S. House of Representatives adopted 1 August 1990; and

WHEREAS, the feasibility study for the Union Beach section of the Raritan Bay and Sandy Hook Bay recommended a plan consisting of levees, floodwalls, road raising, tide gates, interior drainage, pump stations, terminal groins, sand beach and dune construction, utilizing the offshore Sea Bright Borrow Area (SBBA) as the source for sand (Appendix A, Figures 1, 2 and 3); and

WHEREAS, the New York District was authorized to construct the Union Beach section by the Water Resources Development Act of 2007 (Public Law 110-114) on November 8, 2007, but received no appropriations for construction so the project was not constructed; and

WHEREAS, in response to extensive storm damages resulting from Hurricane Sandy (October 2012) and an increased vulnerability to future events, Congress passed the Disaster Relief Appropriations Act of 2013 (P.L. 113-2). The Union Beach section was identified to Congress as authorized but unconstructed and therefore the work in this reach is being funded under P.L. 113-2; and

WHEREAS, the authorized project and existing conditions have been reviewed under the Hurricane Sandy Limited Re-evaluation Report (HSLRR) and draft Supplemental Environmental Impact Statement (SEIS) for the Union Beach Coastal Storm Risk Management Project to confirm that the authorized project is still the most suitable design (the Undertaking); and

WHEREAS, the New York District has defined the "Area of Potential Effect" (APE) for this Undertaking to consist of the footprints and associated work areas for proposed levees, floodwalls, road raising, tide gates, interior drainage, pump stations, terminal groins, sandy beach, wetland and other mitigation sites, and the SBBA; and

WHEREAS, the New York District conducted a Phase I cultural resources survey of the onshore APE as defined at the time of the feasibility study, included testing for deeply buried deposits, and no properties listed on or eligible for the National Register of Historic Places (NRHP) were identified (see Appendix A, Figure 2); and

WHEREAS, the HSLRR study lead to several modifications to project features; the proposed realignment of the Undertaking following the 2016 delineation of the Coastal Barrier Resource System may effect historic properties (Appendix A, Figure 4); and

WHEREAS, wetland mitigation sites have yet to be identified; and

WHEREAS, potential impacts to cultural resources associated with use of the SBBA are addressed through stipulations contained in the Programmatic Agreement (PA) for the New York District's Atlantic Coast of New Jersey (ACNJ) Sandy Hook to Barnegat Inlet Beach Erosion Control Project signed in June 2014 and relevant stipulations therein are incorporated into this document; and

WHEREAS, the New Jersey Historic Preservation Office (NJHPO) has been provided all survey reports for review; and

WHEREAS, the Advisory Council on Historic Preservation (Council), the Delaware Nation and the Delaware Tribe of Indians have been invited to participate in this PA and have declined to be signatories to this document; and

WHEREAS, The New York District provided public review of the PA as part of the SEIS for the Undertaking under the National Environmental Policy Act (NEPA) which will serve as partial fulfillment of the New York District's Section 106 public coordination and shall conduct additional public outreach through the local community; and

WHEREAS, the New York District shall implement the provisions of this PA as funding for the Undertaking is appropriated in future years; and

NOW, THEREFORE, the New York District and the NJHPO agree that the Undertaking shall be administered in accordance with the following stipulations to satisfy the New York District's Section 106 responsibility for all individual undertakings of the Undertaking.

Stipulations

The New York District shall ensure that the following measures are carried out:

I. IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES ON WETLAND MITIGATION SITE(S) AND ALIGNMENT CHANGES

A. The New York District shall ensure that alignment changes and wetland mitigation site(s) will be subject to a cultural resources assessment to identify historic properties and consider project effects on any identified properties.

1. The New York District shall ensure that archaeological surveys, if required, are conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and the New Jersey Historic Preservation Office's (HPO) Guidelines for Phase I Archaeological Investigations: Identification of Archaeological Resources (January 17, 1996).

2. The New York District, in consultation with the NJHPO, shall evaluate the eligibility of any resource encountered using the NRHP Criteria. The New York District will coordinate its determination(s) with the Council, Delaware Nation and the Delaware Tribe of Indians.

3. The New York District shall maintain records of all decisions it makes related to the NRHP eligibility of properties.

B. If historic properties are identified, the New York District shall apply the criteria of adverse effect to the historic properties within the APE and take into account the views of the NJHPO, the Council, Delaware Nation and the Delaware Tribe of Indians.

C. Any objections to a determination of eligibility or the application of adverse effect criteria will be resolved in accordance with Section VII.B, below.

II. SEA BRIGHT BORROW AREA (SBBA):

The New York District will implement the same stipulations addressing work in the SBBA that were developed for the New York District's ACNJ Sandy Hook to Barnegat Inlet Beach Erosion Control Project PA signed in June 2014. The stipulations are as follows:

A. Geomorphology and Native American Site Potential

1. Areas determined sensitive for paleo landforms will be avoided as practicable. If avoidance is not feasible the New York District shall implement a program to monitor the material from these areas that is collected in the UXO screens.

2. Protocol for the monitoring program will be developed in coordination with NJHPO. A brief report will generated after each effort which shall be coordinated with NJHPO and other interested parties.

3. The protocol shall include measures the Corps will undertake should artifacts be encountered.

4. No further regular monitoring of dredged material will be carried out. However, the project archaeologist will educate the UXO specialists at the beginning of each renourishment cycle on the types of archaeological materials that could be encountered so that they will be more likely to identify these materials when or if they are pumped onto the beach. Early detection could allow the archaeologist time to halt the pumping operation, inspect the material, and consult with the NJHPO to make a determination for monitoring or for moving the dredge operation elsewhere.

B. Shipwrecks

1. The New York District shall designate a buffer zone of 250 feet around each potential shipwreck identified through remote sensing surveys conducted for the ACNJ project. Buffer zone(s) shall be clearly delineated on construction plans. No construction activities that could potentially impact the wrecks will occur within the designated zones.

2. If it is determined that a buffer zone cannot be employed in an area as sand from that location is critical for the Undertaking, the District will conduct further study to determine if a target is a cultural resource and evaluate its NRHP eligibility. If determined eligible the District shall consult with the NJHPO to develop treatment plans.

3. Should new borrow areas outside the surveyed area of the SBBA be required the proposed locations shall be surveyed for historic resources employing the survey standards of the time and shall be coordinated with NJHPO and other interested parties.

III. PUBLIC INVOLVEMENT and OUTREACH

A. The New York District shall inform the interested public of the existence of this PA and the New York District plan for meeting the terms of this PA. Copies of this PA and relevant documentation prepared pursuant to the terms of this PA shall be made available for public inspection (information regarding the locations of archaeological sites will be withheld in accordance with the Freedom of Information Act and National Register Bulletin 29, if it appears that this information could jeopardize archaeological sites). Any comments received from the public under this PA shall be taken into account by the New York District.

B. Public Objections. The New York District shall review and resolve timely substantive public objections. Public objections shall be considered timely when they are provided within the review periods specified in Section VII (A) of this PA. The New York District shall consult with the NJHPO, and as appropriate with the Council, to resolve objections. Study actions which are not the subject of the objection may proceed while the consultation is conducted.

IV. UNANTICIPATED DISCOVERY

A. If previously unidentified and unanticipated properties are discovered during the Undertaking implementation, the New York District shall cease all work in the vicinity of the discovered historic property until it can be evaluated. If the property is determined to be eligible, the New York District shall consult with the NJHPO to develop a treatment plan.

B. The New York District shall implement the treatment plan once approved by NJHPO.

V. HUMAN REMAINS

If any human remains and/or grave-associated artifacts are encountered during data recovery, the New York District, the NJHPO, the Council, the Delaware Nation and the Delaware Tribe of Indians, shall consult to develop a treatment plan for human remains that is responsive to the Council's "Policy Statement on Human Remains" (September 27, 1988), the Native American Grave Protection and Repatriation Act (PL 101-601) and, U.S. Army Corps of Engineers, Policy Guidance Letter No. 57, (1998) Indian Sovereignty and Government-to-Government Relations With Indian Tribes.

VI. PROFESSIONAL QUALIFICATIONS

The New York District shall ensure that qualified professionals meeting the National Park Service professional qualifications for the appropriate discipline [National Park Service Professional Qualification Standards, Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44738-39)] are used to complete all identification and evaluation plans related to this undertaking, to include archaeological surveys and testing, historic structure inventories, and documentation.

VII. ADMINISTRATIVE TERMS

A. REVIEW PERIODS

1. The New York District shall ensure that all draft and final reports resulting from actions pursuant to this PA will be provided, to the NJHPO, Council, the Delaware Nation, the Delaware Tribe of Indians, and upon request, to other interested parties.

2. The NJHPO, Council, the Delaware Nation, the Delaware Tribe of Indians and any other interested party shall have 30 days to review and/or object to determinations, evaluations, plans, reports, and other documents submitted to them by the New York District.

B. DISPUTE RESOLUTION

1. The New York District and the signatories shall attempt to resolve any disagreement arising from implementation of this PA. If there is a determination that the disagreement cannot be resolved, the New York District shall request the Council`s recommendations or request the comments of the Council in accordance with 36 CFR Part 800.4(d)(1)(iv)(A) through 36 CFR Part 800.4(d)(1)(iv)(C) and/or 36 CFR Part 800.7(c), depending upon the nature of the disagreement or dispute.

2. Any Council recommendations or comments provided in response will be considered in accordance with 36 CFR Part 800.4(d)(1)(iv)(A) through 36 CFR Part 800.4(d)(1)(iv)(C) and/or 36 CFR Part 800.7(c), with reference only to the subject of the dispute. The New York District shall respond to Council recommendations or comments indicating how the New York District has taken the Council's recommendations or comments into account and complied with same prior to proceeding with Undertaking activities that are subject to dispute. Responsibility to carry out all other actions under this PA that are not the subject of the dispute will remain unchanged.

C. TERMINATION

Any signatory to this PA may terminate it by providing a thirty day notice to the signatories, provided that the signatories will consult during the period prior to termination by certified mail to seek agreement on amendments or other actions that would avoid termination. In the event of termination, the New York District will comply with 36 CFR Parts 800.4 through 800.6 with regard to individual undertakings covered by this PA.

D. SUNSET CLAUSE.

This PA will continue in full force and effect until the construction of the Undertaking is complete and all terms of this PA are met, unless the Undertaking is terminated or authorization is rescinded or a period of five (5) years from execution of the PA has passed at which time the agreement may be extended as written provided all signatories concur.

E. AMENDMENT

This PA may be amended upon agreement in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the Council.

F. ANTI-DEFICIENCY ACT

All requirements set forth in this PA requiring expenditure of funds by the New York District are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. 1341). No obligation undertaken by the New York District under the terms of this PA shall require or be interpreted to require a commitment to extend funds not appropriated for a particular purpose. If the New York District cannot perform any obligation set forth in this PA because of unavailability of funds, that obligation must be renegotiated among the New York District and the signatories as necessary.

Execution and implementation of this PA evidences that the New York District has satisfied its Section 106 responsibilities for all individual undertakings of the Undertaking, and that the New York District has afforded the NJHPO, Council, the Delaware Nation and the Delaware Tribe of Indians an opportunity to comment on the undertaking and its effects on historic properties.

U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT

By: D.A. Caldwell Date: 30 Nov 16
David A. Caldwell
Colonel, U.S. Army
Commander

NEW JERSEY STATE HISTORIC PRESERVATION OFFICE

By: Katherine J. Marcopul Date: 1/10/2017
Katherine J. Marcopul
Deputy State Historic Preservation Officer

APPENDIX I

FISH AND WILDLIFE COORDINATION ACT REPORT (FWCAR)

FISH AND WILDLIFE COORDINATION ACT
SECTION 2(b) REPORT

RARITAN BAY AND SANDY HOOK BAY
HURRICANE AND STORM DAMAGE REDUCTION STUDY
UNION BEACH
MONMOUTH COUNTY, NEW JERSEY

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office
Pleasantville, New Jersey 08232

September 2003

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Field Office
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://njfieldoffice.fws.gov

In Reply Refer to:

FP-03/52

SEP 30 2003

Colonel John O'Dowd
District Engineer, New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Colonel O'Dowd:

This is the final report of the U.S. Fish and Wildlife Service (Service) regarding anticipated impacts on fish and wildlife resources from the U.S. Army Corps of Engineers, New York District's (Corps) proposed Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study for Union Beach Borough, Monmouth County, New Jersey. This report was prepared pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*). This report is provided in accordance with our Fiscal Year-1998 scope-of-work agreement and is based on plans and information provided in the Corps July 1996 *Raritan Bay and Sandy Hook Combined Erosion Control and Storm Damage Prevention Pre-feasibility Report, Union Beach, New Jersey* and May 2002 *Draft Impact Assessment and Mitigation Analysis.*

This final report reflects the New Jersey Division of Fish and Wildlife's August 7, 2002 comments, and the Corps August 20, 2003 response to recommendations contained in the Service's July 2002 draft report. The Service appreciates the Corps willingness to adopt most of our previous recommendations to avoid and minimize adverse effects to wildlife. Service recommendations in this final report have been revised to reflect our recent review of the Corps Union Beach *Draft Feasibility Main Report and Draft Environmental Impact Statement* (comments transmitted under Department of the Interior (DOI) log number ER 03/542 on August 21, 2003).

COASTAL BARRIER RESOURCES ACT

As indicated in the August 21, 2003 letter from DOI, the proposed levee/floodwall line of projection passes along the boundary of the Conaskonk Point Unit (NJ-04) of the John H. Chafee Coastal Barrier Resources System (System). The System was established by the Coastal Barrier Resources Act (P.L. 97-348; 96 Stat. 1653, 16 U.S.C. 3501 *et seq.*) (CBRA), as amended by the

Coastal Barrier Improvement Act of 1990 (P.L. 101-591; 104 Stat. 2931). Section 5 of CBRA prohibits, with certain limited exceptions, federal expenditures within the System. The Service recommends that the Corps provide detailed plans and maps of the Chingarora Creek component of the project to this office for review. The Service will compare these materials to the CBRA maps of the Conaskonk Point Unit and provide the Corps a written determination on whether or not any portion of the proposed structures are located within the unit. Please note that projects within 500 feet of a boundary are forwarded to the Service's Washington Office, which issues the written determination.

FEDERALLY LISTED SPECIES

Other than an occasional transient bald eagle (*Haliaeetus leucocephalus*) or roseate tern (*Sterna dougallii*), no other federally listed or proposed endangered or threatened flora or fauna under Service jurisdiction are known to occur within the project area. However, beach nourishment may create suitable habitat for the federally listed (threatened) piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*), as well several other species of concern. Pursuant to Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA), the enclosed report provides recommendations for the Corps to avoid adverse impacts to these species should they colonize the newly widened beach. These include close coordination and contingency planning with Union Beach Borough regarding protected species prior to project implementation, and continued consultation with the Service as appropriate.

As the proposed project will also affect the estuarine environments of Raritan Bay, consultation pursuant to Section 7 of the ESA, and an Essential Fish Habitat assessment pursuant to Section 305 (b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94-265), must also be completed with the National Marine Fisheries Service prior to project implementation.

The Service looks forward to working with the District during design, construction, and monitoring of the Union Beach project. If you have any questions regarding this report, please contact John Staples or Wendy Walsh of my staff at (609) 646-9310, extension 18 or 48, respectively.

Sincerely,

Clifford G. Day

Clifford G. Day
Supervisor

Enclosure

FISH AND WILDLIFE COORDINATION ACT
SECTION 2(b) REPORT

RARITAN BAY AND SANDY HOOK BAY
HURRICANE AND STORM DAMAGE REDUCTION STUDY
UNION BEACH
MONMOUTH COUNTY, NEW JERSEY

Prepared for:

U.S. Army Corps of Engineers
New York District
New York, New York
10278-0090

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office
Pleasantville, New Jersey 08232

Preparer: Wendy L. Walsh
Assistant Project Leader: John C. Staples
Project Leader: Clifford G. Day

September 2003

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers, New York District (Corps) was authorized to conduct a feasibility study to evaluate federal participation in flood control improvements in Union Beach, Monmouth County, New Jersey (Study). The Study area encompasses the Borough of Union Beach and three coastal marsh systems located in the northern portion of the county. In plan formulation for hurricane and storm damage reduction within the Study area, the Corps considered a full range of traditional non-structural and structural measures.

The Corps selected plan consists of three major elements: (1) Chingarora Creek; (2) Flat and East Creeks; and (3) the Bay Shore. The Corps proposes a line of protection along the creeks, between developed uplands and existing tidal marshes, consisting of: levee (10,870 feet) and floodwall sections (6,885 feet); storm gates on Flat and East Creeks; sluice gates on several creek tributaries; and internal drainage features including ponding areas, drainage ditches, and two pump stations. Near East Creek, the project would also include an interior levee. The proposed line of protection would be constructed to an elevation of +15 NGVD, providing 92 percent reliability protection against the 100-year storm event. Along the Bay Shore, the Corps selected plan consists of 3,160 feet of dune and beach creation between two proposed terminal groins. The plan includes periodic renourishment at 9-year intervals, and two shoreline revetments where the Bay Shore component ties into the levee/floodwall systems. The proposed beach profile includes a 50-foot-wide beach berm at +9 NGVD, and a 50-foot-wide dune crest at +17 feet NGVD. This profile is designed to protect against erosion and wave run-up from the 100-year storm event.

Raritan Bay provides important habitat for numerous fish and wildlife resources including wintering waterfowl; migrant shorebirds and landbirds; raptors; migratory, resident and anadromous fish; and shellfish. Upland portions of Union Beach generally do not support significant wildlife habitats due to development, and the wildlife value of sandy beach areas is limited by narrowness and human disturbance. However, the shallow nearshore waters of Union Beach serve as an important nursery area for many fish species and help support significant recreational fisheries such as in adjacent Keyport Harbor.

In May 2002, the Corps completed a *Draft Impact Assessment and Mitigation Analysis* (IAMA) to document ecological impacts and present a justified mitigation plan that would offset potential adverse impacts associated with the implementation of the proposed levee and floodwall. Although the selected plan was specifically designed to avoid and minimize environmental impacts, unavoidable adverse impacts to natural resources are anticipated. The Corps, in consultation with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service (Service), and the New Jersey Department of Environmental Protection's Land Use Regulation Program, selected the Habitat Evaluation Procedures (HEP) methodology to quantify the impacts to wildlife and wildlife communities and the Evaluation for Planned Wetlands (EPW) method to assess impacts to overall wetland functions and values.

Implementation of the selected plan is expected to impact 8.39 acres of wetlands. Based on the results of HEP and EPW assessments, the Corps has selected a 17.5-acre compensatory mitigation plan to offset anticipated losses of fish and wildlife habitats and other wetland functions. The Service concurs with the selected mitigation plan, but recommends that the Corps continue wetland avoidance and minimization efforts during the design phase of the project, through both careful design of the proposed levee/floodwall, and periodic re-assessment of non-structural alternatives such as buy-outs. Other key Service recommendations include zoning to protect remaining wetlands and floodplains; expanded monitoring programs and contingency planning to ensure that marshes and other sensitive habitats are not impacted by hydrologic changes or sedimentation; using fill material of similar grain size to the existing beach to ensure a quick recovery of intertidal and nearshore benthos and to avoid permanent effects to this faunal community; and developing appropriate mitigation for permanent habitat impacts from groin and revetment construction. Recommendations are also provided to assist the Corps in avoiding adverse effects to federally listed species that may colonize the widened beach berm after project construction.

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Appendix E. Coordination with the New Jersey Division of Fish and Wildlife

I. INTRODUCTION

This constitutes the U.S. Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*), Section 2(b) report describing the fish and wildlife resources and supporting ecosystems in the area of the Union Beach hurricane and storm damage reduction study. This report is provided in accordance with a Fiscal Year-1998 scope-of-work agreement between the U.S. Army Corps of Engineers, New York District (Corps) and the Service's New Jersey Field Office. Information presented in this report documents the fish and wildlife resources in the project area; identifies potential adverse impacts to those resources; and includes the Service's recommendations to minimize adverse impacts. In addition to the FWCA, recommendations regarding migratory birds are provided pursuant to the Migratory Bird Treaty Act (40 Stat. 755;16 U.S.C. 703-712). Consultation is also provided pursuant to Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA). The project area is located on the south shore of Raritan Bay in the Borough of Union Beach, Monmouth County, New Jersey.

The Service requests that no part of this report be used out of context, and if the report is reproduced, it should appear in its entirety. Furthermore, any data, opinions, figures, recommendations, or conclusions excerpted from this report should be properly cited and include the page number from which the information was taken. This report should be cited as follows:

Walsh, W.L. 2003. Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, Monmouth County, New Jersey. Fish and Wildlife Coordination Act Section 2(b) Report, U.S. Department of the Interior, Fish and Wildlife Service, New Jersey Field Office, Pleasantville, New Jersey. 34 pp. + appendices.

Questions or comments regarding this report are welcomed by the Service. Written inquires should be addressed to:

Supervisor
New Jersey Field Office
Ecological Services
U.S. Fish and Wildlife Service
927 North Main Street, Building D
Pleasantville, New Jersey 08232

II. PROJECT DESCRIPTION

A. STUDY AREA

The Corps was authorized to conduct a feasibility study to evaluate federal participation in flood control improvements along the south shore of Raritan Bay between Keyport on the west, and Keansburg on the east, in the Borough of Union Beach, Monmouth County, New Jersey (Figure 1). Union Beach Borough is located along the western shoreline of Raritan Bay in Monmouth County, New Jersey, between Conaskonk Point and Point Comfort. The Borough lies approximately 1 mile east of Keyport Harbor, between 5 and 6 miles east of the mouth of the Raritan River, and between 7 and 8 miles west of the Sandy Hook Unit of Gateway National Recreation Area (Sandy Hook). The 721-acre Union Beach Study (Study) area is drained by three tidal creeks that flow directly into Raritan Bay. These three coastal marsh drainage systems provided the basis for subdividing the Study area into three smaller ecological study areas: Chingarora Creek (415 acres), Flat Creek (137 acres), and East Creek (169 acres) (Figure 1) (U.S. Army Corps of Engineers, 2002a).

Low-lying residential and commercial areas in the Study area are subject to tidal flooding during storm events. Development of the Raritan Bay shoreline in Union Beach resulted in historic erosion of sandy beach areas, including both long-term erosion and periodic storm-induced erosion. Although bulkheads and other structures constructed in the mid-20th Century have halted shoreline retreat, the eroded condition of the beach leaves these structures, as well as private and commercial development, subject to wave attack. In addition, hurricanes, northeasters, and other storms produce tidal surges that enter the tidal creeks and then spread into the surrounding marshes and floodplains. Because much development has occurred in the floodplains, residential and commercial structures are subject to flood damages under storm conditions. Flooding of developed areas is often compounded because the local storm water outfalls drain to the creeks and marshes, which become blocked by high tidal stages (U.S. Army Corps of Engineers, 2003).

The Borough's developed coastline is currently protected by a bulkhead aligned parallel to Front Street from the most northwestern point of development east to Union Avenue. However, storm-induced erosion has eliminated most of the beach on the seaward side of the bulkhead, increasing exposure of the bulkhead to wave action. The bulkhead was replaced in 1995 following a severe northeaster in December 1992 (U.S. Army Corps of Engineers, 1996); however, the Corps determined that development of a more comprehensive flood control solution that would further reduce the damage and destruction of homes and commercial properties is warranted.

B. SELECTED PLAN

The Corps selected plan (Figure 2) for reducing flood damages in the Borough of Union Beach is intended to provide protection against hurricane and storm damage, as well as shoreline erosion and wave attack along the Raritan Bay shoreline. The Corps selected plan consists of three major elements: (1) a levee/floodwall along Chingarora Creek; (2) a levee/floodwall along Flat and East Creeks; and (3) beach nourishment along the Raritan Bay shoreline.

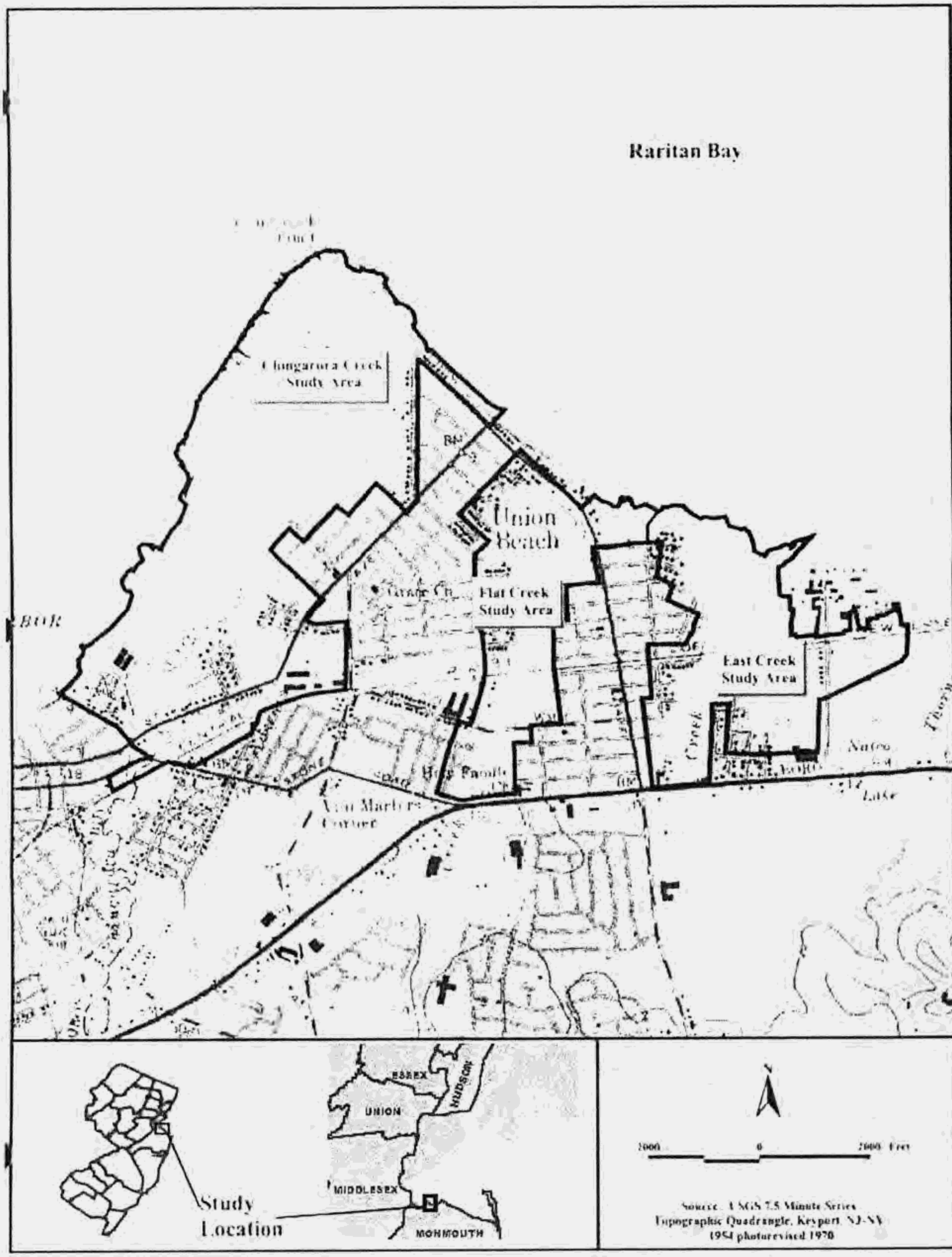

Figure 1. Study Area Location

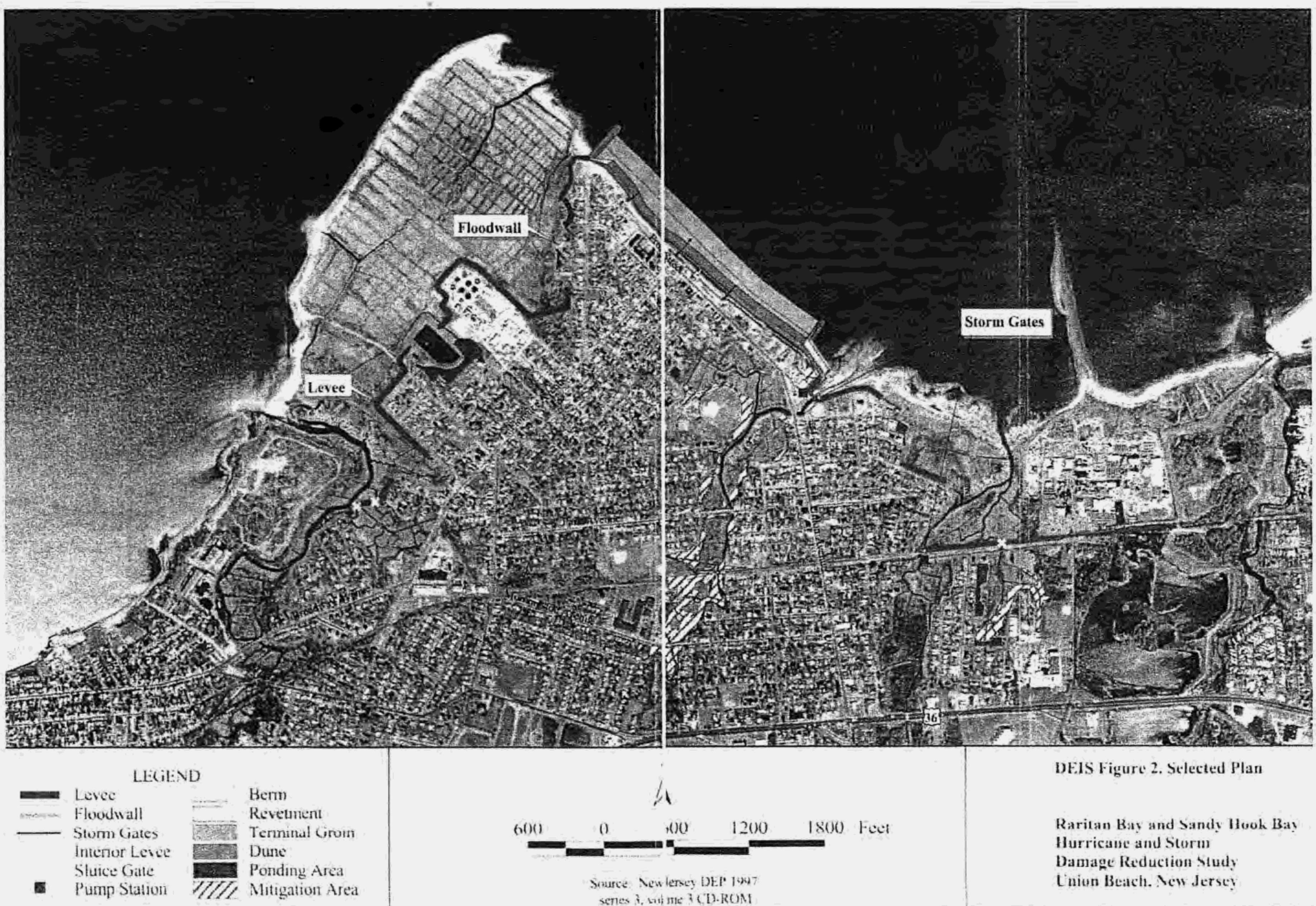

Figure 2. Selected Plan

1. Levee/Floodwall

The Corps selected plan includes a levee and floodwall alignment at the Chingarora Creek study area that begins at the high ground near the intersections of Flòrence Avenue and Bank Street and ends at the northwestern end of the Study area. Closure gates are provided at the Chingarora tributary and Broadway Avenue, and drainage structures are included to provide interior drainage of runoff.

Hurricane and storm damage reduction measures at Flat and East Creeks consist of a floodwall and levee alignment that begins at the southeastern limit of the shorefront and ties into the existing Keansburg levee at the eastern end of the Study area limits. A small interior levee is proposed for the low-lying area between East Creek and an unnamed East Creek tributary. Drainage structures are included to provide interior drainage of runoff, and closure gates are proposed at Flat Creek, East Creek and the East Creek tributary.

The proposed line of protection is designed to provide 92 percent reliability protection against the 100-year storm event (U.S. Army Corps of Engineers, 2003). Combined, the Chigarora Creek and Flat/East Creeks levee/floodwall components of the selected plan will include the following elements, which were evaluated in the Draft Impact Assessment and Mitigation Analysis (IAMA) (U.S. Army Corps of Engineers, 2002a). The levee/floodwall project component also includes 4.61 acres of ponding areas that were assessed in the Draft IAMA (Burlas, pers. comm., 2003).

- Construction of approximately 10,870 feet of levee. The levee will have a top elevation of approximately 15 feet National Geodetic Vertical Datum (NGVD), with a crest width of 10 feet and an approximate base width of 65 feet.

- Construction of approximately 3,388 feet of interior levee. The interior levee would have a top elevation of approximately 8 feet NGVD, with a crest width of 2 feet and a base width of approximately 15 feet.

- Construction of approximately 6,885 feet of floodwall. The floodwall will have a top elevation of approximately 15 feet NGVD, with a top and base width of approximately 1.5 feet.

- Construction of a 20-foot retention ditch on the landward side along the entire length of the levee and floodwall footprints. An approximate10-foot-wide strip of this retention ditch is expected to support wetland vegetation.

- Construction of 11 primary and 37 secondary interior drainage structures within the levee footprint to allow for drainage during normal conditions.

- Construction of two primary swing storm surge barriers (across Flat Creek and East Creek) with pump stations that would be utilized to remove excess water from interior drainage areas during storm events when the drainage structures and storm gates are closed.

2. Beach Nourishment

The Raritan Bay shoreline component of the selected plan consists of a beach berm and dune, with terminal groins and revetments stretching from the Chingarora Creek levee/floodwall alignment to the southeastern limit of the dune that ties into the levee alignment near Flat Creek. The dune generally follows the layout of the existing shoreline and extends bayward along the existing bulkhead and beach. The northwestern limit of the dune ties into the levee alignment west of Dock Street. From its northwestern terminus, the dune would extend 3,160 feet to the southeast to join the levee alignment near Flat Creek. Initial beach nourishment would use sand from the existing Sea Bright borrow area, located approximately 1.8 miles east of Sandy Hook. Subsequent renourishments may use sand from an upland source, or from new borrow areas (located in Raritan Bay and east of Sandy Hook) currently under evaluation by the Corps (U.S. Army Corps of Engineers, 2003).

The proposed beach and dune profile is designed to protect against erosion and wave run-up from the 100-year storm event. The Raritan Bay shoreline component of the select plan would include the following elements. Because the beach nourishment component was recommended later in project planning, these elements were not included in the Draft IAMA (Burlas, pers. Comm., 2003).

- Construction of 3,160 feet of beach berm and dune system using sand from the existing Sea Bright borrow area. The dune would be at 17 NGVD with a 50-foot-wide crest extending down to the 9-foot NGVD berm elevation. The width of the berm would range from 50 feet near the two terminal groins to a maximum of 164 feet between Beach Street and Florence Avenue. The beach and dune are designed to contain 688,000 cubic yards of fill, including advance fill, overfill, and tolerance.

- Construction of a 228-foot eastern terminal groin with an associated 630-foot revetment and a 245-foot western terminal groin with a 405-foot revetment.

- Beach renourishment every 9 years after initial construction, continuing for 50 years, using material from upland sources, existing borrow areas, or new borrow areas currently under investigation.

III. METHODS

A. DOCUMENT REVIEW

In preparation of this report, the Service reviewed the following Corps documents:

- Raritan Bay and Sandy Hook Combined Erosion Control and Storm Damage Prevention Pre-feasibility Report, Union Beach, New Jersey (U.S. Army Corps of Engineers, 1996);
- Draft Impact Assessment and Mitigation Analysis (IAMA) (U.S. Army Corps of Engineers, 2002); and
- Draft Feasibility Main Report and Draft Environmental Impact Statement (DEIS) (U.S. Army Corps of Engineers, 2003).

B. EVALUATION TECHNIQUES

1. HEP and EPW

As part of the Corps Study, Habitat Evaluation Procedures (HEP) (U.S. Fish and Wildlife Service, 1980) and Evaluation for Planned Wetlands (EPW) (Bartoldus *et al.*,1994) were conducted to assess project impacts and determine necessary mitigation to compensate for unavoidable losses from the proposed project. The Corps (2002a) Draft IAMA report documented the potential ecological impacts associated with the proposed Union Beach project, and presented a cost-effective and incrementally justified mitigation plan to offset project impacts. The Corps, as part of the National Environmental Policy Act of 1969 (83 Stat. 852; 42 U.S.C. 4321 *et seq.*) (NEPA) process, consulted with the National Marine Fisheries Service (NMFS), the Service, and the New Jersey Department of Environmental Protection (NJDEP) Land Use Regulation Program (LURP), and selected the HEP methodology to quantify project-related impacts to selected wildlife evaluation species in terms of Habitat Units (HUs), and the EPW methodology to assess project impacts to other wetland functions and values in terms of a numerical index expressed as Functional Capacity Units (FCUs). The EPW methodology was used in conjunction with, and to supplement, the HEP to assist with determining mitigation efforts necessary to offset adverse impacts associated with the proposed flood control activities.

The HEP Team (representatives of the above agencies) selected four evaluation species to be used in the Union Beach HEP study. Species selection was based on consideration of the Corps most recent design, the ecological significance of salt marsh communities, the predominance of potential impacts to upland vegetational cover types, the desire to diversify wildlife habitats within the project area, and the ability of the HEP's Habitat Suitability Index (HSI) models to characterize habitat quality adequately for the species throughout the project area. The HEP is an accepted methodology developed for documenting the quality and quantity of available habitat for selected wildlife species. Habitat quality (HSI on a scale of 0 to 1.0) is multiplied by acreage to yield HUs for a given species. The four evaluation species selected by the HEP Team were American black duck (*Anas rubripes*), clapper rail (*Rallus longirostris*), marsh wren (*Cistothorus palustris*), and yellow warbler (*Dendroica petechia*). Of the four evaluation species, the marsh wren is considered declining in New Jersey (New Jersey Division of Fish and Wildlife, 2002).

The EPW method provides a quantitative assessment of the relative value of wetlands that can be applied consistently in a variety of different wetland types. Based upon the wetland type, the EPW method evaluates six major wetland functions: shoreline bank erosion control, sediment stabilization, water quality, wildlife (general habitat values), fish (tidal, general habitat values), and uniqueness/heritage (*e.g.*, rarity, historical significance, park or sanctuary, habitat for endangered species, scientific value). By expressing each functional value numerically (FCUs), relative comparisons can be made among various mitigation options and project alternatives.

2. Service Position on the use of HEP and EPW

The Service uses both HEP and EPW as tools to assist in making decisions regarding the functions and values of wetlands and uplands within the Study area. When implemented properly, these tools can assist biologists in evaluating potential impacts to evaluation and/or target species that may occur from the proposed project. However, the use of these methodologies does not preclude the use of best professional judgment in assessing project impacts and evaluating compensatory mitigation. Mitigation often involves compensating for wetland functions or values other than the wildlife-related values assessable via HEP. The use of the EPW method may provide additional benefits in evaluating project impacts and mitigation requirements; however, Service staff have found the EPW methodology to be somewhat subjective, requiring discretionary estimates of broad indicators of wetland functions.

IV. EXISTING CONDITIONS

A. PHYSICAL CHARACTERISTICS

Chingarora, Flat, and East Creeks are tidally influenced water bodies, which flow northward into Raritan Bay in northern Monmouth County. All three tributaries originate south of Union Beach, have relatively small watersheds, and flow through primarily developed areas containing residential housing and industrial and commercial businesses. Chingarora Creek originates approximately 2 miles upstream from where it empties into Keyport Harbor in Raritan Bay. Chingarora Creek, from Keyport Harbor upstream to New Jersey State Route 36, is the boundary separating Keyport and Union Beach Boroughs. Flat and East Creeks, located east of Chingarora Creek, originate approximately 3 miles upstream from where both creeks empty into Raritan Bay. The flat gradient of the streams and the low relief of the surrounding terrain makes the Study area extremely vulnerable to flooding during periods of heavy rainfall. Severe storm activity causes the creeks to overtop and spread their flood waters over the broad flood plain, eliminating drainage of interior areas. The waters of Raritan Bay off Union Beach are characterized by shallow soundings (1 to 9 feet) and a primarily sandy bottom (mostly of medium grain size) with a few intervening mud areas, such as at the mouths of the Chingarora, Flat, and East Creeks (Russell, 1999).

B. VEGETATION

The mouth of Chingarora Creek empties into Keyport Harbor. Chingarora Creek is part of Conaskonk Point that extends far out into the Raritan Bay. Chingarora Creek includes a large ditched salt marsh, sandy beach, some fill and spoil material, and wooded fringes. Salt marsh cordgrass (*Spartina alterniflora*) and salt meadow cordgrass (*S. patens*) are the dominant marsh species, occupying 55 percent of the undeveloped/vegetated land (U.S. Army Corps of Engineers, 2002a). On the Raritan Bay side to the north are mudflats and sodbanks.

Flat Creek includes marshes along the creek from the mouth to State Route 36. The site is important to fish and wildlife because the creek mouth is in a natural state, with marsh and mud flats, and the stream channel is not bulk-headed or channelized. The marsh along Flat Creek is intact and within a residential neighborhood. The marsh consists of cordgrass (*S. alterniflora, S. patens,* and *S. cynosuroides*) with sea lavender (*Limonium vulgare*), sea myrtle (*Baccharis halimifolia*), and high tide bush (*Iva frutescens*). Some common reed (*Phragmites communis*) intrusion occurs along the edges of Flat Creek and further upstream.

The salt marsh of East Creek is extensive and of good quality with *S. alterniflora, S. patens,* and *Iva frutescens* being the most dominant vegetation. *Phragmites* is more prevalent upstream of Patterson Avenue. The entire bayshore from Flat Creek to Thorn's Creek, on the east side of Union Beach, is uninterrupted salt marsh. This area is the only site of undisturbed salt marsh on the bayshore outside of Sandy Hook and Conaskonk Point (Kane and Kerlinger, 1994).

C. FISH AND WILDLIFE

1. Shellfish and Crustaceans

Historically, a major oyster bed existed in Raritan Bay off Keyport Harbor. Most of this bed was destroyed by over-harvesting and pollution during the early part of the last century. Approximately 10-12 years ago, some signs of oyster shell and possible recolonization of the Keyport bed were noted (Russell, 1999). The New York/New Jersey Harbor Baykeeper presently oversees a public/private oyster recolonization program in Keyport Harbor (Stringer, pers. comm., 2002). Volunteers from approximately 35 sites in the local area grow oysters from seed that is then relocated as the oyster seed matures (Remaud, pers. comm., 2002).

Although no commercial shellfish beds were identified within the Study area, the south shore of Raritan Bay is an important shellfish foraging area for wintering waterfowl (Russell, 1999). Ettinger (1996) reported that sampling in the vicinity of Laurence Harbor about 2 miles west of Union Beach produced large numbers of the bivalve *Gemma gemma* and the softshell clam *Mya arenaria*; both species are utilized by waterfowl. A lobster (*Homarus americanus*) fishery exists in the deeper waters of Raritan Bay, but lobsters are apparently only occasional winter visitors to the Union Beach area with no commercial take (Ettinger, 1996).

2. Fish

Littoral fishes were sampled near Union Beach at the mouth of Whale Creek by the NJDEP in 1982 and 1983 (U.S. Army Corps of Engineers, 1996). Whale Creek is located 1 mile west of Keyport Harbor and would be representative of supporting fish species expected to be in the Union Beach area. The most commonly recorded saltwater fish were striped killifish (*Fundulus majalis*), bay anchovy (*Anchoa mitchilli*), mummichog (*F. heteroclitus*), Atlantic silverside (*Menidia menidia*), and bluefish (*Pomatomus saltatrix*) with smaller numbers of American eel (*Anguilla rostrata*), Atlantic needlefish (*Strongylura marina*), northern kingfish (*Menticirrhus saxatilis*), striped mullet (*Mugil cephalus*), and northern sennet (*Sphyraena borealis*). Freshwater fish recorded included banded sunfish (*Enneacanthus obesus*), pumpkinseed (*Lepomis gibbosus*), and white perch (*Morone americana*). A popular recreational fishing pier is located on the east bank of Matawan Creek in Keyport Harbor and produces frequent catches of "snapper" blues (small immature bluefish approximately 1 pound) and summer flounder (*Paralichthys dentatus*) up to 2 pounds. Other fish that likely occur in shallow waters of Raritan

Bay include winter flounder (*Pleuronectes americanus*), windowpane flounder (*Scophthalmus aquosus*), and butterfish (*Peprilus triacanthus*).

The small size and degraded condition of Whale Creek precludes it from having a high species diversity or important fishery. However, information provided by the New Jersey Division of Fish and Wildlife (NJDFW) Bureau of Freshwater Fisheries (Appendix E) indicates a confirmed run of river herring in Whale Creek. Striped bass and American shad (*Alosa sapidissima*) frequent Raritan Bay and might conceivably, along with blueback herring (*A. aestivalis*) and alewife (*A. pseudoharengus*), utilize Chingarora, Flat, and East Creeks for spring runs.

3. Reptiles and Amphibians

Reptiles known to occur in the Study area include the common garter snake (*Thamnophis sirtalis*), northern black racer (*Coluber constrictor constrictor*), eastern worm snake (*Carphophis amoenus*), snapping turtle (*Chelydra serpentina*), diamondback terrapin (*Malaclemys terrapin*), eastern painted turtle (*Chrysemys picta*), and eastern box turtle (*Terrapene carolina*) (Russell, 1999).

Amphibians known to occur in the freshwater portions of the Study area include spring peeper (*Hyla crucifer*), bullfrog (*Rana catesbeiana*), and Fowler's toad (*Bufo woodhousii*). The State-listed (endangered) eastern tiger salamander (*Ambystoma tigrinum*) may occur in the area at the northern edge of its range (Russell, 1999).

4. Birds

Migratory birds are a federal trust resource responsibility of the Service. Located strategically along the east coast flyway, Sandy Hook is an important stopover for migrating hawks, passerines, waterfowl, shorebirds, loons, and grebes. Raritan Bay harbors the largest concentration of greater scaup (*Aythya marila*) in New Jersey with flocks of 8 to 50 thousand observed (Kane and Kerlinger, 1994). Other waterfowl such as red-breasted merganser (*Mergus serrator*), American wigeon (*Anas americana*), canvasback (*A. valisineria*), oldsquaw (*Clangula hyemalis*), and common goldeneye (*Bucephala clangula*) are numerous during migration and/or winter. Raritan Bay also hosts large numbers of horned grebes (*Podiceps auritus*) and common (*Gavia immer*) and red-throated loons (*G. stellata*), especially in migration. Great importance is also placed on the bay's mudflats and beaches for shorebirds. Raritan Bay's salt marshes harbor important populations of sharp-tailed sparrow (*Ammodramus caudacutus*), seaside sparrow (*A. maritimus*), clapper rail, herons, and winter populations of raptors (Kane and Kerlinger, 1994).

More specific to the Union Beach Study area is information provided by Kane and Kerlinger (1994) regarding wildlife species documented at Chingarora, Flat, and East Creeks. Chingarora Creek and associated Conaskonk Point are rich in marine organisms and birds. The extensive salt marsh hosts resident clapper rail, green heron (*Butorides striatus*), fish crow (*Corvus ossifragus*), sharp-tailed sparrow, seaside sparrow, willet (*Catoptrophorus semipalmatus*), and marsh wren. Migrants regularly seen there include most terns, Bonaparte's gull (*Larus philadelphia*), waterfowl (especially greater scaup), raptors, horned lark (*Eremophila alpestris*), snow bunting (*Plectrophenax nivalis*), and shorebirds, including the rare Baird's sandpiper

(*Calidris bairdii*), curlew sandpiper (*C. ferruginea*), marbled godwit (*Limosa fedoa*), Hudsonian godwit (*L. haemastica*), and rare gulls, including black-headed gull (*Larus ridibundus*) and little gull (*L. minutus*). Additional residents found on the site include American oystercatcher (*Haematopus palliatus*), green heron, American black duck, and mallard (*Anas platyrhynchos*). Feeding herons and least terns (*Sterna albifrons*) (State-listed as endangered) are common in summer on the marsh and in the creeks. The least tern may attempt to breed on the beach near the creek mouth.

Flat Creek provides important natural habitats because of the marsh, mud flats, and stream channels. The habitat is suitable for clapper rail, Virginia rail (*Rallus limicola*), marsh wren, and possibly least bittern (*Ixobrychus exilis*). Green heron, American oystercatcher, and black skimmer (*Rynchops niger*) (State-listed endangered) feed at the creek mouth. Yellow-crowned night-heron (*Nycticorax violacea*) (State-listed threatened) feed on fiddler crabs (*Uca* species) and green crabs (*Carcinus maenas*) upstream in the creek. Double-crested cormorant (*Phalacrocorax auritus*), brant (*Branta bernicla*), American black duck, and lesser numbers of other waterfowl frequent the mouth. Birds found on the marsh include snowy egret (*Egretta thula*), yellow-crowned night-heron, American black duck, sora rail (*Porzana carolina*), and sharp-tailed sparrow. Shorebirds at this site include black-bellied plover (*Pluvialis squatarola*), semipalmated plover (*Charadrius semipalmatus*), greater yellowlegs (*Tringa melanoleuca*), least sandpiper (*Calidris minutilla*), ruddy turnstone (*Arenaria interpres*), dunlin (*C. alpina*), and American oystercatcher.

As previously mentioned, the entire bayshore from Flat Creek to Thorn's Creek consists of uninterrupted salt marsh and is the only place on the bayshore providing this cover type other than Sandy Hook and Conaskonk Point (Kane and Kerlinger, 1994). This distinction makes East Creek, which is in the middle of this stretch, a prime feeding area for waterfowl. Black-crowned night-heron (*N. nycticorax*) (State-listed as threatened, breeding population only), yellow-crowned night-heron, snowy egret, greater yellowlegs, American black duck, clapper rail, willet, and fish crow are found on the marsh. Double-crested cormorant, brant, American black duck, bufflehead (*Bucephala albeola*), red-breasted merganser, and greater scaup feed at the creek mouth.

5. Mammals

Mammals expected to occur in the riparian corridors of the Study area include whitetail deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), woodchuck (*Marmota monax*), red fox (*Vulpes fulva*), and invasive species such as Norway rat (*Rattus norvegicus*). Although juvenile whales may enter the bay, they are restricted to the deeper waters. Several species of dolphins and one or more species of small whales might occasionally occur off Union Beach, including bottle-nose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), and short-finned blackfish (*Globicephala macrorhynchus*), a species of pilot whale. The area in the vicinity of Union Beach also contains a concentration of harbor seals (*Phoca vitulina*) in the winter (Russell, 1999).

D. ENDANGERED AND THREATENED SPECIES

1. Federally Listed Species

There are known occurrences of the federally listed (threatened) piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*) within 10 miles of the project area, in Sandy Hook and Sea Bright Borough. These species are not expected to occur on the project site prior to beach nourishment due to the current lack of suitable habitat (*i.e.*, narrow widths of existing sandy beach). However, beach nourishment may create suitable habitat for these species. Pursuant to Section 7 of the ESA, the Service provides recommendations below for the Corps to avoid adverse impacts to these species should they colonize the newly widened beach.

Except for the above-mentioned species and an occasional transient bald eagle (*Haliaeetus leucocephalus*) or roseate tern (*Sterna dougallii*), no other federally listed or proposed endangered or threatened flora or fauna under Service jurisdiction are known to occur within the vicinity of the proposed project area. If additional information on federally listed species becomes available, or if project plans change, this determination may be reconsidered. Current information regarding federally listed and candidate species occurring in New Jersey is enclosed, as well as addresses of State agencies that may be contacted for current site-specific information regarding federal candidate and State-listed species (Appendix A).

The Service provides the above determination with respect to federally listed or proposed threatened or endangered flora and fauna under Service jurisdiction only. The proposed project may affect the marine environment of Raritan Bay. Principal responsibility for threatened and endangered marine species is vested with the NMFS. In a March 6, 1999 letter to the Corps, the NMFS discussed species under its jurisdiction in the project area (Appendix B). Therefore, continued coordination with the NMFS is necessary to fulfill consultation requirements pursuant to Section 7(a)(2) of the ESA:

National Marine Fisheries Service
Habitat Conservation Division
Sandy Hook Laboratory
Highlands, New Jersey 07732
(732) 872-3023

2. Other Species of Concern

In addition to federally listed species discussed above, the proposed beach nourishment may also create suitable habitat for State-listed species and State species of special concern, such as least terns and seabeach knotweed (*Polygonum glaucum*) (State-listed as endangered). Recommendations are provided below (under Section VD) for the Corps to avoid adverse impacts to these species should they colonize the Study area following widening of the beach.

In a March 1, 2000 letter to the Northern Ecological Associates, Inc., the New Jersey Natural Heritage Program (NJNHP) identified records of occurrences of migratory shorebird concentration sites that may be in the project area, and occurrences of the State-listed (threatened) osprey (*Pandion haliaetus*) that may be on or in the immediate vicinity of the project area (Appendix C). Suitable habitat is present for the following State-listed species that utilize the coastal wetlands of the project area for feeding or resting: yellow-crowned night-heron (threatened), black-crowned night-heron (threatened, breeding population only), black skimmer (endangered), least tern (endangered), and osprey (threatened), as well as the State species of concern great blue heron (*Ardea herodias*) (Kane and Kerlinger, 1994; Jenkins, pers. comm., 2002). In addition, the NJDEP Landscape Project mapping shows critical habitat for a "herptile species of concern" within the Study area. The Service recommends that the Corps coordinate with this office and the NJDFW Endangered and Nongame Species Program (ENSP) during the design phase of project planning to avoid adverse effects to these species through buffers, seasonal restrictions, or other appropriate conservation measures.

Included with the March 1, 2000 NJNHP letter (Appendix C) was a list of rare species from records in the general vicinity of the project site (within approximately 2 miles). Also included was a list of rare species and natural communities that have been documented from Monmouth County. In the DEIS, the Corps states that 7 State-listed plant species may possibly occur in the project area. The Service recommends that the Corps survey suitable habitats in the project area for these or other sensitive plant species during the appropriate times of year to determine presence or absence. The NJNHP county list can be used as a master species list for directing further inventory work. If any State-listed plants or sensitive natural communities are documented, the Corps should coordinate with this office and the NJNHP to develop appropriate conservation measures during the design phase of the project.

V. PROJECT IMPACTS AND RECOMMENDED MITIGATIVE MEASURES

A. SERVICE MITIGATION POLICY

The views and recommendations set forth in this report are guided by the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, January 23, 1981). This policy reflects the goal that the most important fish and wildlife resources should receive priority in mitigation planning. The term "mitigation" is defined as: (a) avoiding a negative impact altogether by not taking a certain action or parts of an action; (b) minimizing negative impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the negative impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating negative impacts over time; and, (e) compensating for negative impacts by replacing or providing substitute resources or habitats.

B. LEVEE/FLOODWALL

1. Wetlands

a. <u>Direct Impacts</u>

Although the selected plan was specifically designed to avoid and minimize environmental impacts, some unavoidable adverse effects to natural resources are expected to occur. Construction of the levee/floodwall components of the selected plan would impact 8.39 acres of wetland vegetation (U.S. Army Corps of Engineers, 2003). The project would also convert up to 4.61 acres of wetlands from one type to another (*i.e.*, emergent to open water; scrub/shrub to emergent) for the construction of ponding areas (Burlas, pers. comm., 2003). The Corps conducted ecological assessments of these effected wetlands to characterize their current functions and values. The results were used as a basis for designing appropriate compensatory mitigation for unavoidable adverse effects. These function and value results were used to assess impacts and mitigation for the selected levee/floodwall project components only (as described above under "Project Description"). Because beach nourishment was recommended later in project planning, this component was not included in these ecological assessments (U.S. Army Corps of Engineers, 2002b).

As discussed above, the Corps, in consultation with the NMFS, the Service, and the LURP, selected the HEP to quantify impacts to wildlife evaluation species in terms of AAHUs, and the EPW method to assess impacts to wetland functions and values in terms of FCUs. The results of these assessments are summarized in Table 1.

Table 1. Levee/Floodwall Wetland Impacts and Compensatory Mitigation

HEP	Evaluation Species	AAHUs Lost Without Compensatory Mitigation	AAHUs Provided by Compensatory Mitigation	Net Change in AAHUs
	black duck	0.4	4.4	+4.0
	clapper rail	6.1	4.2	-1.9
	marsh wren	1.7	3.2	+1.5
	yellow warbler	3.7	2.4	-1.3
EPW	**Wetland Function**	**FCUs Lost Without Compensatory Mitigation**	**FCUs Provided by Compensatory Mitigation**	**Net Change in FCUs**
	shoreline bank erosion control	4.60	6.15	+1.55
	sediment stabilization	5.81	2.10	-3.71
	water quality	3.96	6.93	+2.97
	wildlife	3.08	7.15	+4.07
	fish (tidal)	2.17	2.04	-0.13
	uniqueness/heritage	5.80	2.50	-3.3
		Acres Lost Without Compensatory Mitigation	**Acres Enhanced by Compensatory Mitigation**	**Acreage Ratio**
		8.39	17.50	2.09:1

In addition to permanent impacts due to the structures themselves, temporary adverse impacts to wetlands may occur during construction in areas that are used for haul roads and temporary workspaces (U.S. Army Corps of Engineers, 2003).

b. Compensatory Mitigation

(1) Mitigation Goal

The Corps mitigation goal to compensate for adverse impacts on wildlife habitats and wetland functional values, associated with implementation of the selected plan, was to develop an array of mitigation alternatives that would either individually or in combination replace all of the HUs lost through time (*i.e.,* AAHUs), and replace all of the FCUs at the time of their loss. As a benchmark, the Corps set a goal of replacing a minimum of 50 percent of the total AAHUs lost per evaluation species and 50 percent of the total FCUs lost per wetland function (U.S. Army Corps of Engineers, 2002a).

Although HEP results are expressed in HUs, and annualized as AAHUs, for each evaluation species, the Service cautions that combining HUs for different species yields a meaningless sum. Due to the variation in habitat requirements for different species, adding HUs across species can result in habitat values being double-counted or canceled out. Rather, HUs or AAHUs should always be expressed as a unit for a given species. Similarly, adding FCUs from dissimilar functions would not yield a meaningful number or account for critical functions that may constitute limiting factors. The Service does agree with the Corps overall goal, which is to select the mitigation plan that best compensates for lost habitat values for each of the evaluation species and each of the wetland functions. We also acknowledge, and expect, that some trade-offs may be justifiable, depending on the regional importance of given evaluation species or the critical nature of a given wetland function. The HEP and EPW results remain as useful tools to gauge relative gains and losses for individual species and individual wetland functions, respectively.

(2) Selected Mitigation Plan

The Corps conducted a screening analysis to identify potential mitigative options and potential off-site and on-site mitigation areas. The screening analysis resulted in the identification of two on-site mitigation areas and three potential mitigative options: levee improvements, habitat improvements, and habitat conversions. The Corps determined that conversion of wetland cover types to other wetland cover types, and conversion of upland cover types to wetland cover types were the best mitigative options based on the potential gain in AAHUs and the potential mitigation sites available. Potential mitigation areas were identified in the East Creek and Flat Creek ecological study areas.

Based on the analysis of AAHU and FCU outputs, total cost, and incremental cost/output, the Corps identified Plan A of Mitigation Alternative 2 as the selected mitigation plan.

Plan A of Mitigation Alternative 2:

Conversions:	Flat Creek Wetland *Phragmites*:	10.0 acres Salt Marsh
		2.0 acres Wetland Scrub-Shrub
	East Creek Wetland *Phragmites*:	3.0 acres Wetland Scrub-Shrub
	Flat Creek Upland *Phragmites*:	2.5 acres Wetland Herbaceous/Scrub-Shrub
	Total Wetland:	15.0 acres
	Total Upland:	2.5 acres
	Total Conversion:	17.5 acres

The Corps concluded that Plan A of Mitigation Alternative 2 represents the best trade-off among evaluation species and among EPW functions, in that it maximizes benefits to most species and most wetland functions while minimizing net losses. Wetland functions and values replaced by the selected mitigation plan are given in Table 1, based on HEP and EPW methodologies. The net gain in AAHUs for marsh wren is of importance since the species is rated by the NJDFW as declining in New Jersey. The selected plan meets the 50 percent replacement goal of FCUs for most wetland functions, except sediment stabilization (due to the high value of stabilization attributed to *Phragmites*, which would be converted to other vegetative cover types) and uniqueness/heritage, which was determined to be the least important attribute. The Corps proposes to monitor mitigation areas for 5 years following construction (U.S. Army corps of Engineers, 2003). The Service requests to participate in this effort.

(3) Service Recommendations

Based on the HEP and EPW results, the Service concurs with the Corps selection of Plan A of Mitigation Alternative 2 as compensatory mitigation for the 8.39 acres of anticipated wetland impacts (*i.e.,* from the project's levees, floodwalls, retention ditches, and the surge barriers and pumping stations at Flat Creek and East Creek). However, the Service urges the Corps to continue efforts toward avoidance and minimization of wetland impacts during the design phase of the project, through both careful design of the proposed levee/floodwall, and periodic re-assessment of non-structural alternatives.

Additional avoidance and minimization would improve the environmental acceptability of the project, and would incidentally reduce the Corps compensatory mitigation and monitoring costs. For example, we recommend that the Corps seek opportunities to further reduce wetland impacts through the increased use of floodwalls and decreased use of levees. The Service further recommends that the Corps periodically update economic information and analyses during the design phase to determine if incorporation of a partial buy-out, or other non-structural measures that would reduce environmental impacts, have become economically viable. In addition, if there is a substantial time lag (several years) prior to project design and/or construction, the Corps should fully reassess buy-outs and other non-structural alternatives, as changed conditions over time may alter the cost-benefit ratios of these options. In addition, the Service encourages the Corps to work with the local project sponsor to ensure that zoning ordinances fully protect floodplain and wetland areas as a condition of project implementation.

To minimize construction-related impacts, the Service recommends implementing strict erosion control practices to minimize adverse impacts from construction, to include construction under dry conditions and use of silt barriers to minimize sediment transport. The Service further recommends that the Corps fully restore temporary wetland impacts to pre-construction grades and hydrologic conditions, and revegetate these areas with appropriate native species. The Service recommends monitoring the success of post-construction restoration efforts for at least 3 years; 5 years in areas where the project impacts involve *Spartina*-dominated marsh.

The proposed mitigation plan was formulated to compensate for unavoidable adverse impacts associated with the above-mentioned flood control features and was not intended to mitigate adverse impacts associated with beach nourishment. Potential impacts to wetlands associated with beach, groin, and revetment construction are discussed in Section C (Beach Nourishment) below.

c. Indirect Impacts

Based on the results of a hydrological model to predict tidal flows and losses through constructed features, the Corps designed storm gates, sector gates, and sluice gates to cause no significant reduction or change in normal tidal flows. Therefore, the Corps expects tidal wetlands in the Study area to receive the same frequency and levels of tidal inundation, allowing hydrological and vegetative patterns to remain the same. The Corps has concluded that no significant adverse impacts to wetland hydrology are anticipated (U.S. Army Corps of Engineers, 2003).

To verify a lack of hydrologic impacts, the Corps proposes a tidal marsh monitoring plan focused on the effects of the storm gates on the daily tidal cycle. The plan includes placement of tide gages throughout the tidal marsh to ascertain tidal levels before and after installation of the storm gates. Water quality parameters may also be measured and vegetation may be sampled. The Corps proposes to record data for 2 years pre-construction to establish a baseline, 1 year during construction, and 2 consecutive years post-construction to evaluate potential effects (U.S. Army Corps of Engineers, 2003).

The Service emphasizes the importance of avoiding indirect hydrologic impacts to the extensive tidal marshes in the Study area. As described above, these marshes provide high quality fish and wildlife habitat, and offer the largest remaining expanses of wetlands on the Raritan Bay shoreline outside of Sandy Hook. Preliminary Corps assessments indicated that hydrologic effects could potentially impact an additional 14.41 acres of wetlands (U.S. Army Corps of Engineers, 2003). If these effects cannot be avoided with confidence, the Service would recommend re-designing the proposed levee/floodwall, or abandoning it in favor of non-structural flood control alternatives.

Therefore, the Service requests to participate in the proposed tidal marsh monitoring effort, and recommends expanding the monitoring plan to include:

1. monitoring for at least 5 years following construction;
2. monitoring for changes to the duration (as well as frequency and levels) of tidal inundation, under both normal (*i.e.*, storm gates open) and storm (*i.e.*, storm gates closed) conditions;
3. monitoring of the effects of altered surface water sheet flows (*i.e.*, direction of runoff into ponding areas and ditches, and subsequent point discharges through the line of protection into the marshes); and
4. water quality, vegetative, and faunal (especially benthos and birds) sampling of marsh edges and interior areas at varying distances from the line of protection.

The Service further recommends that the Corps develop a contingency plan that will be implemented if adverse hydrologic effects are documented. The plan should include modifications to the line of protection and/or storm gate operation procedures as needed to reddress any hydrologic impacts to the marshes.

2. Creeks

The Service recommends that the Corps work with this office and appropriate State agencies during the design phase of the project to ensure that selected construction methods and practices minimize in-stream impacts during storm gate and sluice gate installation. The Service also recommends that the Corps design these proposed structures to minimize hardening and other alterations of the tidal creek beds and banks.

3. Uplands

The selected plan would permanently impact a total of 12.23 acres of upland vegetation. Much of the vegetated upland portions of the Study area consist of disturbed areas, such as an old landfill, and are dominated by weedy or invasive species. However, undisturbed pockets of upland forest are also present (U.S. Army Corp of Engineers, 2003).

The Corps selected compensatory mitigation plan focuses on restoring wetland habitats and other functions impacted by the proposed project. This focus is appropriate, as tidal marshes offer the highest quality wildlife habitats in the Study area. However, the mitigation plan does not include creation or restoration of upland habitats. Therefore, the Service recommends that the Corps work with this office during the design phase of the project to characterize upland impacts (*i.e.*, acreage of disturbed land versus intact forest), and to avoid impacts to higher quality upland wildlife habitats wherever possible.

4. Invasive Species

The Corps determined that the proposed levees and floodwalls may prevent the spread of *Phragmites* by functioning as a barrier between wetlands and developed lands. However, the levees, retention ditches, and ponding areas could also provide habitat and serve as introductory points for invasive species. The Service recommends that the Corps: (1) prepare and implement a plan to avoid burial of *Phragmites* rhizomes along the levee; (2) monitor the levees, retention ditches, and ponding areas for invasive plant and animal species for at least 5 years following construction; and (3) take corrective actions if invasive species are documented along the line of protection.

C. BEACH NOURISHMENT

The selected plan with mitigation as identified in the Corps (2002a) IAMA does not address potential impacts from construction of the more recently proposed beach berm and dune system, and associated terminal groins and revetments, nor does it evaluate potential impacts to borrow sites. These impacts are addressed in the Corps (2003) DEIS.

The Service views the shallow waters of southern Raritan Bay as of high value to fish and wildlife resources. In accordance with the Service's Mitigation Policy, our planning goal is no-net-loss of in-kind habitat value.

Pursuant to requirements in section 305 (b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94-265), coordination should continue with the NMFS regarding any aspects of the proposed action that may adversely affect Essential Fish Habitat (EFH) identified under the Act. A list of species for which EFH has been designated is included in the NMFS March 26, 1999 correspondence (Appendix B).

1. Raritan Bay Shoreline

Although coastal areas are among the most productive and critical areas for fish and wildlife resources, beaches are low diversity systems, supporting only those species able to cope with constantly changing conditions. Due to shoreline stabilization and other human activities, many of these specialized beach species are threatened or endangered at the federal or State level. Beaches can generally be divided into upper, middle, and lower zones. The upper zone, extending from dune areas to just above the high water line is dry except during storm events or extra-high tides. Where human disturbance is not significant, this zone (along with the middle zone) provides nesting areas for shorebirds. Due to extensive development along the New Jersey coast, natural beach and dune systems have been greatly diminished.

Influenced by tidal fluctuations, the middle beach zone is often submerged and animals are more susceptible to desiccation. Few species occur in this zone; however, there may be large numbers of adapted species, serving as a prey base for nesting and migratory shorebirds and fish. These include various copepods, ciliates, tardigrades, gastrotrichs, and turbellarians. In addition, amphipods, annelid worms, small clams, and mole crabs (*Emerita*), as well as other mollusks and crustaceans can be expected to inhabit this zone. The lower beach zone is nearly continuously flooded and supports a rich and varied fauna that includes polychaetes, crustaceans, and mollusks. Small fish can also be found in this zone (U.S. Fish and Wildlife Service, 1989).

a. Direct Impacts

(1) Permanent Impacts

Construction of the beach berm, dune, revetments, and terminal groins would convert existing sandy-bottom shallow water habitats to upland beaches and rocky substrates. Permanent loss of shallow water habitats would not occur along the proposed beach berm, as new intertidal and shallow water zones will form at the edge of the widened berm. Using fill material of similar grain size to sediments on the existing beach is essential to avoiding permanent impacts to the intertidal faunal assemblage. With dissimilar grain sizes, the surf zone macrofaunal community after recolonization of a nourished beach may differ considerably from the original community. Once established, it may be difficult for species of the original community to displace the new colonizers (Hurme and Pullen, 1988). The Service recommends that the Corps ensure a close match between fill material and native Union Beach bayshore sediments.

Sandy beach and dune systems in the Study area and along most of the Raritan Bay shoreline have been diminished by historic shoreline stabilization efforts. Based on the limited availability of this habitat type, widening the existing beach is expected to benefit species dependant on beach and dune habitats such as shorebirds, horseshoe crabs (*Limulus polyphemus*), diamondback terrapins, and rare beach plant species. Implementation of a beach berm should provide increased beach and intertidal habitats attractive to migratory shorebirds. The State-listed red knot (*Calidris canutus*) is known to occur in the area as a spring and fall migrant. Any project that increases the availability of an intertidal zone should benefit this arctic-breeding species as well as other migratory shorebirds. Implementation of the beach berm and dune system would also increase beach habitat for breeding terrapins, if beach areas are constructed above the levels of normal high tides. These habitat benefits would last for the proposed 50-year project life. These benefits are contingent on obtaining beach nourishment material of similar grain size to the native sediments on Union Beach, to minimize the chances for rapid beach erosion and to promote recolonization of indigenous species.

Project-related habitat benefits, however, are partially offset by the creation of an artificially stabilized beach berm and dune system. Optimal habitat for most beach-dependant species consists of unstabilized, shifting beaches and dunes. Wildlife benefits from a wider beach could be further offset if the beach attracts intensive human recreational use and management. To maximize the fish and wildlife benefits of beach widening, the Service recommends that the Corps: (1) limit ocean-side dune stabilization (*i.e.*, vegetation planting, sand fencing) to the minimum necessary for storm protection; (2) plant a low-density, high-diversity assemblage of native species when ocean-side dune planting is required; (3) implement the recommendations provided below in Section D (Endangered and Threatened Species) for the protection of federally listed species and other species of concern to manage recreational use and educate the public.

Along the land-side of the dune, the Service recommends planting warm seasonal grasses with a mixture of salt tolerant shrubs identified (Appendix E) in "Landscaping for Birds on New Jersey's Barrier Islands." Planting with a proper mixture of native species will reduce the amount of maintenance required by the local sponsor and provide additional habitats for some

HEP evaluation species and other native birds. The use of a native species mixture will stabilize the dune, assuring conservation of sand and water, and act to enhance the environment. The local Soil Conservation District can provide information on the appropriate mixture of plant species based on the planting date and drainage. The recommended native plant species are naturally drought and disease resistant. The Service recommends avoiding non-native species, particularly aggressive or invasive species such as Asiatic sand sedge (*Carex kobomugi*). To protect any shorebirds or terrapins that may attempt to breed on the ocean-side beach, the Corps should also avoid planting trees and shrubs, such as Japanese black pine (*Pinus thunbergii*), that would provide perches for predators such as gulls (*Larus* sp.) and crows (*Corvus* sp.).

Groin and revetment construction may provide limited benefits to fish and wildlife. Rocky structures tend to benefit certain species of fish and shellfish by serving as an anchoring point for marine flora and sessile invertebrates, thereby enhancing the area for foraging by fish and other mobile animals. However, permanent loss of sandy-bottom shallow water habitats, and possibly wetlands, would occur along the proposed revetments and terminal groins. In particular, wetland and shallow water habitats may be impacted by the eastern revetment, which is proposed between the terminal groin and Flat Creek. On the western side of this area, an existing rock revetment extends east from the Borough's existing bulkhead (Burlas, pers. comm., 2003). However, further east (closer to the mouth of Flat Creek), marshes, intertidal, and shallow water habitats may be present in the footprint of the proposed revetment. Because beach nourishment was proposed later in project planning, impacts from groin and revetment construction were not included in the HEP and EPW assessments or factored into the design of the selected mitigation plan. Therefore, the Service recommends that the Corps take the following mitigative actions during the design phase of the project:

1. delineate and characterize any existing wetlands, intertidal, and shallow water habitats along the beach berm, groin, and revetment footprints, especially the eastern revetment;
2. informally assess project effects to these habitats (formal HEP and EPW are probably unnecessary); and
3. design and implement appropriate mitigation based on expected impacts, possibly including restoration of an existing area of hardened Raritan Bay shoreline.

The Service requests to participate in the above effort.

(2) Temporary Impacts

Mortality of any submerged aquatic vegetation (SAV) and sessile fish and shellfish in the work area is expected during construction of beach berm, revetments, and terminal groins, with resultant displacement of waterfowl such as wintering brant, American black duck, greater scaup, common goldeneye, and bufflehead. Mobile fish and shellfish species are expected to be temporarily displaced, but not killed. Mortality of fish eggs and benthic invertebrates, such as amphipods, bivalves, crabs, isopods, polychaetes, and intertidal fauna, is also expected. These species should eventually recolonize the intertidal and subtidal zones of the newly widened beach berm. Additional temporary wildlife impacts are expected due to increased turbidity during sand placement. The temporary effects associated with sand placement would recur every

9 years over the 50-year project life. The Service expects temporary effects to last between 6 months and 2 years following initial construction, and each of the five renourishment events.

The magnitude of temporary impacts to benthos and other fauna is dependent upon several factors: (1) the abundance and kinds of organisms present; (2) the quantity and quality of the material and how it is placed; and (3) the time of year the nourishment is undertaken. The Service reiterates our recommendation to ensure a close grain size match between fill material and native beach, intertidal, and nearshore sediments. Similar grain sizes are essential for a rapid recolonization of benthic invertebrate populations after beach nourishment. Recovery can take considerably longer when fill material contains substantially more silts and clays than the native sediment (U.S. Army Corps of Engineers, 2001). A low percentage of fine sediments in the fill material will also minimize turbidity effects.

The Service recommends that the Corps construct the beach and associated structures during those times of year when impacts to benthic fauna would be minimized, based on site-specific monitoring as well as the results of monitoring from similar projects such as the Atlantic Coast of New Jersey Beach Erosion Control Project (BECP) (U.S. Army Corps of Engineers, 2001). Based on the Corps (2001) BECP monitoring work, sand placement between November and January would be expected to produce the longest-lasting benthic impacts and should be avoided. However, pre-construction monitoring of benthic resources in the Union Beach Study area should be conducted to obtain a site-specific seasonal profile of faunal abundance. These data can be used as a basis for determining seasonal windows for sand placement that will minimize the duration of adverse effects to the benthic faunal community.

Timing of sand placement should also be scheduled to avoid impacts to anadromous fish, horseshoe crabs, and nesting shorebirds and diamondback terrapins. The Service recommends that the Corps coordinate with the NJDFW Bureau of Freshwater Fisheries and implement seasonal restrictions and any other conservation measures necessary to avoid construction impacts to migrating and spawning river herring in Whale Creek. The Service further recommends that the Corps survey the beach for 1-2 years prior to construction to determine use by spawning horseshoe crabs, shorebirds, or diamondback terrapins. If any of these species breed on the beach, the Service recommends seasonally restricting sand placement activities to avoid the breeding season. Please contact this office and the NJDEP to develop appropriate dates for the restricted seasons.

The Corps proposes intertidal and subtidal monitoring to document the nature and speed of recovery following sand placement, including benthic infauna, finfish, grain size, and water quality (U.S. Army Corps of Engineers, 2003). The Service supports this effort and concurs that the monitoring would provide valuable information regarding the effects of beach nourishment on intertidal and subtidal resources in a low energy estuarine environment.

Maintenance activities prolong the recovery period, turning short-term effects into long-term losses of faunal productivity. Less frequent maintenance is preferable, since it reduces the frequency of disturbance. Several steps may be taken to minimize the biological impacts of sand deposition. Minimizing or eliminating the use of large earth-moving machinery through the use of natural wave and current patterns to shape the beach profile could yield considerable reduction in environmental impacts (Reilly and Bellis, 1978).

To mitigate adverse impacts to shellfish beds, the Service recommends that the Corps increase structure in the impacted area through placement of oyster shell, which would facilitate recolonization of the area by various shellfish, including clams and, potentially, oysters.

b. Indirect Impacts

The construction of new hard shoreline stabilization structures, such as the proposed revetments and terminal groins, generally causes adverse environmental effects by preventing the natural migration of shorelines. Native coastal wildlife and plant species are adapted to these naturally dynamic conditions, and are adversely effected through habitat loss and degradation when shorelines are stabilized. In this case, the Union Beach shoreline was previously stabilized by bulkheads, and the proposed terminal groins are necessary to prevent sedimentation of adjacent marshes following beach nourishment. However, the proposed project will perpetuate the adverse environmental effects associated with hard shoreline stabilization structures by protecting and expanding this infrastructure. The proposed eastern revetment may also represent hardening of a currently unstabilized area of Raritan Bay shoreline, involving wetland and shallow water impacts. As discussed above, the Service recommends that the Corps implement appropriate compensatory mitigation for these effects, to potentially include restoration of an existing area of hardened Raritan Bay shoreline.

Inclusions of terminal groins are expected to reduce erosion of beach nourishment material by 50 percent (U.S. Army Corps of Engineers, 2003). The Service is concerned that even with reduced erosion rates due to the groins, sedimentation of adjacent tidal marshes and/or Keyport Harbor may result from beach nourishment. The Corps proposes to conduct coastal processes and shoreline profile monitoring, but no pre-construction assessment or post-construction monitoring of down-drift sedimentation effects are proposed in the DEIS (U.S. Army Corps of Engineers, 2003).

The Service emphasizes the importance of avoiding indirect hydrologic impacts to the extensive tidal marshes and shallows in the Study area. As previously discussed, marshes east (Conaskonk Point) and west (Flat Creek to Thorn's Creek) of the beach nourishment area provide vast, high-quality fish and wildlife habitats. Nearby Keyport Harbor is the site of a publicly funded oyster restoration project, and Whale Creek supports a confirmed run of river herring. If adverse sedimentation effects cannot be avoided with confidence, the Service would recommend re-designing the beach and dune system and associated structures, or abandoning these in favor of non-structural storm damage reduction alternatives. The Service requests to participate in the proposed coastal processes monitoring effort. The Service recommends expanding the monitoring plan to include pre- and post-construction modeling, monitoring, and assessment of sediment transport out of the Study area, including transport rates and directions and deposition rates and locations, to characterize the nature and severity of potential indirect effects to wetlands, shellfish, and other natural resources from sedimentation. The Service further recommends that the Corps develop a contingency plan that will be implemented if adverse ecological effects from sedimentation are documented. The plan should include provisions to modify the as-built beach berm and associated hard structures, and/or to alter or cancel subsequent planned renourishment events, as needed to address down-drift sedimentation impacts.

As an indirect consequence of beach widening, the proposed project may adversely affect federally listed and other sensitive species by creating sub-optimal habitats with high levels of human recreational use and management. Service recommendations to address these effects are provided in Section D (Endangered and Threatened Species) below.

2. Borrow Areas

a. Direct Impacts

In general, dredging impacts may be categorized into water column impacts and impacts to the bottom substrate. Potential water column impacts include increased turbidity, decreased oxygen concentration, reduced light penetration, reduced photosynthetic oxygen production, release of toxic organic compounds and heavy metals, increased temperature, and increased salinity. These impacts vary with the magnitude and duration of the disturbance, physical and chemical characteristics of the sediment, water quality, and hydrologic characteristics of the waterbody. The type and condition of the dredging equipment also influences the impacts of dredging. Hopper dredge overflow and clamshell dredging usually generate the highest turbidity and are of major concern (Allen and Hardy, 1980).

Potential adverse impacts to the bottom include: destruction of benthic organisms; altered benthic diversity following recolonization; changes in circulation patterns; modified sediment impact and deposition; changed nearshore wave refraction and diffraction patterns; creation of oxygen-depleted sinks; and creation of contaminant traps.

Depending upon the dredging technique employed, mortality could occur as organisms pass through the dredging apparatus or as a result of transport to an unsuitable environment. Burial of benthic organisms occurs from resuspended and redeposited sediments. Sessile species are eliminated from direct burial (U.S. Fish and Wildlife Service, 1989).

Removal of material from the Sea Bright borrow area for initial construction of the beach berm and dune will result in temporary physical and biological changes in the benthic environment. Sand mining will cause a bathymetric depression, resulting in the temporary loss of a portion of the benthic invertebrate assemblage and displace motile invertebrates and finfish. Also, there may be changes in water quality (U.S. Army Corps of Engineers, 2003). To minimize adverse effects, the Service recommends selecting the least damaging dredging equipment and practices, and avoiding the creation excessively deep borrow pits, which may revert to anoxic conditions. The Service concurs with the Corps borrow area monitoring plan presented in the DEIS (U.S. Army Corps of Engineers 2003).

Sand for initial beach nourishment is proposed to come from the Sea Bright Borrow Area. The Sea Bright borrow area is an existing borrow area that was subject to NEPA and ESA review processes and has received all necessary federal and State permits authorizations and approvals

(U.S. Army Corps of Engineers, 2003). However, if the proposed use of the Sea Bright borrow area for beach nourishment along the Raritan Bay was not specifically included in the original agency reviews, these may need to be reassessed in order to authorize expanded use of the borrow area. The Service recommends the Corps clarify this issue with all appropriate federal and State agencies. An EFH assessment may also be required by the NMFS.

Upland sources would be used for subsequent renourishment events, involving overland (truck) transport of sediment from an existing quarry (Burlas, pers. comm., 2003). The Service stresses the importance of obtaining a close match between fill material and native beach sediments, which may be more difficult to achieve using upland sources.

As an alternative sediment source for future renourishment events, the Corps is also characterizing four offshore sites and evaluating their potential as future borrow areas. These potential offshore borrow areas are located within 5,000 feet of the shore; three are located off the Raritan Bay/Sandy Hook Bay shoreline and the fourth is in the Atlantic Ocean just northeast of Sandy Hook. The Corps proposes a monitoring program for existing and potential offshore borrow areas. The monitoring program will focus on benthic infauna, epifauna, finfish, benthic fish feeding habits, grain size, and water quality (U.S. Army Corps of Engineers, 2003).

The Service's Chesapeake Bay Field Office is currently surveying bird use of offshore shoals. Results to date indicate that shoals can be bird concentration areas, particularly for diving waterfowl, and that removal of shoals can eliminate usage of an area by diving ducks (Forsell, pers. comm., 2003). As described above, Raritan and Sandy Hook Bays support regionally significant concentrations of wintering waterfowl, including the largest concentration of greater scaup (*Aythya marila*) in New Jersey. Scaup are diving ducks that favor shallow waters of medium salinities, and feed on shellfish. The Service recommends that the Corps amend the proposed monitoring plan for potential offshore borrow areas to include monitoring of waterfowl usage and foraging habits. The Service further recommends that the Corps coordinate with the this office and appropriate State natural resource agencies regarding waterfowl usage before initiating dredging at new borrow areas.

b. <u>Indirect Impacts</u>

The Service is concerned about the potential for sediment removal from existing and proposed borrow areas to impact regional sediment transport process and thereby alter shorelines along Sandy Hook. In particular, the proposed Sandy Hook Channel Borrow Area is located in close proximity to Sandy Hook. The ocean front shoreline of Sandy Hook supports numerous federally and State-listed species, as well as rare back dune and heath habitats and intensive recreational uses. The bay side shoreline of Sandy Hook provides unique wildlife habitats such as maritime forests, and numerous historic resources. In evaluating new borrow areas, as well as expanded uses of the existing Sea Bright borrow area, the Service urges the Corps to assess potential disruptions of regional sediment transport patterns to determine if any Sandy Hook shorelines may be effected. This effort should be coordinated with this office to protect federally listed species, and with the National Park Service, which administers Sandy Hook.

D. ENDANGERED AND THREATENED SPECIES

1. Federally Listed Species

The Service expects that, prior to dune construction and beach nourishment, nesting piping plovers or seabeach amaranth are unlikely to occur within the Union Beach project area because of a lack of the sandy beach substrate and low-energy bayshore environment. However, beach nourishment may create suitable habitat for nesting piping plovers and seabeach amaranth. Although not anticipated, these species may occur within the project area after project implementation.

Threatened and endangered species and their habitats are afforded protection under Section 7(a)(2) of the ESA, which requires every federal agency, in consultation with the Service, to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. An assessment of potential direct, indirect, and cumulative impacts is required for all federal actions that may affect listed species. Because the proposed Union Beach project will be carried out by the Corps, further consultation pursuant to Section 7 of the ESA will be necessary if nesting piping plovers or seabeach amaranth are found to occur within the project area at any time over the life of the project.

The Service requests that the Corps take the following steps to ensure the protection of piping plovers and seabeach amaranth following project implementation:

1. Initiate a monitoring program, funded by the Corps, to survey for piping plovers and seabeach amaranth on beaches created or nourished by the Corps. Monthly piping plover surveys should commence beginning approximately March 15 each year, and may cease if no nesting activity (territorial displays, courting, nesting, or brood rearing) is detected by July 1. A survey for seabeach amaranth should be conducted annually between August 15 and September 15. Surveys to determine the presence or absence of these species should occur for at least 5 years after each nourishment, unless suitable habitat is eliminated sooner by erosion, and the Service concurs in writing. If no piping plovers or seabeach amaranth are detected, annual assessments by the Corps and Service can be conducted to reevaluate the necessity of continued monitoring. The Corps must report monitoring results to the Service and, for piping plovers, to the ENSP.

2. If piping plovers are documented to occur within the project area, ensure that the Borough of Union Beach initiates and sustains a management program for the protection of piping plover adults and chicks during the annual nesting and brood-rearing period (approximately March 15 through August 15). A copy of the Service's "Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act" (Guidelines) and a copy of the publication entitled "Endangered Beach Nesting Bird Management on New Jersey's Municipal Beaches" are enclosed to assist the Borough in understanding its management responsibilities (Appendix D).

3. Initiate education and outreach programs within the Borough of Union Beach to ensure compliance with the Service's Guidelines. These programs should include participation by the Service and the ENSP, and should be targeted to municipal officials and staff directly responsible for recreation on municipal beaches (*e.g.*, lifeguards, law enforcement, maintenance workers).

4. If seabeach amaranth is documented to occur within the project area, coordinate with the Service to initiate and sustain a management program for the protection of this species. Management activities for this species may include use of string-and-post fencing to close areas of beach to vehicle and pedestrian traffic, outreach and education, monitoring, and participation in scientific research. The seabeach amaranth management program may be combined with the piping plover management program to be carried out by the Borough.

5. Re-initiate consultation with the Service pursuant to Section 7 of the ESA prior to subsequent beach renourishment.

If additional information on listed or proposed species becomes available or project plans change, the above determinations may be reconsidered. Information on federally listed species and candidate species for federal listing is updated continually, and new species may be added to the list of threatened and endangered plants and animals. Therefore, if the selected plan is not implemented within 1 year, the Service recommends that the Corps contact the Service to obtain an updated species list.

2. Other Species of Concern

The Service recommends including any State-listed or other beach species of concern (*i.e.*, least turn, seabeach knotweed) that may colonize the widened beach in the endangered species management program described above. The Service reiterates our above recommendations to coordinate with this office, the ENSP, and the NJNHP during the design phase to develop appropriate conservation measures for other State-listed species, such as osprey and herons.

VI. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

The Service concurs that the levee/floodwall project components have been designed to avoid and minimize wetland impacts to date, but urges the Corps to seek further minimization during the design phase. The Service concurs with the Corps selected compensatory mitigation plan to offset adverse impacts to fish and wildlife habitats and other wetland functions from the levee/floodwall. The Service requests to participate in an expanded monitoring program to ensure that the levee/floodwall does not impact the surrounding tidal marshes through adverse hydrologic effects.

The Bay Shore project component may provide benefits to certain wildlife species by widening sandy beach habitats and creating rocky substrates. The Bay Shore component will create temporary adverse effects during dredging from borrow areas, and beach, groin, and revetment construction. Using fill material of similar grain size to the existing beach is essential to ensuring a quick recovery of intertidal and nearshore fauna, and to avoiding permanent effects to this community. The Service requests to participate in an effort to assess and mitigate habitat impacts from groin and revetment construction, and to participate in an expanded monitoring program to ensure that beach nourishment does not adversely effect the surrounding tidal marshes, shellfish beds, and other sensitive habitats through sedimentation.

A summary of Service recommendations included in this final report is provided below.

1. Coordinate with this Service office, the ENSP, and the NJNHP during the design phase of project planning to avoid adverse effects to State-listed species and State species of concern through the use of appropriate conservation measures such as buffers and seasonal restrictions.

2. Survey suitable habitats in the Study area during appropriate times of year to determine presence or absence of State-listed and other sensitive plant species, using information provided by NJNHP as a basis for further inventory work.

3. Implement Plan A of Mitigation Alternative 2 to compensate for adverse impacts associated with levees, floodwalls, retention ditches, and the surge barriers and pumping stations at Flat Creek and East Creek. Provide for Service participation in monitoring of mitigation areas.

4. Continue wetland avoidance and minimization efforts during the design phase of the project, through both careful design of the proposed levee/floodwall (*i.e.*, increased use of floodwalls, and decreased use of levees), and periodic re-assessment of non-structural alternatives (*i.e.*, buy-outs, zoning).

5. Develop a strict erosion and sediment control plan for any construction activities. Erosion and sediment runoff should be minimized by conducting all construction activities on shore under dry conditions. Silt barriers should be utilized to minimize the movement of sediment.

6. Fully restore temporary wetland impacts to pre-construction grades and hydrologic conditions, and revegetate these areas with appropriate native species. Monitor the success of post-construction restoration for at least 3 years; 5 years in areas where the project impacts involve *Spartina*-dominated marsh.

7. Work with this Service office to verify a lack of hydrologic wetland impacts from levee/floodwall construction through an expanded tidal marsh monitoring plan, and develop contingency plans to rectify any adverse effects that may be documented.

8. Work with this Service office and appropriate State agencies during the design phase of the project to ensure that selected construction methods and practices minimize in-stream impacts during storm gate and sluice gate installation, and design these proposed structures to minimize hardening and other alterations of the tidal creek beds and banks.

9. Work with this Service office during the design phase of the project to characterize upland impacts (*i.e.*, acreage of disturbed land versus intact forest), and to avoid impacts to higher-quality upland wildlife habitats wherever possible.

10. Prepare and implement a plan to avoid burial of *Phragmites* rhizomes along the levee; monitor the levees, ditch/swales, and ponding areas for invasive plant and animals species for at least 5 years following construction; and take corrective control actions if invasive species are documented along the line of protection.

11. Continue to coordinate with the NMFS to conclude consultation pursuant to Section 7 of the ESA, and regarding any EFH that may be affected by the proposed action.

12. Use sand borrow material with similar grain size to that of the renourishment site to reduce chances of erosion, minimize turbidity, and promote quick recolonization by a similar faunal community to that impacted.

13. Limit ocean-side dune stabilization (*i.e.*, vegetation planting, sand fencing) to the minimum necessary for storm protection, and plant a low-density, high-diversity assemblage of native species when dune planting is required.

14. Plant the land-side of dunes with warm seasonal grasses and a mixture of salt tolerant shrubs. Coordinate with the local Soil Conservation District for guidance. Avoid non-native species, particularly invasive plants, and tress and shrubs that may provide perches for shorebird predators.

15. Work with this Service office during the design phase of the project to assess and mitigate any wetland and other impacts from the construction of groins and revetments.

16. Schedule construction of the beach, dune, and associated structures during those times of year when impacts to benthic fauna would be minimized, and to avoid impacts to breeding anadromous fish, horseshoe crabs, shorebirds, and diamondback terrapins.

17. Implement the intertidal and borrow area monitoring plans proposed in the DEIS; coordinate the results with the appropriate federal and State agencies (the Service, the NMFS, and the NJDFW Bureaus of Marine Fisheries and Shell Fisheries).

18. Minimize use of large earth-moving equipment to reduce impacts associated with beach nourishment; allow natural currents to slope the beach profile wherever feasible.

19. Mitigate any losses to shellfish beds in borrow areas and nearshore areas by increasing structure through shell placement.

20. Work with this Service office to assess and monitor down-drift sedimentation impacts from beach nourishment through an expanded coastal processes monitoring plan, and develop contingency plans to rectify any adverse effects that may be documented.

21. Select the least damaging dredging equipment and practices, and avoid creating excessively deep borrow pits, which may revert to anoxic conditions.

22. Determine if any federal (*i.e.*, NEPA, ESA, EFH assessment) or State review processes or authorizations need to be reassessed to authorize expanded use of the Sea Bright borrow area for Raritan Bay shoreline beach nourishment.

23. Amend the proposed monitoring plan for potential offshore borrow areas to include monitoring of waterfowl usage and foraging habits, and coordinate with the this office and appropriate State natural resource agencies regarding waterfowl usage before initiating dredging at new borrow areas.

24. In cooperation with the Service and the National Park Service, assess potential disruptions of regional sediment transport patterns from use of existing and proposed borrow areas to determine if any Sandy Hook shorelines may be effected.

25. Continue informal Section 7 consultation with the Service following project implementation regarding piping plovers and sea amaranth.

26. Initiate a monitoring program to survey for piping plovers and seabeach amaranth on beaches nourished by the Corps. These surveys should occur for at least 5 years after each nourishment unless suitable habitat is eliminated sooner by erosion, and the Service concurs in writing. Monitoring results should be reported to the Service and to the New Jersey Division of Fish and Wildlife's ENSP.

27. Ensure that the Borough of Union Beach initiates and sustains a piping plover management program, if piping plovers are documented to occur within the project area, for the protection of adults and chicks during the nesting and brood-rearing period.

28. Initiate an education and outreach program with the Borough of Union Beach to ensure compliance with the Service's Guidelines for protection of nesting piping plovers.

29. Coordinate with this Service office to initiate a management program for seabeach amaranth if the species is detected on the project site.

30. Re-initiate consultation with this Service office pursuant to Section 7 prior to any subsequent renourishment.

31. Contact the Service to obtain an updated list of threatened and endangered plants and animals if the selected plan is not implemented within 2 years.

32. Include State-listed and other beach species of concern in the Borough's endangered species management program.

In the July 2002 draft of this report, the Service provided 16 of the above recommendations. Some of these recommendations have been revised, and several have been added, based on new information provided in the Corps DEIS. In a letter dated August 20, 2003, the Corps concurred with most of the Service's previous 16 recommendations. As numbered above, the Corps fully concurred with recommendations 1, 3 (now modified to include Service participation in monitoring), 5, 11, 12, 17, 25, 29, 30, and 31, and partially concurred with recommendations 26, 27 and 28. The Service appreciates the Corps willingness to implement these measures for the protection of fish and wildlife, and offers the following response to the Corps August 20 comments (as numbered above).

Recommendation #1: The Corps agreed with the Service's previous recommendation to coordinate with the ENSP, and pointed out that the ENSP will have a formal comment opportunity during the State Coastal Zone Management consistency review. Despite this formal comment opportunity, the Service encourages the Corps to contact the ENSP and the NJNHP early in the design phase for additional coordination to determine appropriate conservation recommendations for State-listed and State species of concern.

Recommendation #17: The Corps concurred with the Service's previous recommendation to implement a long-term monitoring plan to evaluate project impacts to vertebrate and invertebrate species at the borrow site, nearshore, intertidal, and subtidal areas, in coordination with appropriate federal and State agencies. The Service has now had an opportunity to review the Corps proposed monitoring plans as described in the DEIS. The Service concurs with these plans, and this recommendation has been revised accordingly.

Recommendation #18: The Corps did not concur to minimize use of large earth-moving equipment. The Service's recommendation stands for the above-stated reasons.

Recommendation #19: The Corps did not agree to mitigate adverse impacts to shellfish, in part because Corps characterization studies did not find that the borrow areas contain commercially viable populations of shellfish. Shellfish provide important forage for many species of federal trust fish and birds, regardless of the commercial viability of the beds or harvest restrictions due to water quality impairments. Shellfish impacts may occur at the sand placement site as well as the borrow area; therefore, the Service's recommendation stands.

Recommendation #26: The Corps agreed to monitor widened beaches for 3 years following sand placement for the presence of piping plovers and seabeach amaranth. The Service looks forward to continuing our partnership with the Corps regarding federally listed beach species. However, the Service recommends that the Corps monitoring program continue for at least 5 years after each nourishment event, unless suitable habitat is eliminated sooner by erosion (this recommendation has been revised accordingly). In the Corps Atlantic Coast of New Jersey Beach Erosion Control Project (BECP), Sea Bright Borough to Manasquan Borough, Monmouth County, piping plovers and seabeach amaranth colonized different sections of the project area between 1 and 4 years following initial beach nourishment. Although these species are less likely to occupy bay beaches than Atlantic coast beaches, the BECP demonstrates that several years can elapse before colonization of a newly widened or created beach.

Recommendations #27 and 28: The Corps agreed to work cooperatively with the Service and Union Beach Borough to manage any federally listed species that may colonize the beach, and to conduct appropriate public education efforts. However, the Corps indicated that it lacks Congressional authority to require these measures from Union Beach. The Service maintains that the protection of federally listed species could be made a requirement of receiving federally funded hurricane and storm damage protection. Regardless, the Service looks forward to working cooperatively with the Corps and Union Beach to manage and protect any federally listed species. The Service requests that the Corps take an active lead in establishing this coordination among the Borough, the Service, and the Corps, and stresses the importance of doing so prior to project implementation. To effectively avoid adverse effects to federally listed species as required under Section 7 of the ESA, it is essential that the Corps, prior to construction, fully inform Union Beach residents and officials of the obligations and restrictions the Borough may face if the federally constructed beach should become occupied by federally listed species.

VII. REFERENCES

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B. PERSONAL COMMUNICATIONS

Burlas, M. 2003. Biologist. U.S. Army Corps of Engineer, New York District, New York, New York.

Forsell, D. 2003. Migratory Bird Biologist. Chesapeake Bay Field Office, U.S. Fish and Wildlife Service, Annapolis, Maryland.

Jenkins, D. 2002. Biologist. New Jersey Division of Fish and Wildlife, Trenton, New Jersey.

Remaud, G. 2002. Biologist. New York / New Jersey Baykeeper. Sandy Hook, New Jersey.

Stringer, M. 2002. Conservation Associate. New York / New Jersey Baykeeper. Sandy Hook, New Jersey.

APPENDIX A

Federally Listed Endangered and Threatened Species and Candidate Species in New Jersey

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW JERSEY

An ENDANGERED species is any species that is in danger of extinction throughout all or a significant portion of its range.

A THREATENED species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

	COMMON NAME	SCIENTIFIC NAME	STATUS
FISHES	Shortnose sturgeon*	*Acipenser brevirostrum*	E
REPTILES	Bog turtle	*Clemmys muhlenbergii*	T
	Atlantic Ridley turtle*	*Lepidochelys kempii*	E
	Green turtle*	*Chelonia mydas*	T
	Hawksbill turtle*	*Eretmochelys imbricata*	E
	Leatherback turtle*	*Dermochelys coriacea*	E
	Loggerhead turtle*	*Caretta caretta*	T
BIRDS	Bald eagle	*Haliaeetus leucocephalus*	T
	Piping plover	*Charadrius melodus*	T
	Roseate tern	*Sterna dougallii dougallii*	E
MAMMALS	Eastern cougar	*Felis concolor couguar*	E+
	Indiana bat	*Myotis sodalis*	E
	Gray wolf	*Canis lupus*	E+
	Delmarva fox squirrel	*Sciurus niger cinereus*	E+
	Blue whale*	*Balaenoptera musculus*	E
	Finback whale*	*Balaenoptera physalus*	E
	Humpback whale*	*Megaptera novaeangliae*	E
	Right whale*	*Balaena glacialis*	E
	Sei whale*	*Balaenoptera borealis*	E
	Sperm whale*	*Physeter macrocephalus*	E

	COMMON NAME	SCIENTIFIC NAME	STATUS
INVERTEBRATES	Dwarf wedgemussel	*Alasmidonta heterodon*	E
	Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	T
	Mitchell saytr butterfly	*Neonympha m. mitchellii*	E+
	American burying beetle	*Nicrophorus americanus*	E+
PLANTS	Small whorled pogonia	*Isotria medeoloides*	T
	Swamp pink	*Helonias bullata*	T
	Knieskern's beaked-rush	*Rhynchospora knieskernii*	T
	American chaffseed	*Schwalbea americana*	E
	Sensitive joint-vetch	*Aeschynomene virginica*	T
	Seabeach amaranth	*Amaranthus pumilus*	T

STATUS:			
E	endangered species	PE	proposed endangered
T	threatened species	PT	proposed threatened
+	presumed extirpated**		

* **Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.**

** Current records indicate the species does not presently occur in New Jersey, although the species did occur in the State historically.

Note: for a complete listing of Endangered and Threatened Wildlife and Plants, refer to 50 CFR 17.11 and 17.12.

For further information, please contact:

U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Building D
Pleasantville, New Jersey 08232
Phone: (609) 646-9310
Fax: (609) 646-0352

Revised 12/06/00

FEDERAL CANDIDATE SPECIES IN NEW JERSEY

CANDIDATE SPECIES are species that appear to warrant consideration for addition to the federal List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the U.S. Fish and Wildlife Service encourages federal agencies and other planners to give consideration to these species in the environmental planning process.

SPECIES	SCIENTIFIC NAME
Bog asphodel	***Narthecium americanum***
Hirst's panic grass	***Panicum hirstii***

Note: For complete listings of taxa under review as candidate species, refer to Federal Register Vol. 64, No. 205, October 25, 1999 (Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species).

Revised 11/99

FEDERAL CANDIDATE AND STATE-LISTED SPECIES

Candidate species are species under consideration by the U.S. Fish and Wildlife Service (Service) for possible inclusion on the List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the Service encourages federal agencies and other planners to consider federal candidate species in project planning.

The New Jersey Natural Heritage Program maintains the most up-to-date information on federal candidate species and State-listed species in New Jersey and may be contacted at the following address:

Coordinator
Natural Heritage Program
Division of Parks and Forestry
P.O. Box 404
Trenton, New Jersey 08625
(609) 984-0097

Additionally, information on New Jersey's State-listed wildlife species may be obtained from the following office:

Dr. Larry Niles
Endangered and Nongame Species Program
Division of Fish and Wildlife
P.O. Box 400
Trenton, New Jersey 08625
(609) 292-9400

If information from either of the aforementioned sources reveals the presence of any federal candidate species within a project area, the Service should be contacted to ensure that these species are not adversely affected by project activities.

Revised 07/03

APPENDIX B

National Marine Fisheries Service Correspondence of March 26, 1999 Regarding Federally Listed Species and Managed Species Under NMFS Jurisdiction in the Project Area

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

MAR 26 1999

Mr. Frank Santomauro, P.E.
Chief, Planning Division
Department of the Army
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0900

Dear Mr. Santomauro:

Reference is made to your letter dated November 5, 1998 requesting informal consultation pursuant to Section 7 of the Endangered Species Act for the Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey Combined Erosion Control and Shoreline Protection Project. The Scoping Document included with your letter indicates that beach nourishment is a component of the proposed project. As a result, the potential impacts to the nearshore shallows of Raritan Bay and any offshore borrow sites must be addressed in the environmental documentation for this project. Additional comments have been provided on this project in our letter dated September 2, 1998.

Several species of sea turtles and marine mammals, such as the threatened loggerhead sea turtle (Caretta caretta), and the endangered Kemp's ridley (Lepidochelys kempii), green (Chelonia mydas) and leatherback (Dermochelys coriacea), may be in the project area from June through November. Endangered right whales (Eubalaena glacialis) and humpback whales (Megaptera novaeangliae) may be found in coastal waters of New Jersey during the late winter through early spring. Fin whales (Balaenoptera physalus), the most likely species to occur in the coastal waters of New Jersey, may also be found in the area year round.

Recent information indicates a potential for interactions between federally protected species and dredging activities in the Bight Apex. Hopper dredges conducting maintenance dredging in the federal navigation channels in Delaware Bay and in the southeast have lethally taken sea turtles. In August 1997, a loggerhead sea turtle (Caretta caretta) was taken lethally by a hopper dredge conducting beach nourishment off Monmouth County, New Jersey. Thus, the use of hopper dredges in the New York Bight Apex when sea turtles may be present necessitates initiation of formal Section 7 consultation.

In December 1995, the National Marine Fisheries Service (NMFS) issued a Biological Opinion for Beach Nourishment Projects - South Shore of Long Island and Northern New Jersey Shore, Sandy Hook to Manasquan. Several potential borrow sites for the beach nourishment projects were identified in the biological opinion. The individual and cumulative effects of the use of the identified borrow sites on federally protected sea turtles and marine mammals have been evaluated in this document and an Incidental Take Statement was issued. However, because the Army Corps of Engineers (ACOE) has not identified a borrow site or the quantity of sand needed for this project, we cannot determine if this project is within the scope of the existing biological opinion. As a result, a final determination on ESA issues cannot be made. Based upon the available information, we recommend that the ACOE prepare a biological assessment for all the proposed shore protection/flood control projects planned for the Raritan and Sandy Hook bayshore area. We will continue to coordinate with your office as more project specific details become available to insure compliance with Section 7 of the ESA.

The 1996 Sustainable Fisheries Act amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) require the designation of essential fish habitat (EFH) for federally managed species of fish and shellfish. A list of species for which EFH will be designated in the Northeast is attached. The EFH designations for the New England Fishery Management Council's Northeast Mulitspecies Fisheries Management Plan have been approved, and the remaining designations are scheduled to be approved this spring. Under the provisions of the MSFMCA, federal agencies are required to consult with the NMFS regarding any action they authorize, fund, or undertake that may adversely affect EFH. Final and preliminary designations indicate that the EFH for several species, including winter flounder (Pleuronectes americanus), summer flounder (Paralichthys dentatus), windowpane flounder (Scophthalmus aquosus), black sea bass (Centropristis striata), scup (Stenotomus chrysops), Atlantic cod (Gadus morhua), Atlantic herring (Clupea harengus), Atlantic butterfish (Peprilus triacanthus), monkfish (Lophius americanus) red hake (Urophycis chuss), whiting (Merluccius bilinearis), witch flounder (Glyptocephalus cynoglossus), yellowtail flounder (Pleuronectes ferrugineus), bluefish (Pomatomus saltatrix), dusky shark (Carcharhinus obscurus), sandbar shark (Carcharhinus plumbeus), tiger shark (Galeocerdo cuvier) and surf clams (Spisula solidissima), may be designated either in the project area or at the offshore borrow sites. As a result, the impacts of the project on EFH must be addressed. We will continue to work with your staff as the EFH designations are finalized to insure compliance with the EFH consultation requirements.

We look forward to continued coordination with your office on this project. If you would like to discuss this matter further, please contact Ms. Karen Greene at our Sandy Hook field office at 732-872-3023.

Sincerely,

Jon C. Rittgers
Acting Regional Administrator

Attachment

kmg:unionbch.rc 992

cc: EPA - Region II
FWS - Pleasantville
NJDEP - Land Use
Milford - Haley

ATTACHMENT A

NORTHEAST REGION

LIST OF MANAGED SPECIES FOR WHICH ESSENTIAL FISH HABITAT HAS BEEN DESIGNATED

New England Fisheries Management Council
American plaice - *Hippoglossoides platessoides*
Atlantic cod - *Gadus morhua*
Atlantic halibut - *Hippoglossus hippoglossus*
Atlantic herring - *Clupea harengus*
Atlantic salmon - *Salmo salar*
Atlantic sea scallop - *Placopecten magellanicus*
haddock - *Melanogrammus aeglefinus*
monkfish (goosefish)- *Lophius americanus*
offshore hake - *Merluccius alibidus*
ocean pout - *Macrozoarces americanus*
pollock - *Pollachius virens*
redfish - *Sebastes marinus*
red hake - *Urophycis chuss*
silver hake (whiting) - *Merluccius bilinearis*
white hake - *Urophycis tenuis*
windowpane flounder - *Scophthalmus aquosus*
winter flounder - *Pleuronectes americanus*
witch flounder - *Glyptocephalus cynoglossus*
yellowtail flounder -*Pleuronectes ferrugineus*

Mid-Atlantic Fisheries Management Council
Atlantic butterfish - *Peprilus triacanthus*
Atlantic mackerel - *Scomber scombrus*
black sea bass - *Centropristis striata*
bluefish - *Pomatomus saltatrix*
long finned squid - *Loligo pealei*
ocean quahog - *Arctica islandica*
scup - *Stenotomus chrysops*
short finned squid - *Illex illecebrosus*
spiny dogfish - *Squalus acanthias*
summer flounder - *Paralichthys dentatus*
surf clam - *Spisula solidissima*
tilefish - *Lopholatilus chamaeleonticeps*

National Marine Fisheries Service Highly Migratory Species
albacore - *Thunnus alalunga*
bigeye tuna - *Thunnus obesus*
bluefin tuna - *Thunnus thynnus*
Skipjack tuna - *Katsuwonus pelamis*
swordfish - *Ziphias gladius*

yellowfin tuna - *Thunnus albacares*
blue marlin - *Makaira nigricans*
white marlin - *Tetrapturus albidus*
<u>Sharks</u>
tiger - *Galeocerdo cuvier*
scalloped hammerhead - *Sphyrna lewini*
sandbar - *Carcharhinus plumbeus*
sand tiger - *Odontaspis taurus*
dusky -*Carcharhinus obscurus*
basking - *Cetorhinus maximus*
silky - *Carcharhinus falciformis*
white - *Carcharodon carcharias*
Atlantic sharpnose - *Rhizoprionodon terraenovae*
Atlantic angel - *Squatina dumerili*
shortfin mako - *Isurus oxyrinchus*
longfin mako - *Isurus paucus*
porbeagle - *Lamma nasus*
thresher - *Alopias vulpinus*
blue - *Prionace glauca*

South Atlantic Fisheries Management Council
cobia - *Rachycentron canadum*
golden crab - *Chaeceon fenneri*
king mackerel - *Scomberomorus cavalla*
red drum - *Sciaenops ocellatus*
Spanish mackerel - *Scomberomorus maculatus*

APPENDIX C

State-Listed Endangered and Threatened Species in New Jersey and Office of Natural Lands Management's Natural Heritage Program Rare Species Information

New Jersey Division of Fish and Wildlife

Conserve Wildlife
N.J. Division of Fish & Wildlife
Endangered & Nongame Species Program

Endangered and Threatened Wildlife of New Jersey

Endangered Species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in New Jersey.

Threatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate.

Species names link to PDF documents containing identification, habitat, and status and conservation information. Use the Adobe Acrobat Reader to view and print these documents. The Reader is available free from Adobe's Web site.

BIRDS			
Endangered		**Threatened**	
Bittern, American	*Botaurus lentiginosos* BR	Bobolink	*Dolichonyx oryzivorus* BR
Eagle, bald	*Haliaeetus leucocephalus* BR **	Eagle, bald	*Haliaeetus leucocephalus* NB **
Falcon, peregrine	*Falco peregrinus*	Hawk, Cooper's	*Accipiter cooperii*
Goshawk, northern	*Accipiter gentilis* BR	Hawk, red-shouldered	*Buteo lineatus* NB
Grebe, pied-billed	*Podilymbus podiceps**	Night-heron, black-crowned	*Nycticorax nycticorax* BR
Harrier, northern	*Circus cyaneus* BR	Night-heron, yellow-crowned	*Nyctanassa violaceus*
Hawk, red-shouldered	*Buteo lineatus* BR	Knot, red	*Calidris canutus* BR
Owl, short-eared	*Asio flammeus* BR	Osprey	*Pandion haliaetus* BR
Plover, piping	*Charadrius melodus***	Owl, barred	*Strix varia*
Sandpiper, upland	*Batramia longicauda*	Owl, long-eared	*Asio otus*
Shrike, loggerhead	*Lanius ludovicianus*	Rail, black	*Laterallus jamaicensis*
Skimmer, black	*Rynchops niger* BR	Skimmer, black	*Rynchops niger* NB
Sparrow, Henslow's	*Ammodramus henslowii*	Sparrow, grasshopper	*Ammodramus savannarum* BR
Sparrow, vesper	*Pooecetes gramineus* BR	Sparrow, Savannah	*Passerculus sandwichensis* BR
Tern, least	*Sterna antillarum*	Sparrow, vesper	*Pooecetes gramineus* NB
Tern, roseate	*Sterna dougallii***	Woodpecker, red-headed	*Melanerpes erythrocephalus*
Wren, sedge	*Cistothorus platensis*		
**Federally endangered or threatened			
BR - Breeding population only; NB - non-breeding population only			

REPTILES			
Endangered		**Threatened**	
Rattlesnake, timber	*Crotalus h. horridus*	Snake, northern pine	*Pituophis m. melanoleucus*
Snake, corn	*Elaphe g. guttata*	Turtle, Atlantic green	*Chelonia mydas***
Turtle, bog	*Clemmys muhlenbergii***	Turtle, wood	*Clemmys insculpta*
Atlantic hawksbill	*Eretmochelys imbricata***		
Atlantic leatherback	*Dermochelys coriacea***		
Atlantic loggerhead	*Caretta caretta***		
Atlantic Ridley	*Lepidochelys kempi***		
**Federally endangered or threatened			

AMPHIBIANS			
Endangered		**Threatened**	
Salamander, blue-spotted	*Ambystoma laterale*	Salamander, eastern mud	*Pseudotriton montanus*
Salamander, eastern tiger	*Ambystoma tigrinum*	Salamander, long-tailed	*Eurycea longicauda*
Salamander, Tremblay's	*Ambystoma tremblayi*		
Treefrog, pine barrens	*Hyla andersonii*		
Treefrog, southern gray	*Hyla chrysocelis*		

INVERTEBRATES			
Endangered		**Threatened**	
Beetle, American burying	*Nicrophorus mericanus***	Elfin, frosted (butterfly)	*Callophrys irus*
Beetle, northeastern beach tiger	*Cincindela d. dorsalis***	Floater, triangle (mussel)	*Alasmidonta undulata*
Copper, bronze	*Lycaena hyllus*	Fritillary, silver-bordered (butterfly)	*Bolaria selene myrina*
Floater, brook (mussel)	*Alasmidonta varicosa*	Lampmussel, eastern (mussel)	*Lampsilis radiata*
Floater, green (mussel)	*Lasmigona subviridis*	Lampmussel, yellow (mussel)	*Lampsilis cariosa*
Mussel, dwarf wedge	*Alasmidonta heterodon***	Mucket, tidewater (mussel)	*Leptodea ochracea*
Satyr, Mitchell's (butterfly)	*Neonympha m. mitchellii***	Pondmussel, eastern (mussel)	*Ligumia nasuta*
Skipper, arogos (butterfly)	*Atrytone arogos arogos*	White, checkered (butterfly)	*Pontia protodice*
...r, Appalachian grizzled (butterfly)	*Pyrgus wyandot*		

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
Division of Parks and Forestry
Office of Natural Lands Management
Natural Heritage Program
P.O. Box 404
Trenton, NJ 08625-0404
Tel. #609-984-1339
Fax. #609-984-1427

Robert C. Shinn, Jr.
Commissioner

March 1, 2000

Brad Schaeffer
Northern Ecological Associates, Inc.
451 Presumpscot Street
Portland, ME 04103

Re: USACOE Union Beach Flood Control Project

Dear Mr. Schaeffer:

Thank you for your data request regarding rare species information for the above referenced project site in Union Beach and Keyport Boroughs, Monmouth County.

The Natural Heritage Data Base has records for occurrences of migratory shorebird concentration site that may be on the site, for osprey that may be on or in the immediate vicinity of the site, and another occurrence for osprey that may be in the immediate vicinity of the site. The attached lists provide more information about these occurrences. **Because some species are sensitive to disturbance or sought by collectors, this information is provided to you on the condition that no specific locational data are released to the general public. This is not intended to preclude your submission of this information to regulatory agencies from which you are seeking permits.**

Also attached is a list of rare species from records in the general vicinity of the project site (within approximately two miles). This includes the rare occurrences located on and in the immediate vicinity of the site. Also attached is a list of rare species and natural communities that have been documented from Monmouth County. This county list can be used as a master species list for directing further inventory work. If suitable habitat is present at the project site, these species have potential to be present. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend you contact the Division of Fish, Game and Wildlife, Endangered and Nongame Species Program.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Thomas F. Breden
Supervisor

cc: Lawrence Niles
Thomas Hampton
NHP File No. 00-4007442

28 FEB 2000

POSSIBLY O… …ECT SITE

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
*** Other types									
MIGRATORY SHOREBIRD CONCENTRATION SITE	MIGRATORY SHOREBIRD CONCENTRATION SITE				G?	S?	1982-10-??	Y	MOUTH OF CHINGARORA CREEK ON RARITAN BAY, AT NORTHEAST BOUNDARY OF KEYPORT BORO. WITHIN KEYPORT HARBOR.

1 Records Processed

28 FEB 2000

IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
*** Vertebrates									
PANDION HALIAETUS	OSPREY		T/T		G5	S2B	1987-??-??	Y	LOCATED AT THE END OF THE SPIT BETWEEN CONASKONK PT. AND POINT COMFORT.

1 Records Processed

EXPLANATIONS OF CODES USED IN NATURAL HERITAGE REPORTS

F \L STATUS CODES

The following U.S. Fish and Wildlife Service categories and their definitions of endangered and threatened plants and animals have been modified from the U.S. Fish and Wildlife Service (F.R. Vol. 50 No. 188; Vol. 61, No. 40; F.R. 50 CFR Part 17). Federal Status codes reported for species follow the most recent listing.

LE Taxa formally listed as endangered.

LT Taxa formally listed as threatened.

PE Taxa already proposed to be formally listed as endangered.

PT Taxa already proposed to be formally listed as threatened.

C Taxa for which the Service currently has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.

S/A Similarity of appearance species.

STATE STATUS CODES

Two animal lists provide state status codes after the Endangered and Nongame Species Conservation Act of 1973 (NSSA 23:2A-13 et. seq.): the list of er red species (N.J.A.C. 7:25-4.13) and the list defining status of indigenous, nongame wildlife species of New Jersey (N.J.A.C. 7:25-4.17(a)). The st. animal species is determined by the Nongame and Endangered Species Program (ENSP). The state status codes and definitions provided reflect the most recent lists that were revised in the New Jersey Register, Monday, June 3, 1991.

D Declining species-a species which has exhibited a continued decline in population numbers over the years.

E Endangered species-an endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.

EX Extirpated species-a species that formerly occurred in New Jersey, but is not now known to exist within the state.

I Introduced species-a species not native to New Jersey that could not have established itself here without the assistance of man.

INC Increasing species-a species whose population has exhibited a significant increase, beyond the normal range of its life cycle, over a long term period.

T Threatened species-a species that may become endangered if conditions surrounding the species begin to or continue to deteriorate.

P Peripheral species-a species whose occurrence in New Jersey is at the extreme edge of its present natural range.

S Stable species-a species whose population is not undergoing any long-term increase/decrease within its natural cycle.

U Undetermined species-a species about which there is not enough information available to determine the status.

Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2 Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

S3 Rare in state with 21 to 100 occurrences (plant species in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.

S4 Apparently secure in state, with many occurrences.

S5 Demonstrably secure in state and essentially ineradicable under present conditions.

SA Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded; examples include European strays or western birds on the East Coast and vice-versa.

SE Elements that are clearly exotic in New Jersey including those taxa not native to North America (introduced taxa) or taxa deliberately or accidentally introduced into the State from other parts of North America (adventive taxa). Taxa ranked SE are not a conservation priority (viable introduced occurrences of G1 or G2 elements may be exceptions).

SH Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains, historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work.

SP Element has potential to occur in New Jersey, but no occurrences have been reported.

SR Elements reported from New Jersey, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. In some instances documentation may exist, but as of yet its source or location has not been determined.

SRF Elements erroneously reported from New Jersey, but this error persists in the literature.

SU Elements believed to be in peril but the degree of rarity uncertain. Also included are rare taxa of uncertain taxonomical standing. More information is needed to resolve rank.

SX Elements that have been determined or are presumed to be extirpated from New Jersey. All historical occurrences have been searched and a reasonable search of potential habitat has been completed. Extirpated taxa are not a current conservation priority.

SXC Elements presumed extirpated from New Jersey, but native populations collected from the wild exist in cultivation.

SZ Not of practical conservation concern in New Jersey, because there are no definable occurrences, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped and

MONMOUTH COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

THE NEW JERSEY NATURAL HERITAGE DATABASE

	NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
Vertebrates							
	ACCIPITER COOPERII	COOPER'S HAWK		T/T		G5	S3B,S4N
	AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/S		G5	S2B
	BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		G5	S1B
	CHARADRIUS MELODUS	PIPING PLOVER	LT	E		G3	S1B
	CLEMMYS INSCULPTA	WOOD TURTLE		T		G4	S3
	CLEMMYS MUHLENBERGII	BOG TURTLE	LT	E		G3	S2
	CROTALUS HORRIDUS HORRIDUS	TIMBER RATTLESNAKE		E		G4T4	S2
	DOLICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2B
	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	E		G4	S1B,S2N
	HYLA ANDERSONII	PINE BARRENS TREEFROG		E		G4	S3
	MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		T/T		G5	S2B,S2N
	NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON		T/T		G5	S2B
	PANDION HALIAETUS	OSPREY		T/T		G5	S2B
	PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2B,S4N
	PITUOPHIS MELANOLEUCUS MELANOLEUCUS	NORTHERN PINE SNAKE		T		G4T4	S3
	PODILYMBUS PODICEPS	PIED-BILLED GREBE		E/S		G5	S1B,S3N
	POOECETES GRAMINEUS	VESPER SPARROW		E		G5	S1B,S2N
	RYNCHOPS NIGER	BLACK SKIMMER		E		G5	S1B
	STERNA ANTILLARUM	LEAST TERN		E		G4	S1B
	STRIX VARIA	BARRED OWL		T/T		G5	S3B
Ecosystems							
	COASTAL DUNE WOODLAND	COASTAL DUNE WOODLAND				G2G3	S1
	FLOODPLAIN FOREST	FLOODPLAIN FOREST				G4	S3?
	MARITIME FOREST	MARITIME FOREST				G3?	S1
Invertebrates							
	APAMEA APAMIFORMIS	A NOCTUID MOTH				G4	S2S4

MONMOUTH COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
CALAMAGROSTIS PICKERINGII	PICKERING'S REEDGRASS		E		G4	S1
CALAMOVILFA BREVIPILIS	PINE BARREN REEDGRASS			LP	G4	S4
CAREX BARRATTII	BARRATT'S SEDGE			LP	G3G4	S4
CAREX CUMULATA	CLUSTERED SEDGE		E		G4?	SH
CAREX POLYMORPHA	VARIABLE SEDGE		E		G3	S1
CERATOPHYLLUM ECHINATUM	SPINY COONTAIL		E		G4?	S1
CRATAEGUS CALPODENDRON	PEAR HAWTHORN		E		G5	S1
CRATAEGUS SUCCULENTA	FLESHY HAWTHORN		E		G5	S1
CYPERUS LANCASTRIENSIS	LANCASTER FLATSEDGE				G5	S1
CYPERUS POLYSTACHYOS	COAST FLATSEDGE		E		G5	S1
DESMODIUM HUMIFUSUM	TRAILING TICK-TREFOIL		E		G1G2Q	SH
DIODIA VIRGINIANA	LARGER BUTTONWEED		E		G5	S1
DIRCA PALUSTRIS	LEATHERWOOD				G4	S2
ERIOCAULON PARKERI	PARKER'S PIPEWORT				G3	S2
FRAXINUS PROFUNDA	PUMPKIN ASH		E		G4	S1
GENTIANA AUTUMNALIS	PINE BARREN GENTIAN			LP	G3	S3
GLAUX MARITIMA	SEA-BEACH MILKWORT		E		G5	SH
HELONIAS BULLATA	SWAMP-PINK	LT	E	LP	G3	S3
HYDROCOTYLE VERTICILLATA	WHORLED PENNYWORT				G5	S2
JUNCUS CAESARIENSIS	NEW JERSEY RUSH		E	LP	G2	S2
LIATRIS SCARIOSA VAR. NOVAE-ANGLIAE	NORTHERN BLAZING STAR		E		G5?T3	SH
LIMOSELLA SUBULATA	MUDWEED		E		G4?	S1
LINUM INTERCURSUM	SANDPLAIN FLAX		E		G4	S1
LISTERA AUSTRALIS	SOUTHERN TWAYBLADE			LP	G4	S2
LUZULA ACUMINATA	HAIRY WOODRUSH		E		G5	S1
LYGODIUM PALMATUM	CLIMBING FERN			LP	G4	S2
MYRIOPHYLLUM TENELLUM	SLENDER WATER-MILFOIL		E		G5	S1
ONOSMODIUM VIRGINIANUM	VIRGINIA FALSE-GROMWELL		E		G4	S1
PHORADENDRON SEROTINUM	MISTLETOE			LP	G5	S2

APPENDIX D

Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act and Endangered Beach Nesting Bird Management on New Jersey's Municipal Beaches

GUIDELINES FOR MANAGING RECREATIONAL ACTIVITIES IN PIPING PLOVER BREEDING HABITAT ON THE U.S. ATLANTIC COAST TO AVOID TAKE UNDER SECTION 9 OF THE ENDANGERED SPECIES ACT

Northeast Region, U.S. Fish and Wildlife Service
April 15, 1994

The following information is provided as guidance to beach managers and property owners seeking to avoid potential violations of Section 9 of the Endangered Species Act (16 U.S.C. 1538) and its implementing regulations (50 CFR Part 17) that could occur as the result of recreational activities on beaches used by breeding piping plovers along the Atlantic Coast. These guidelines were developed by the Northeast Region, U.S. Fish and Wildlife Service (Service), with assistance from the U.S. Atlantic Coast Piping Plover Recovery Team. The guidelines are advisory, and failure to implement them does not, of itself, constitute a violation of the law. Rather, they represent the Service's best professional advice to beach managers and landowners regarding the management options that will prevent direct mortality, harm, or harassment of piping plovers and their eggs due to recreational activities.

Some land managers have endangered species protection obligations under Section 7 of the Endangered Species Act (see section I below) or under Executive Orders 11644 and 11989[1] that go beyond adherence to these guidelines. Nothing in this document should be construed as lack of endorsement of additional piping plover protection measures implemented by these land managers or those who are voluntarily undertaking stronger plover protection measures.

This document contains four sections: (I) a brief synopsis of the legal requirements that afford protection to nesting piping plovers; (II) a brief summary of the life history of piping plovers and potential threats due to recreational activities during the breeding cycle; (III) guidelines for protecting piping plovers from recreational activities on Atlantic Coast beaches; and (IV) literature cited.

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[1] Executive Order 11644, Use of Off-Road Vehicles on the Public Lands and Executive Order 11989, Off-Road Vehicles on Public Lands pertain to lands under custody of the Secretaries of Agriculture, Defense, and Interior (except for Indian lands) and certain lands under the custody of the Tennessee Valley Authority.

Section 10 also allows permits to be issued for take that is "incidental to, and not the purpose carrying out an otherwise lawful activity" if the Service determines that certain conditions have been met. An applicant for an incidental take permit must prepare a conservation plan that specifies the impacts of the take, steps the applicant will take to minimize and mitigate the impacts, funding that will be available to implement these steps, alternative actions to the take that the applicant considered, and the reasons why such alternatives are not being utilized.

Section 7 of the ESA may be pertinent to beach managers and landowners in situations that have a Federal nexus. Section 7 requires Federal agencies to consult with the Service (or National Marine Fisheries Service for marine species) prior to authorizing, funding, or carrying out activities that may affect listed species. Section 7 also requires that these agencies use their authorities to further the conservation of listed species. Section 7 obligations have caused Federal land management agencies to implement piping plover protection measures that go beyond those required to avoid take, for example by conducting research on threats to piping plovers. Other examples of Federal activities that may affect piping plovers along the Atlantic Coast, thereby triggering Section 7 consultation, include mits for beach nourishment or disposal of dredged material (U.S. Army Corps of gineers) and funding of beach restoration projects (Federal Emergency Management Authority).

Piping plovers, as well as other migratory birds such as least terns, common terns, American oystercatchers, laughing gulls, herring gulls, and great black-backed gulls, their nests, and eggs are also protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712). Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting such conduct. Violators may be fined up to $5000 and/or imprisoned for up to six months.

Almost all States within the breeding range of the Atlantic Coast piping plover population list the species as State threatened or endangered (Northeast Nongame Technical Committee 1993). Various laws and regulations may protect State-listed species from take, but the Service has not ascertained the adequacy of the guidelines presented in this document to meet the requirements of any State law.

Strauss 1990). Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (Ammophila breviligulata) or other vegetation (Patterson 1988, Flemming et al. 1990, MacIvor 1990). Plover nests may be very difficult to detect, especially during the 6-7 day egg-laying phase when the birds generally do not incubate (Goldin 1994).

Plover foods consist of invertebrates such as marine worms, fly larvae, beetles, crustaceans or mollusks (Bent 1929, Cairns 1977, Nicholls 1989). Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines[4], and shorelines of coastal ponds, lagoons or salt marshes (Gibbs 1986, Coutu et al. 1990, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu et al. 1990, McConnaughey et al. 1990, Loegering 1992, Goldin 1993, Hoopes 1993) and by stage in the breeding cycle (Cross 1990). Adults and chicks on a given site may use different feeding habitats in varying proportion (Goldin et al. 1990). Feeding activities of chicks may be particularly important to their survival. Cairns (1977) found that piping plover chicks typically tripled their weight during the first two weeks post-hatching; chicks that failed to achieve at least 60% of this weight gain by day 12 were unlikely to survive. During courtship, nesting, and brood rearing, feeding territories are generally contiguous to nesting territories (Cairns 1977), although instances where brood-rearing areas are widely separated from nesting territories are not uncommon (see Table 1). Feeding activities of both adults and chicks may occur during all hours of the day and night (Burger 1993) and at all stages in the tidal cycle (Goldin 1993, Hoopes 1993).

THREATS FROM NONMOTORIZED BEACH ACTIVITIES

Sandy beaches that provide nesting habitat for piping plovers are also attractive recreational habitats for people and their pets. Nonmotorized recreational activities can be a source of both direct mortality and harassment of piping plovers. Pedestrians on beaches may crush

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[4] Wrack is organic material including seaweed, seashells, driftwood and other materials deposited on beaches by tidal action.

r ' intertidal zone. These movements place chicks in the paths of vehicles driving along the , or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Eddings et al. 1990, Strauss 1990, Howard et al. 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes et al. 1992, Goldin 1993). Wire fencing placed around nests to deter predators (Rimmer and Deblinger 1990, Melvin et al. 1992) is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed (see Table 1).

Vehicles may also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes et al. 1992, Goldin 1993).

III. GUIDELINES FOR PROTECTING PIPING PLOVERS FROM RECREATIONAL DISTURBANCE

The Service recommends the following protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks.

MANAGEMENT OF NONMOTORIZED RECREATIONAL USES

On beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users are present in numbers that could harm or disturb incubating plovers, their eggs, or chicks, areas of at least 50 meter-radius around nests above the high tide line should be delineated with warning signs and symbolic fencing[5]. Only persons engaged in rare species monitoring, management, or research activities should enter posted areas. These areas should remain fenced as long as viable eggs or unfledged chicks are present. Fencing is intended to prevent accidental crushing of nests and repeated flushing of

[5] "~ymbolic fencing" refers to one or two strands of light-weight string, tied between posts to eate areas where pedestrians and vehicles should not enter.

Pets should be leashed and under control of their owners at all times from April 1 to August 31 on beaches where piping plovers are present or have traditionally nested. Pets should be prohibited on these beaches from April 1 through August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.

Kite flying should be prohibited within 200 meters of nesting or territorial adult or unfledged juvenile piping plovers between April 1 and August 31.

Fireworks should be prohibited on beaches where plovers nest from April 1 until all chicks are fledged.

MOTOR VEHICLE MANAGEMENT

The Service recommends the following minimum protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks on beaches where vehicles are permitted. Since restrictions to protect unfledged chicks often impede vehicle access along a barrier spit, a number of management options affecting the timing and size of vehicle closures are presented here. Some of these options are contingent on implementation of intensive plover monitoring and management plans by qualified biologists. It is recommended that landowners seek concurrence with such monitoring plans from either the Service or the State wildlife agency.

Protection of Nests

All suitable piping plover nesting habitat should be identified by a qualified biologist and delineated with posts and warning signs or symbolic fencing on or before April 1 each year. All vehicular access into or through posted nesting habitat should be prohibited. However, prior to hatching, vehicles may pass by such areas along designated vehicle corridors established along the outside edge of plover nesting habitat. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers are disturbed by passing or parked vehicles, or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

P tection of Chicks

Sections of beaches where unfledged piping plover chicks are present should be temporarily closed to all vehicles not deemed essential. (See the provisions for essential vehicles below.) Areas where vehicles are prohibited should include all dune, beach, and intertidal habitat within the chicks' foraging range, to be determined by either of the following methods:

1. The vehicle free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 2000 meter-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles.

OR

2. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:

A. Provides for monitoring of all broods during the chick-rearing phase of the breeding season and specifies the frequency of monitoring.

AND

B. Specifies the minimum size of vehicle-free areas to be established in the vicinity of unfledged broods based on the mobility of broods observed on the site in past years and on the frequency of monitoring. Unless substantial data from past years show that broods on a site stay very close to their nest locations, vehicle-free areas should extend at least 200 meters on each side of the nest site during the first week following hatching. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, but in no case should it be reduced to less than 100 meters on each

OR

2) Without intensive monitoring: Restrictions should begin on May 15 (the earliest probable hatch date). If the nest is discovered after May 15, then restrictions should start immediately.

If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If ruts are present that are deep enough to restrict movements of plover chicks, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

Essential Vehicles

Because it is impossible to completely eliminate the possibility that a vehicle will accidently crush an unfledged plover chicks, use of vehicles in the vicinity of broods should be avoided whenever possible. However, the Service recognizes that life-threatening situations on the beach may require emergency vehicle response. Furthermore, some "essential vehicles" may be required to provide for safety of pedestrian recreationists, law enforcement, maintenance of public property, or access to private dwellings not otherwise accessible. On large beaches, maintaining the frequency of plover monitoring required to minimize the size and duration of vehicle closures may necessitate the use of vehicles by plover monitors.

Essential vehicles should only travel on sections of beaches where unfledged plover chicks are present if such travel is absolutely necessary and no other reasonable travel routes are available. All steps should be taken to minimize number of trips by essential vehicles through chick habitat areas. Homeowners should consider other means of access, eg. by foot, water, or shuttle services, during periods when chicks are present.

The following procedures should be followed to minimize the probability that chicks will be crushed by essential (non-emergency) vehicles:

some unusual circumstances, Service or State biologists may recognize situations where ..s guidance provides insufficient protection for piping plovers or their nests. In such a case, the Service or the State wildlife agency may provide written notice to the landowner describing additional measures recommended to prevent take of piping plovers on that site.

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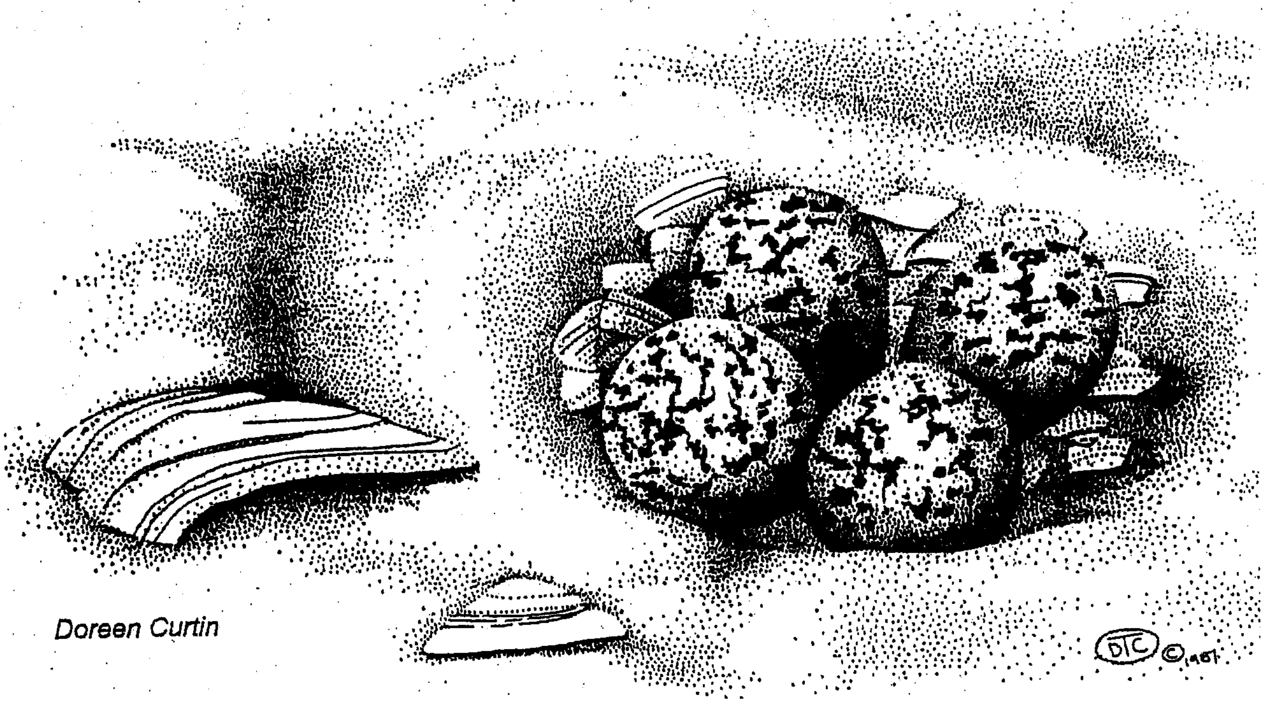
Endangered Beach Nesting Bird Management on New Jersey's Municipal Beaches

United States Department of the Interior
Fish and Wildlife Service

New Jersey Department of Environmental Protection
Division of Fish, Game and Wildlife
Endangered and Nongame Species Program



Doreen Curtin

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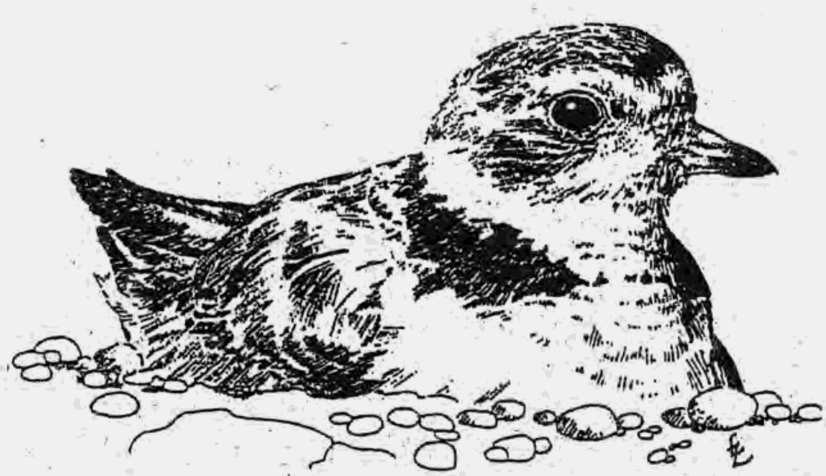


Louise Zemaitis

Beach Nesting Bird Management

Clay Meyers

Effective partnerships with municipal public beach managers is integral to the success of beach nesting birds.

The New Jersey Division of Fish, Game and Wildlife has been managing beach nesting birds since the mid 1970s. Over the past two decades the intensity of protective management has increased along with the recreational pressures affecting the birds. Many conservation organizations, agencies, and volunteers provide assistance in all aspects of protection and management.

The U.S. Fish and Wildlife Service has established recovery goals for the Atlantic Coast piping plover population. New Jersey's management and protection efforts are designed to meet these goals. The Division of Fish, Game and Wildlife's Endangered and Nongame Species Program has set a population objective for least terns and black skimmers of at least 2,000 birds of each species distributed over traditional nesting areas.

Wildlife managers employ a wide variety of techniques to increase the nesting success of the beach nesting birds. Investigating new approaches for providing better protection to the birds while providing for recreational interests of the public is an ongoing process. Effective partnerships with municipal and public beach managers is integral to the success of the Endangered Beach Nesting Bird Management Program.

Restricting Access

Wildlife managers and volunteers erect symbolic fencing (posts, string, and flagging) around traditional nesting areas and individual nests. Snow fence is occasionally used to create corridors in areas of heavy human use to direct traffic around or through nesting areas. Wildlife managers also use wire pasture fence to surround large colonies of birds to provide increased protection from predators and human disturbance. "Area Closed" signs are posted around nesting area perimeters to alert the public to the nesting birds.

Patrolling

Biologists monitor beaches at least once a week to check for nests, observe incubating birds, and document the progress of the chicks. Volunteers and wildlife managers patrol nesting areas on weekends and holidays to reduce the potential for trespassing into the nesting areas and harassment of the birds. New Jersey Division of Fish, Game and Wildlife Conservation Officers and U.S. Fish and Wildlife Service personnel frequently patrol nesting areas as well.

Regulations Protecting Beach Nesting Birds

Beach nesting birds and their habitats are protected by state and federal regulations. The piping plover, least tern, and black skimmer are protected by the New Jersey Endangered Species Conservation Act (NJESCA). As a federally listed species, the piping plover is additionally protected by the provisions of the federal Endangered Species Act (ESA) of 1973 (97 Stat. 884, as amended: 16 U.S.C. 1531 et. seq.).

Regulations that Prohibit Harming or Harassing Beach Nesting Birds

Federal Regulations

Section 9 (a)(1) of the ESA affords protection to endangered species by prohibiting "take." The ESA defines "take" to include harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect; or to attempt to engage in any of these activities. U.S. Fish and Wildlife Service regulations that codify provisions of the ESA (50 CFR Part 17) further define "harass" to mean any intentional or negligent act or omission which creates the likelihood of injury to protected wildlife. "Harm" is defined as any act which actually kills or injures wildlife. Violations of Section 9 of the ESA can be prosecuted as criminal or civil offenses and are punishable by fines up to $25,000.00 or prison terms up to one year per violation.

State Regulations

The NJESCA (NJSA 23:2A-6) extends protection to all three species of beach nesting birds. It is similar to federal legislation by prohibiting taking of any regulated nongame animal species. By definition, "taking" includes harassment, disturbance, or destruction of nests, eggs, or chicks of any beach nesting bird species. Violations of the NJESCA are punishable by fines of from $100.00 to $3,000.00 per violation.

Regulations that Protect the Habitat of Beach Nesting Birds

Federal Regulations

Section 7(a)(2) of the ESA affords protection to piping plover habitat by requiring every federal agency, in consultation with the U.S. Fish and Wildlife Service, to insure that any action a federal agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of listed species. The most common application of this provision of the ESA relevant to beach nesting birds deals with coastal projects that are funded with federal dollars (including those funded by the Federal Emergency Management Administration). The provisions of Section 7 also extend to any project for which a federal agency must issue a permit (e.g. Section

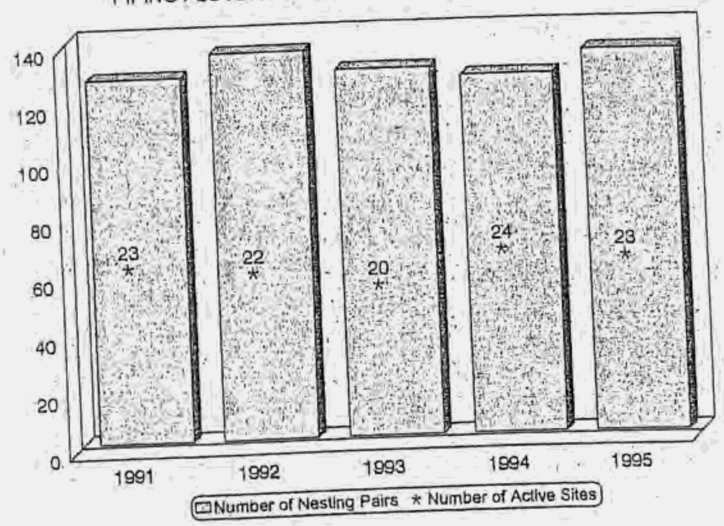
404 permit from the U.S. Army Corp of Engineers).

Section 9 of the ESA provides for protection of piping plover habitat by prohibiting significant habitat modification or destruction.

State Regulations

The NJESCA does not specifically provide for the protection of endangered species habitat. However, habitat protection for beach nesting birds is provided through various land use regulations that are included in Rules on Coastal Resources and Development (N.J.A.C. 7:7E - 1.1 et seq.). These rules prohibit the development of endangered or threatened species habitats in a coastal area unless it can be demonstrated that the proposed development will not adversely affect habitat through direct or secondary impacts.

PIPING PLOVER POPULATION IN NEW JERSEY 1991-1995



Egg Laying

Eggs are laid in late April to mid-May. If the initial nest is lost the pair may renest. Pairs may be on eggs into early July. Plovers almost always lay four eggs (may be less for renests). The eggs are sand-colored with dark splotches. This coloration pattern camouflages the eggs against the sand and shell background of the nest. Both of the adults will incubate the eggs for approximately 28 days.

Care of Young

Young plovers are downy when hatched and able to leave the nest within hours. The chicks feed themselves while the parents watch over them (precocial). The adult birds will stand or sit over their young to shelter them from the sun or inclement weather.

Piping plover chicks are able to leave the nest within hours of hatching and can be seen feeding along side of their parents.

Most young are flying by the 4th of July (approximately 25-30 days after hatching), although, with renesting, flightless chicks may be on the beach until August.

Nest/Chick Defense

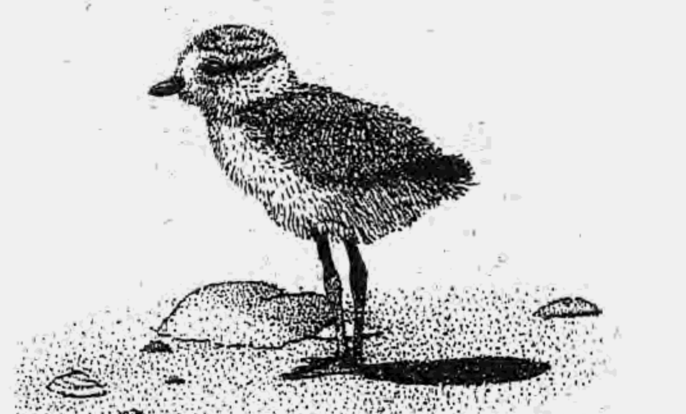
Adults try to lure intruders away from nests or young by moving a safe distance away and pretending to be injured (feigning or "broken-wing" display). Adults will also dive at small predators such as crows and ghost crabs. The chicks will crouch down, motionless, and wait for the "all clear" signal from the parents, making chicks vulnerable to being crushed by moving vehicles.

Range

There are three distinct piping plover populations in North America: Inland - on lakes, reservoirs, and rivers in the Midwest and Great Plains; Great Lakes region; and Atlantic coast - North Carolina to Newfoundland. In New Jersey piping plovers breed from Cape May to Sandy Hook. At the start of migration in mid-July, plovers from other Atlantic coast states begin to arrive and are joined by the New Jersey plover families. By late September piping plovers are gone from most New Jersey beaches. Piping plovers can be found wintering along the coast from Texas to North Carolina.

Population

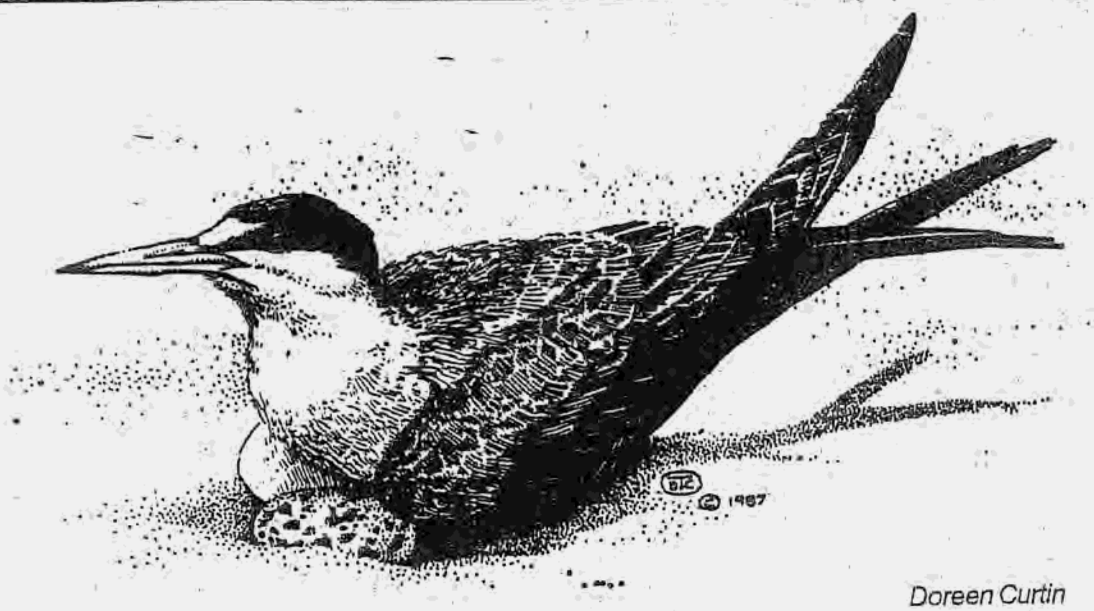
The New Jersey piping plover population has averaged 122 nesting pairs over the past 9 years (1987-1995).



Scott Hecker

Least Tern Facts

Least terns will protect their nests and young by dive bombing intruders or hovering above and defecating.



Doreen Curtin

Scientific Name: *Sterna antillarum*

Status

New Jersey listed the least tern as an endangered species in 1979. The California and Inland populations were added as endangered to the federal List of Endangered and Threatened Wildlife in 1985.

Threats

Human disturbance during the nesting season by recreational beach users is the primary factor involved in the poor reproductive success of least terns. Other threats include vehicles and flooding. Predation, especially by human-introduced (rats, dogs, and cats) or human-encouraged (fox, raccoons, and skunks) species has a tremendous effect on reproduction in tern colonies. Coastal development and the subsequent stabilization of the dynamic beach ecosystem by seawalls, groins, and jetties have resulted in the destruction and alteration of suitable nesting habitat.

Physical Description

The smallest of the terns, the least tern can be identified by the distinctive white forehead, black eye line, and orange-yellow bill. Terns feed on small fish and crustaceans that are caught by plunge diving.

Nesting Habitat

Least terns nest on sandy beaches above the high tide line and occasionally on sandy fill on bay islands. Although usually found near abundant food sources at inlets and estuaries, least terns often forage miles from the nesting colony. Terns prefer flat, sandy, shell-covered, sparsely vegetated areas for nesting. Natural dynamics of the beach ecosystem and severe storms create suitable nesting areas as waves scour the beach.

Courtship

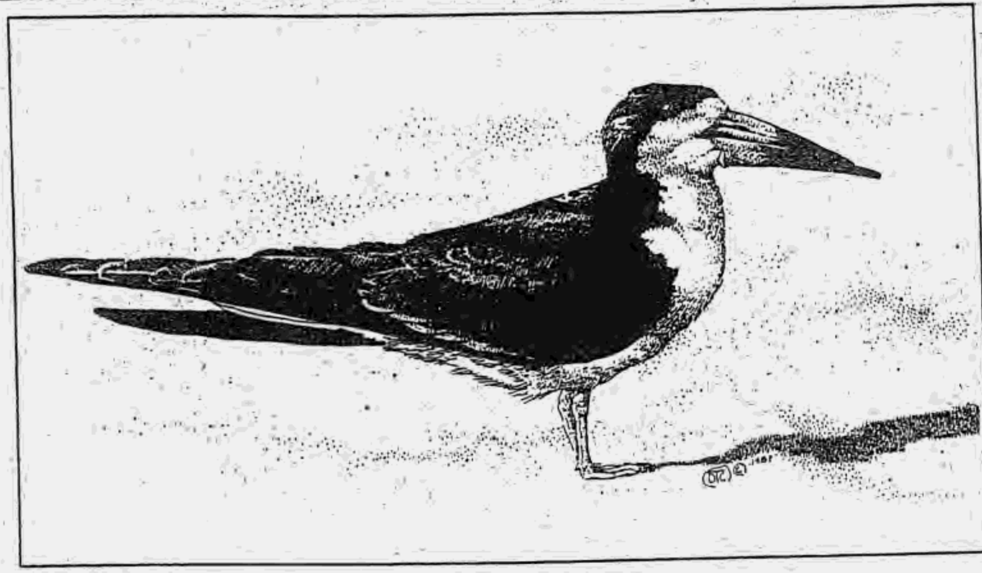
The terns arrive in early to mid-May and begin forming nesting groups called colonies. Colonies can range in size from a few birds to several hundred. Males will court the females by offering small fish while shaking their heads from side to side. The female may accept the "gift" and mate with the male. Terns make shallow depressions in the sand, called scrapes. One of the scrapes will be chosen as the nest and eggs will be laid.

Egg Laying

In late May to mid-June (later for renesting after initial nest loss) one to three eggs are laid. The eggs are sand-colored with dark splotches that create a camouflaged effect in the sandy nest. These markings make the eggs vulnerable to accidental crushing by people or vehicles. Both parents will share

Black Skimmer Facts

Black skimmers nest in colonies ranging in number from a few to several hundred on sandy beaches or back-bay islands.



Doreen Curtin

Scientific Name: *Rynchops niger*

Status

The black skimmer was listed as an endangered species under the NJESCA in 1979.

Threats

Human disturbance during the breeding season by recreational beach users is the primary cause of nesting failure. Predation, especially by human-introduced (rats, dogs, and cats) or human-encouraged (fox, raccoons, and skunks) species is a major factor in nest and chick loss. Vehicles and flooding are also contributing factors to reproductive failure. The black skimmer population decline, since the enactment of protection laws, is due to habitat loss and disturbance during the breeding season.

Physical Description

The black skimmer resembles a gull-like bird with a black back, white underside, and extremely long, narrow wings. The most distinguishing characteristic is the long, flat, black-tipped red bill with the lower mandible being longer than the upper. Small fish and crustaceans are caught by skimming the water with the lower bill; hence the name, black skimmer.

Nesting Habitat

The black skimmer nests on sandy beaches, back-bay and inlet sandy islands, and marsh islands on wrack mats. Skimmers nest in colonies ranging in number from a few to several hundred. Flat, sandy areas with little vegetation is the preferred nesting habitat.

Courtship

Arriving in May, the skimmers begin establishing nesting colonies. The skimmers make shallow depressions in the sand, called scrapes. A scrape will be chosen as the nest site.

Egg Laying

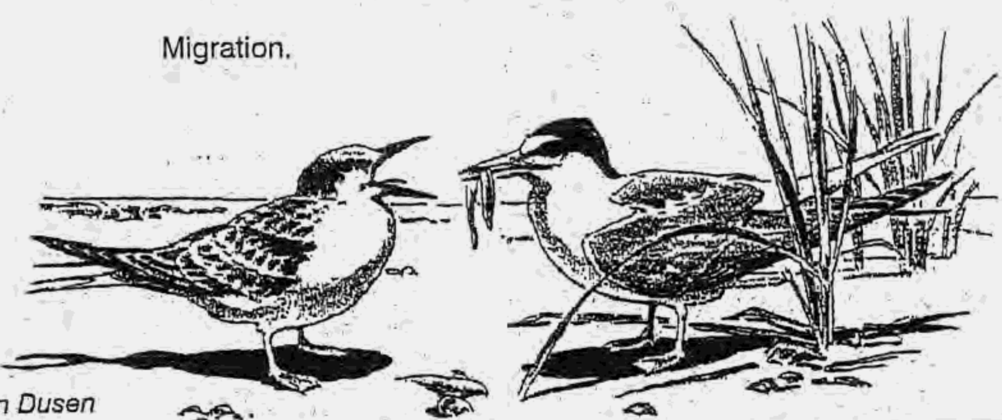
Eggs are laid in early June and sometimes later if renesting occurs after a nest loss. Two to five eggs are laid and both adults incubate the eggs for approximately 22 days.

Care of Young

Young are downy when hatched and able to leave the nest within hours. Chicks are first fed food regurgitated to the ground and later given whole fish. Young skimmers fledge in about 24 days from hatching (mid-July to mid-August). The young skimmer's bill is even in length until it reaches adult size.

Beach Nesting Birds Calendar Of Events

Mid-March	First piping plovers arrive on beaches.
Mid-April	Piping plovers establish territories. Fencing and signs are erected around traditional nesting areas.
Late April	First piping plovers lay eggs.
Early May	Least terns and black skimmers begin arriving.
Mid-May	Most piping plovers are on eggs. Least tern colonies are forming. Black skimmer colonies are forming.
Late May	First piping plover chicks hatch. Many least tern colonies have formed. Some birds are on eggs.
Memorial Day	First major effects of human disturbance to nesting birds due to long holiday weekend. Biologists and volunteers begin patrolling nesting areas.
Early June	Least terns begin to nest in earnest. Some black skimmers are nesting. Piping plover chicks are on the beach.
Mid/Late June	First piping plover chicks fledge. Least tern chicks begin to hatch. Some black skimmer chicks hatch.
July 4th	Busiest holiday weekend of the season presents great disturbance to nesting birds and young chicks.
Early/Mid-July	Most piping plovers and least terns have fledged.
Late July/ Mid-August	Black skimmers are fledging. Piping plovers and least terns are staging for migration.
Mid-August/ Mid-September	Migration.



Barry Van Dusen

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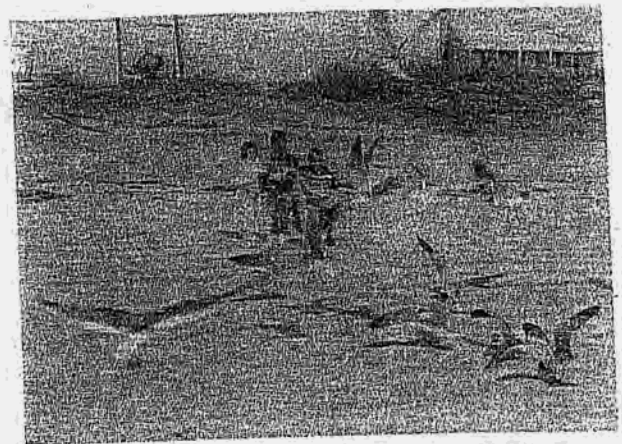


New Jersey Division of Fish, Game & Wildlife

Pets and Predators

Naturally occurring predators such as gulls, foxes, and rats are encouraged by certain practices, especially leaving food scraps on beach. People often permit domestic dogs and cats to roam at will. Unwanted cats are abandoned and become feral.

Threats to Beach Nesting Birds:

- Young and adults are harassed and preyed upon.
- Eggs are eaten or crushed and nests may be abandoned.
- Birds regard a dog anywhere on the beach as a predator forcing them to leave nests and young unattended.
- Harassment may cause nesting birds or colonies to abandon nest sites.

Encouraged Practices To Avoid Threats:

- Trash cans should be placed as far from nesting areas as possible and be equipped with lids.
- Consider establishing and enforcing prohibitions on feeding gulls.
- Actively remove predators (live-traps can be used in cooperation with state and county animal control officials).
- Have the local animal control agency initiate a feral cat removal program.

Special Beach Uses

Recreational activities such as volleyball and kite flying can interfere with nesting or feeding birds. The storage of catamarans on the beach in prime nesting habitat increases the chance of vehicles destroying nests or young. Concessionaires increase vehicle and human activity in certain areas.

Threats To Beach Nesting Birds:

- People or balls can crush nests.
- Intense human activity near the nesting areas causes disturbance to nesting birds.
- The birds regard kites as flying predators.
- Crashing kites may fall into nesting areas causing egg destruction or colony abandonment.
- Vehicles setting out catamarans may crush eggs or young.

Encouraged Practices To Avoid Threats:

- Establish official recreational areas for different beach uses away from nesting areas.
- Encourage the use of official recreational areas.
- Have concessionaires set up operations well away from nesting areas.
- Provide concessionaires with information about beach nesting birds and ask for cooperation in protecting the birds.

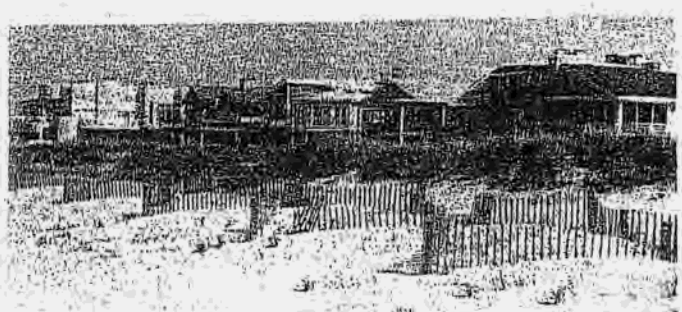
Beach Protection and Restoration Projects

The U.S. Fish and Wildlife Service and the New Jersey Division of Fish, Game and Wildlife recognize the necessity and value of beach protection projects, such as dune building and planting, beach restoration, and construction of groins and jetties. These projects are important components in the strategy to protect New Jersey's valuable coastal areas. However, in certain circumstances, some coastal protection projects may not be compatible with endangered beach nesting birds. Less potentially harmful alternatives may be available. Careful planning and evaluation of such projects is needed. The following guidelines are offered.

Dune Management

Maintenance of dune systems is critical to coastal management. Dune systems are a natural alternative to beach protection with many benefits over the use of hard structures, such as bulkheads. Strategies for building and maintaining dunes can be beneficial to the coastal community as well as to beach nesting birds. Dune systems with natural features such as blowouts and overwash areas provide more suitable habitat for beach nesting birds than straight line systems. Attempts to build additional dunes in areas with well developed dune systems may reduce available habitat as well as reduce recreational beach areas while providing no additional storm protection.

Routinely, beach managers erect snow fence to provide dune protection or building. In areas where dunes are eroded or absent, mechanical creation of dunes may be conducted. Beach grass is usually planted after either of these dune management strategies to provide dune stabilization.

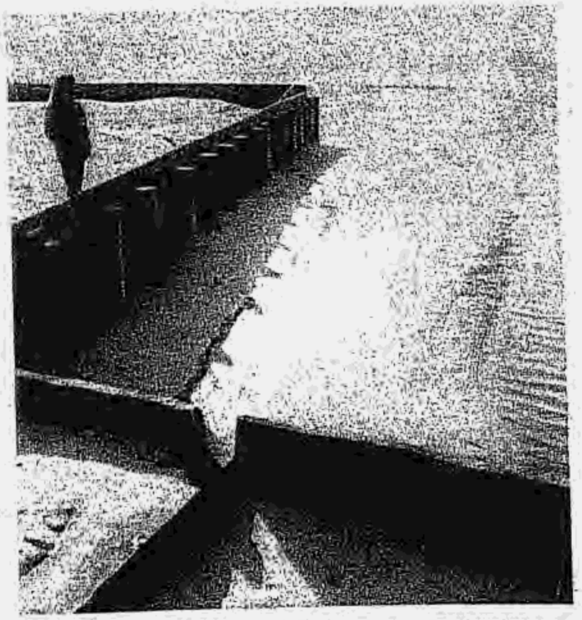


New Jersey Division of Fish, Game & Wildlife

Proper placement of snow fence can create nesting habitat for beach nesting birds while still protecting the coastal community.

Threats To Beach Nesting Birds:

- Snow fencing creates straight line dunes without natural breaks (results in reduced nesting habitat).
- Straight line fence doesn't allow for washover areas (preferred nesting habitat) to be created .
- Erecting fences, creating dunes, or planting dune grasses during the nesting season may destroy nests or disturb nesting birds.
- By creating dunes, natural breaks and washovers in dune system are filled in, resulting in loss of nesting habitat.
- The steep slope on mechanically created dunes makes them unsuitable for nesting sites.
- Young chicks can't negotiate the steep slopes of newly created dunes.
- Existing habitat may be damaged in areas where sand is being harvested.
- Natural breaks and washovers in dunes are filled in.
- Birds will not nest in heavily vegetated areas.
- Heavily vegetated areas provide cover for predators.



New Jersey Division of Fish, Game & Wildlife

Hard structures, such as bulkheads, groins and jetties, can cause habitat loss by contributing to beach erosion and vegetation encroachment.

Encouraged Practices To Avoid Threats:

- Schedule projects to avoid the nesting season (generally April 1 to August 15).
- Seek input from New Jersey Division of Fish, Game & Wildlife and U.S. Fish & Wildlife Service biologists.
- Carefully evaluate options to standard repair methods if options are not a threat to structures.
- Consider alternatives to placing snow fence or using other repair methods on narrow beaches if there is no threat to property.

Wildlife managers use billboards and other educational displays to increase public awareness.

New Jersey Division of Fish, Game & Wildlife

APPENDIX E

Coordination with the New Jersey Division of Fish and Wildlife

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://njfieldoffice.fws.gov

In Reply Refer to:

FP-02/08

JUL 11 2002

Robert McDowell, Director
New Jersey Division of Fish and Wildlife
CN400
Trenton, New Jersey 08625

Dear Mr. McDowell:

Enclosed is the U.S. Fish and Wildlife Service's (Service) Draft Fish and Wildlife Coordination Act Report entitled *Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, Monmouth County, New Jersey.* This constitutes the Service's draft report on fish and wildlife impacts that can be expected to result from the Army Corps of Engineers (Corps) proposed plan. This report has been prepared pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*) and is for inclusion in the Corps forth-coming feasibility report.

The Service's report contains an assessment of the proposed plan and recommendations for the protection of fish and wildlife resources. Please provide a letter of comment including indication of concurrence, or lack thereof, within 30 days from the date of this letter. If there are any questions concerning this report, please contact John Staples or Allen Jackson of my staff at (609) 646-9310, extension 18 or 23, respectively. Thank you for your assistance in this matter.

Sincerely,

Clifford G. Day
Supervisor

Enclosure

State of New Jersey
Department of Environmental Protection

Jan McGreevey
ernor

Bradley M. Campbell
Commissioner

Division of Fish and Wildlife
Robert McDowell, Director
PO Box 400
Trenton, NJ 08625-0400
www.njfishandwildlife.com

August 7, 2002

Clifford G. Day, Administrator
U.S. Fish and Wildlife Service
927 N. Main St.: Bldg. D
Pleasantville, NJ 08232

Dear Mr. Day:

This serves to inform you that the Division of Fish and Wildlife [DFW] concurs with the *Draft Fish and Wildlife 2 (b) Coordination Act Report; Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, Monmouth County, New Jersey.* This constitutes the USFWS's draft report on fish and wildlife impacts that can be expected to result from the ACOE's proposed project for Union Beach.

We agree with the service's recommendation to ensure protection of piping plovers and seabeach amaranth through a monitoring program and an educational program in cooperation with the Borough of Union Beach. Our ENSP Bureau maybe reached at (609) 292-9400 for further coordination.

The need for additional coordination between our Bureaus of Marine Fisheries and Shellfisheries as the borrow site selection process continues is recognized.

Information provided by our Bureau of Freshwater Fisheries indicates a confirmed run of river herring in Whale Creek and a timing restriction maybe necessary to protect these species during migration and spawning from any sediment generating activity.

To help stabilize the beach berm it should be planted with beach grasses. The berms along the interior should be planted in warm seasonal grasses with a mixture of salt tolerant shrubs as listed in the attached "Landscaping for Birds on NJ's Barrier Islands". This planting will reduce the amount of maintenance required by the local sponsor and provide additional habitat for some of the species listed in the HEP study and other species. These mixes can be found in the "Standards for Soil Erosion and Sediment Control in New Jersey" (July 1999) under "Permanent Vegetation Cover for Soil

Stabilization" section 4. The use of one of these mixtures will permanently stabilize the soil, assuring conservation of soil and water, and act to enhance the environment. Your local soil conservation service can provide information on the appropriate mixture based on the planting date and drainage. These native species are naturally drought and disease resistant.

We hope this information is of service to you.

Sincerely,

Robert McDowell, Director
Division of Fish and Wildlife

Attachment (1)

c. A. Didun, OER
J. Staples, USFWS
D. Wilkinson, OER

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

REPLY TO
ATTENTION OF

August 20, 2003

Planning Division
Environmental Analysis Branch

Mr. Clifford G. Day
Supervisor
U.S. Fish and Wildlife Service
927 North Main Street, Building D
Pleasantville, New Jersey 08232

Re: Raritan Bay and Sandy Hook Bay
Hurricane and Storm Damage Reduction Study
Union Beach, New Jersey

Dear Mr. Day:

The U.S. Army Corps of Engineers, New York District (District) is pleased to submit to your office our comments to the subject project's U.S. Fish and Wildlife Service (Service) draft 2b report (Attachment 1). To maintain the current project schedule, we request that your office submit the project's final 2b report no later than September 5, 2003.

The District looks forward to the continuation of working with the Service on this project. If you have any questions, contact Howard Ruben at 212-264-0206.

Sincerely,

Josephine R. Axt

for Len Houston
Chief, Environmental Analysis Branch

Attachment
CF: John Garofalo; NJDEP

1. Service Recommendation #1: Implement Plan A of Mitigation Alternative 2 to compensate for adverse impacts associated with levees, floodwalls, retention ditches, and the surge barriers and pumping stations at Flat Creek and East Creek.

The District Response: The District concurs with this recommendation. The selected mitigation plan is Alternative 2A.

2. Service Recommendation #2: Develop a strict erosion and sediment control plan for any construction activity. Erosion and sediment runoff should be minimized by conducting all construction activities on shore under dry conditions. Silt barriers should be utilized to minimize the movement of sediment.

The District Response: The District concurs with this recommendation. Once the construction contract has been awarded, the contractor will be responsible for obtaining a Soil Erosion and Sediment Control permit from the Freehold Soil Conservation District and take the responsibility for its implementation with QA/QC by District construction personnel and inspections by the representatives from the Freehold Soil Conservation District.

3. Service Recommendation #3: Evaluate impacts to beach, nearshore, and offshore biological resources from proposed beach renourishment, berm and dune construction.

The District Response: The District agrees with this recommendation. The District has initiated intertidal sampling of a 5-year biological monitoring program and plans to monitor the beach for piping plovers, least terns and seabeach amaranth, and the newly constructed dune to ensure vegetative success.

4. Service Recommendation #4: Minimize use of large earth-moving equipment to reduce impacts associated with beach nourishment; allow natural currents to slope the beach profile wherever feasible.

The District Response: As part of the construction contract, the District will permit the contractor to use construction equipment at their discretion as needed to fulfill the contract. Once the construction template has been reached, natural currents will slope the beach profile accordingly.

5. Service Recommendation #5: Mitigate any loss to shellfish beds by increasing structure (through shell placement) in borrow areas. Avoid creating excessively deep borrow sites, which may become anoxic. Coordinate with the Service, NMFS, and the State Bureaus of Marine Fisheries and Shellfisheries as selection of borrow sites progresses.

The District Response: The District plans to monitor the recolonization of benthic resources and finfish feeding habitats to determine the impacts of dredging sand for its placement onto the beach. Characterization studies of the borrow areas did not indicate that the borrow areas contain commercially viable populations of shellfish. Accordingly, the District does not intend to mitigate for the loss of shellfish beds. The identified borrow areas are shoals that when dredged are expected to be at the same elevation as the surrounding bay bottom. The District agrees and intends to continue its coordination with the Service, NMFS and NJDEP during the selection of the borrow areas. Coordination with the NMFS will occur pursuant to the Essential Fish Habitat evaluation and ESA formal consultation regarding sea turtles; coordination with the NJDEP will occur during the process to secure State Water Quality Certificate and CZM Consistency Statement.

6 Service Recommendation #6: Use sand borrow material with similar grain size to that of the renourishment site to reduce chances of erosion and promote recolonization.

The District Response: The District concurs with this recommendation. The results of our grain size analysis has concluded the material at the borrow sites is of compatible size of sand at the placement areas.

7. Service Recommendation #7: Develop and implement a long-term monitoring plan to evaluate project impacts to vertebrate and invertebrate species at the borrow site, nearshore, intertidal and subtidal areas; coordinate the results with appropriate federal and State agencies (the Service, the NMFS, and the New Jersey Division of Fish and Wildlife's Bureaus of Marine Fisheries and Shellfisheries.

The District Response: The District concurs with this recommendation: The intertidal and subtidal areas, which are considered nearshore components and the offshore borrow areas will consist of 2 years pre-construction, 1-year during-construction and 2 years of post-construction data collection. Data collection at the nearshore will consist of spring and fall benthic samples collected at mean low water and 1-meter below mean low water, grain size, water quality, beach seining (from June once a month to November), finfish stomach analysis and suspended sediment monitoring during construction. Data collection at the offshore borrow areas will of consist spring and fall benthic samples, grain size analysis , finfish utilization, finfish stomach analysis and water quality. Finally, once the beach and berm have been constructed, the District plans to monitor these areas for piping plovers, least terns and seabeach amaranth for 3 consecutive years following initial construction and 3 consecutive years following each period nourishment.

8. Service Recommendation #8: Continue to coordinate with the NMFS regarding any Essential Fish Habitat that may be affected by the proposed action.

The District Response: The District concurs with this recommendation and intends to continue our on-going coordination with the NMFS for the life of the project.

9. Service Recommendation #9: Continue informal Section 7 consultation with the Service following project implementation regarding seabeach amaranth and potential breeding status of piping plover, due to the close proximity of these two species at Sandy Hook.

The District Response: The District concurs with this recommendation and intends to monitor for piping plovers and seabeach amaranth 3 consecutive years following initial construction and after each periodic renourishment. The District looks forward to continuing its partnership with the Service regarding the status of ESA species.

10. Service Recommendation #10: Initiate a monitoring program to survey for piping plovers and seabeach amaranth on beaches nourished by the Corps. These surveys should occur each year over the life of the project. Monitoring results should be reported to the Service and to the New Jersey Division of Fish and Wildlife's Endangered Non-Game Species Program (ENSP).

The District Response: In general the District agrees to monitor for piping plovers and seabeach amaranth at beaches nourished by the Corps for 3 years following initial nourishment and each periodic renourishment. The District in consultation with the Service would like to terminate monitoring after 3 years. The District looks forward to the continuation of its partnership with the Service and the NJDEP's ENSP to conduct monitoring activities and reporting the results, respectively.

11. Service Recommendation #11: Ensure that the Borough of Union Beach initiates and sustains a piping plover management program, if piping plovers are documented to occur within the project area, for the protection of adults and chicks during the nesting and brood-rearing period.

The District Response: The District does not agree with this recommendation because it lacks Congressional authority to force and subsequently enforce a municipality to develop and implement a threatened and endangered species program pursuant to the ESA. However, the District looks forward to working with the Service and the NJDEP's ENSP to encourage the municipality that it's in the best interest of all of the stakeholders that they also provide active participation, coordination and consultation in the ESA's monitoring activities if piping plovers and/or seabeach amaranth occur within the project area.

12. Service Recommendation #12: Initiate an education and outreach program with the Borough of Union Beach to ensure compliance with the Service's Guidelines for protection of nesting piping plovers.

The District Response: In general the District agrees with this recommendation and looks forward to working with the Service and the NJDEP's ENSP to encourage the municipality that it's in the best interest of all of the stakeholders that they also provide active participation, coordination and consultation in the ESA's monitoring activities if piping plovers and/or seabeach amaranth occur within the project area. However, it should be noted that the District lacks Congressional authority to force and subsequently enforce a municipality to develop and implement a threatened and endangered species program pursuant to the ESA.

13. Service Recommendation #13: Coordinate with the Service to initiate a management program for seabeach amaranth if the species is detected on the project site.

The District Response: The District concurs with this recommendation and looks forward to the continuation of its partnership with the Service to implement a management program for seabeach amaranth if the species is detected on the project site.

14. Service Recommendation #14: Re-initiate consultation with the Service pursuant to Section 7 prior to any subsequent renourishment.

The District Response: The District concurs with this recommendation and intends to re-initiate ESA consultation with the Service prior to each periodic renourishment.

15. Contact the Service to obtain an updated list of threatened and endangered plants and animals if the selected plan is not implemented within 2 years.

<u>The District Response:</u> The District concurs with this recommendation and looks forward to the continuation of its partnership with the Service to consult and coordinate activities pursuant to the ESA for the life of the project.

16. Service Recommendation #16: Coordinate with the State's ENSP prior to project construction to verify the presence or absence of osprey, yellow-crowned night-heron, black-crowned night heron, least tern or other State-listed species in the project area, and if present, institute measures (as recommended by the ENSP) to avoid adverse impacts on these species.

<u>The District Response:</u> The District agrees with this recommendation and looks forward to the continuation of its partnership with the NJDEP for the life of the project. The State's ENSP will have a formal opportunity to comment and make their own recommendations pursuant to the acquisition of the State's CZM Consistency Statement.

DRAFT
FISH AND WILDLIFE COORDINATION ACT
SECTION 2(b) REPORT

RARITAN BAY AND SANDY HOOK BAY
HURRICANE AND STORM DAMAGE REDUCTION STUDY
UNION BEACH
MONMOUTH COUNTY, NEW JERSEY

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office
Pleasantville, New Jersey 08232

July 2002

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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Tel: 609/646 9310
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In Reply Refer to:

FP-02/08

JUL 11 2002

Colonel John O'Dowd
District Engineer, New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Colonel O'Dowd:

This is the draft report of the U.S. Fish and Wildlife Service (Service) regarding anticipated impacts on fish and wildlife resources from the U.S. Army Corps of Engineers (Corps) proposed Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study for Union Beach, Monmouth County, New Jersey. This report was prepared pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*).

This report is provided in accordance with our Fiscal Year-1998 scope-of-work agreement and is based on plans and information provided in the Corps July 1996 *Raritan Bay and Sandy Hook Combined Erosion Control and Storm Damage Prevention Pre-feasibility Report, Union Beach, New Jersey* and the May 2002 Draft *Impact Assessment and Mitigation Analysis.*

Apart from an occasional transient bald eagle (*Haliaeetus leucocephalus)* or roseate tern (*Sterna dougallii*), no other federally listed or proposed endangered or threatened flora or fauna under Service jurisdiction are known to occur within the project area.

The Service looks forward to working with the District during the course of this project. We would appreciate any comments on this draft report within 30 days. If you have any questions regarding this report, please contact John Staples or Allen Jackson of my staff at (609) 646-9310, extension 18 or 23 respectively.

Sincerely,

Clifford G. Day

Clifford G. Day
Supervisor

Enclosure

DRAFT
FISH AND WILDLIFE COORDINATION ACT
SECTION 2(b) REPORT

RARITAN BAY AND SANDY HOOK BAY
HURRICANE AND STORM DAMAGE REDUCTION STUDY
UNION BEACH
MONMOUTH COUNTY, NEW JERSEY

Prepared for:

U.S. Army Corps of Engineers
New York District
New York, New York
10278-0090

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office
Pleasantville, New Jersey 08232

Preparer: Allen C. Jackson
Assistant Project Leader: John C. Staples
Project Leader: Clifford G. Day

July 2002

EXECUTIVE SUMMARY

The New York District (District), U.S. Army Corps of Engineers (Corps) was authorized to conduct a reconnaissance study to evaluate federal participation in flood control improvements in Union Beach, Monmouth County, New Jersey. The study area encompasses the Borough of Union Beach and three coastal marsh systems located in the northern portion of the County. Plan formulation for hurricane and storm damage reduction within the study area considered a full range of structural and non-structural measures. Preliminary analysis indicated that levee and floodwall protection of flood-prone properties in the study area was found to be economically and technically feasible. More detailed analysis indicated that levees and floodwalls between high ground and existing marsh habitat would be economically justified and would have minimal effects on wetlands. A combination of hurricane and storm damage reduction measures was selected (Selected Plan). The study progressed with the completion of the Corps May 2002 Draft *Impact Assessment and Mitigation Analysis* (IAMA). The purpose of the IAMA was to document ecological impacts and present a justified mitigation plan that would offset potential adverse impacts associated with the implementation of the proposed hurricane and storm damage reduction measures at Union Beach.

Even though the Selected Plan was specifically designed to avoid and minimize environmental impacts, unavoidable adverse impacts to the natural resources are anticipated. The District, in consultation with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the New Jersey Department of Environmental Protection's Land Use Regulation Program, selected the Habitat Evaluation Procedures (HEP) methodology to quantify the impacts to wildlife and wildlife communities and the Evaluation for Planned Wetlands (EPW) method to assess impacts to wetland functions and values.

Raritan Bay provides important habitat for numerous fish and wildlife resources including wintering waterfowl; migrant shorebirds and landbirds; raptors; migratory, resident and anadromous fish; and shellfish. Other than the wetlands and habitat associated with Chingarora, Flat, and East Creeks, Union Beach generally does not support significant wildlife habitats due to its narrowness and human disturbance. However, since the nearshore area of Union Beach is relatively shallow, it serves as an important nursery area for many fish species and helps support significant recreational fisheries such as in adjacent Keyport Harbor. With appropriate mitigative measures, project-related adverse impacts on fish and wildlife resources can be minimized.

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E. Coordination with the New Jersey Division of Fish and Wildlife

I. INTRODUCTION

This constitutes the U.S. Fish and Wildlife Service's (Service) draft Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*), Section 2(b) report describing the fish and wildlife resources and supporting ecosystems in the area of the Union Beach hurricane and storm damage reduction study. This report is provided in accordance with a Fiscal Year-1998 scope-of-work agreement between the New York District (District), U.S. Army Corps of Engineers (Corps) and the Service's New Jersey Field Office. Information presented in this report: documents the fish and wildlife resources in the project area; identifies potential adverse impacts to those resources; and includes the Service's recommendations to minimize adverse impacts. In addition to the FWCA, recommendations regarding migratory birds are provided pursuant to the Migratory Bird Treaty Act (40 Stat. 755;16 U.S.C. 703-712). Consultation is also provided pursuant to Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA). The project area is located on the south shore of Raritan Bay in the Borough of Union Beach, Monmouth County, New Jersey.

The Service requests that no part of this report be used out of context, and if the report is reproduced, it should appear in its entirety. Furthermore, any data, opinions, figures, recommendations, or conclusions excerpted from this report should be properly cited and include the page number from which the information was taken. This report should be cited as follows:

Jackson, A.C. 2002. Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, Monmouth County, New Jersey. Draft Fish and Wildlife Coordination Act Section 2(b) Report, U.S. Department of the Interior, Fish and Wildlife Service, New Jersey Field Office, Pleasantville, New Jersey. 23 pp. + appendices.

Questions or comments regarding this report are welcomed by the Service. Written inquires should be addressed to:

Supervisor
New Jersey Field Office
Ecological Services
U.S. Fish and Wildlife Service
927 North Main Street, Building D
Pleasantville, New Jersey 08232

II. DESCRIPTION OF THE PROPOSED PROJECT

The Corps was authorized to conduct a feasibility study to evaluate federal participation in flood control improvements along the south shore of Raritan Bay between Keyport, on the west, and Keansburg, on the east, in the Borough of Union Beach, Monmouth County, New Jersey (Figure 1). Low-lying residential and commercial areas that are located adjacent to three coastal marsh systems in the 721-acre Union Beach Study (Study) area are subject to tidal flooding during storm events. The three coastal marsh drainage systems provided the basis for subdividing the Study area into three smaller ecological study areas: Chingarora Creek (415 acres), Flat Creek (137 acres), and East Creek (169 acres) (U.S. Army Corps of Engineers, 2002a). Storm-driven tides and waves have induced shoreline erosion, which has eliminated most sand beaches in the Borough and resulted in the deterioration of existing coastal protection and drainage structures.

The Borough's developed coastline is currently protected by a bulkhead aligned parallel to Front Street from the most northwestern point of development east to Union Avenue. However, storm induced erosion has eliminated most of the beach on the seaward side of the bulkhead, further exposing the bulkhead to wave action. The bulkhead was replaced in 1995 following a severe northeaster in December 1992 (U.S. Army Corps of Engineers, 1996); however, the District determined a need to develop a more comprehensive flood control system that would further reduce the damage and destruction of homes and commercial properties.

The Corps current proposal for reducing flood damage to the Borough of Union Beach is intended to provide protection against hurricane and storm damage, as well as shoreline erosion and wave attack along the Raritan Bay and Sandy Hook Bay shore. More specifically, the Corps plans to provide flood control and storm damage protection to private, commercial, and public properties located in the Chingarora Creek, Flat Creek, and East Creek drainage basins (Figure 1).

The Corps selected plan consists of a levee and floodwall alignment at the Chingarora Creek study area that begins at the high ground near the intersections of Florence Avenue and Bank Street and ends at the northwestern end of the Study area (Figure 2a). Closure gates are provided at the Chingarora tributary and Broadway Avenue, and drainage structures are provided to mitigate interior drainage runoff. Shoreline protection consists of a beach berm and dune, incorporating terminal groins and revetments stretching from the Chingarora Creek levee/floodwall alignment to the southeastern limit of the dune that ties into the levee alignment near Flat Creek. The dune generally follows the layout of the existing shoreline and extends bayward along the existing bulkhead and beach. The northwestern limit of the dune ties into the levee alignment west of Dock Street. From its northwestern terminus, the dune will extend 3,160 feet to the southeast to join the levee alignment near Flat Creek. The Corps is evaluating alternative borrow sites for a source of sand for initial construction of the beach and dune system; to date, the primary site is the existing Sea Bright borrow area.

Hurricane and storm damage reduction measures at Flat and East Creeks consist of a floodwall and levee alignment that begins at the southeastern limit of the shorefront and ties into the existing Keansburg levee at the eastern end of the Study limits (Figure 2b). A small interior levee is provided for the low-lying area between East Creek and an unnamed East Creek tributary. Drainage structures are provided to mitigate interior drainage runoff, and closure gates are situated at Flat Creek, East Creek and the East Creek tributary. Selected Plan activities evaluated within the May 2002 Draft *Impact Assessment and Mitigation Analysis* (IAMA) (U.S. Army Corps of Engineers, 2002a) are summarized below and are presented in Figures 2a and 2b.

- Construction of approximately 10,870 feet of levee. The levee will have a top elevation of approximately 15 feet National Geodetic Vertical Datum (NGVD), with a crest width of 10 feet and an approximate base width of 65 feet.

- Construction of approximately 3,388 feet of interior levee. The interior levee would have a top elevation of approximately 8 feet NGVD, with a crest width of 2 feet and a base width of approximately 15 feet.

- Construction of approximately 6,885 feet of floodwall. The floodwall will have a top elevation of approximately 15 feet NGVD, with a top and base width of approximately 1.5 feet.

- Construction of a 20-foot retention ditch on the landward side along the entire length of the levee and floodwall footprints. Approximately a 10-foot-wide strip of this retention ditch is expected to support wetland vegetation.

- Construction of 11 primary and 37 secondary, interior drainage structures within the levee footprint to allow for drainage during normal conditions.

- Construction of two primary swing storm surge barriers (across Flat Creek and East Creek) with pump stations that would be utilized to remove excess water from interior drainage areas during storm events when the drainage structures and storm gates are closed.

Selected Plan activities not addressed in the draft IAMA but included in the Corps (U.S. Army Corps of Engineers, 2002b) design include:

- Construction of 3,160 feet of beach berm and dune system. The dune will be at 17 NGVD with a 50-foot-wide crest extending down to the 9 foot NGVD berm elevation. The width of the berm will range from 50 feet near the two terminal groins to a maximum of 164 feet between Beach Street and Florence Avenue. The beach and dune is designed to contain 688,000 cubic yards of fill, including advance fill, overfill, and tolerance.

- Construction of a 228-foot eastern terminal groin with an associated 630-foot revetment and a 245-foot western terminal groin with a 405-foot revetment.

- Beach nourishment material will be utilized from the Sea Bright borrow area for initial construction, with upland sources identified for subsequent renourishment cycles every 9 years. Other than the Sea Bright borrow area, alternative borrow sites have not yet been identified.

III. METHODS

A. EVALUATION TECHNIQUES

1. HEP and EPW

As part of the study, a Habitat Evaluation Procedures (HEP) (U.S. Fish and Wildlife Service, 1980) and Evaluation for Planned Wetlands (EPW) (Bartoldus *et al.*,1994) were conducted to assess project impacts and determine necessary mitigation to compensate for unavoidable losses from the proposed project. The Corps (2002a) IAMA report documented the potential ecological impacts associated with the proposed Union Beach project, and presented a cost-effective and incrementally justified mitigation plan to offset project impacts. The Corps, as part of the National Environmental Policy Act of 1969 (83 Stat. 852; 42 U.S.C. 4321 *et seq.*) (NEPA) process, consulted with the National Marine Fisheries Service (NMFS), the Service, and the New Jersey Department of Environmental Protection's (NJDEP) Land Use Regulation Program (LURP) and selected the HEP methodology to quantify project-related impacts to selected wildlife evaluation species in terms of Habitat Units (HUs), and the EPW methodology to assess project impacts to other wetland functions and values in terms of a numerical index expressed as Functional Capacity Units (FCUs). The EPW methodology was used in conjunction with, and to supplement, the HEP to assist with determining mitigation efforts necessary to offset adverse impacts associated with the proposed flood control activities.

The HEP Team (representatives of the above agencies) selected four evaluation species to be used in the Union Beach HEP study. Species selection was based on consideration of the Corps' most recent design, the ecological significance of salt marsh communities, the predominance of potential impacts to upland habitat types, the desire to diversify habits within the project area, and the ability of the HEP's Habitat Suitability Index (HSI) models adequately to characterize habitat quality for the species throughout the project area. The HEP is an accepted methodology developed for documenting the quality and quantity of available habitat for selected wildlife species. Habitat quality (HSI on a scale of 0 to 1.0) is multiplied by acreage to yield HUs for a given species. The four evaluation species selected by the HEP team were American black duck (*Anas rubripes*), clapper rail (*Rallus longirostris*), marsh wren

(*Cistothorus palustris*), and yellow warbler (*Dendroica petechia*). Of the four evaluation species, the marsh wren is considered declining in New Jersey (New Jersey Division of Fish and Wildlife, 2002).

The EPW method provides a quantitative assessment of the relative value of wetlands that can be applied consistently in a variety of different wetland types. Based upon the wetland type, the EPW method evaluates six major wetland functions: shoreline bank erosion control, sediment stabilization, water quality, wildlife (general habitat values), fish (tidal, general habitat values), and uniqueness/heritage (*e.g.*, rarity, historical significance, park or sanctuary, habitat for endangered species, scientific value). By expressing each functional value numerically (FCUs), relative comparisons can be made among various mitigation options and project alternatives.

2. Service Position on the use of HEP and EPW

The Service views both HEP and EPW as tools to assist in making decisions regarding the functions and values of wetlands and uplands within the study area. When implemented properly, these tools can assist biologists in evaluating potential impacts to target species that may occur from the proposed project. However, the use of these methods does not preclude the use of best professional judgement in assessing project impacts and evaluating compensatory mitigation. Mitigation often involves compensating for wetland functions or values other than the wildlife-related values assessable via HEP. The use of the EPW method may provide additional benefits in evaluating project impacts and mitigation requirements; however, Service staff have found the EPW methodology to be somewhat subjective, requiring discretionary estimates of broad indicators of wetland functions.

B. MITIGATION GOAL

The Corps mitigation goal to compensate for adverse impacts on wildlife habitats and wetland functional values, associated with implementation of the Selected Plan, was to develop an array of mitigation alternatives that would either individually or in combination replace all of the HUs lost through time (*i.e.,* Average Annual Habitat Units [AAHU]), and replace all of the FCUs at the time of their loss. As a benchmark, the Corps set a goal of replacing a minimum of 50 percent of the total AAHUs lost per evaluation species and 50 percent of the total FCUs lost per wetland function (U.S. Army Corps of Engineers, 2002).

Although HEP results are expressed in HUs, and annualized as AAHUs, for each evaluation species, the Service cautions that combining HUs for different species yields a meaningless sum. Due to the variation in habitat requirements for different species, adding HUs across species can result in habitat values being double-counted or canceled out. Rather, HUs or AAHUs should always be expressed as a unit for a given species. Similarly, adding FCUs from dissimilar functions would not yield a meaningful number or account for critical functions that may constitute limiting factors. The Service does agree with the overall goal, which is to select the mitigation plan that best compensates for lost habitat values for each of the evaluation species and each of the wetland functions. We also acknowledge that some trade-offs may be justifiable, depending on the regional importance of given evaluation species or the critical nature of a given wetland function. The HEP and EPW results remain as useful tools to gauge relative gains and losses for individual species and individual wetland functions, respectively.

A screening analysis was conducted to identify potential mitigation options and potential off-site and on-site mitigation areas. The screening analysis resulted in the identification of two on-site mitigation areas and three potential mitigation options: levee improvements, habitat improvements, and habitat conversions.

IV. EXISTING CONDITIONS

A. PHYSICAL CHARACTERISTICS

Chingarora, Flat, and East Creeks are tidally influenced waterbodies, which flow northward into Raritan Bay in northern Monmouth County. All three tributaries originate south of Union Beach, have relatively small watersheds, and flow through primarily developed areas containing residential housing and industrial and commercial businesses. Chingarora Creek originates approximately 2 miles upstream from where it empties into Keyport Harbor in Raritan Bay. Chingarora Creek, from Keyport Harbor upstream to New Jersey State Route 36, is the boundary separating Keyport and Union Beach. Flat and East Creeks, located east of Chingarora Creek, originate approximately 3 miles upstream from where both creeks empty into Raritan Bay. The flat gradient of the streams and the low relief of the surrounding terrain makes the study area extremely vulnerable to flooding during periods of heavy rainfall. Severe thunderstorm activity causes the creeks to overtop and spread their flood waters over the broad flood plain, eliminating drainage of interior areas.

The waters of Raritan Bay off Union Beach are characterized by shallow soundings (1 to 9 feet) and a primarily sandy bottom (mostly of medium grain size) with a few intervening mud areas, such as at the mouths of the Chingarora, Flat, and East Creeks (Russell, 1999).

B. VEGETATION

The mouth of Chingarora Creek empties into Keyport Harbor. Chingarora Creek is part of Conaskonk Point that extends far out into the Raritan Bay. Chingarora Creek includes a large ditched salt marsh, sandy beach, some fill and spoil material, and wooded fringes. Salt marsh cordgrass (*Spartina alterniflora)* and salt meadow cordgrass (*S. patens)* are the dominant marsh species, occupying 55 percent of the undeveloped/vegetated land (U.S. Army Corps of Engineers, 2002a). On the Raritan Bay side to the north are mudflats and sodbanks.

Flat Creek includes marshes along the creek from the mouth to State Route 36. The site is important to fish and wildlife because the creek mouth is in a natural state, with marsh and mud flats, and the stream channel is not bulk-headed or channelized. The marsh along Flat Creek is intact and within a residential neighborhood. The marsh consists of cordgrass (*S. alterniflora, S. patens,* and *S. cynosuroides*) with sea lavendar (*Limonium vulgare)*, sea myrtle (*Baccharis halimifolia)*, and high tide bush (*Iva frutescens*). Some common reed (*Phragmites communis)* intrusion occurs along the edges of Flat Creek and further upstream.

The salt marsh of East Creek is extensive and of good quality with *S. alterniflora, S. patens,* and *Iva frutescens* being the most dominant vegetation. *Phragmites* is more prevalent upstream of Patterson Avenue. The entire bay shore from Flat Creek to Thorn's Creek, on the east side of Union Beach, is uninterrupted salt marsh. This area is the only other site of undisturbed salt marsh on the bay shore outside of Sandy Hook and Conaskonk Point (Kane and Kerlinger, 1994).

C. FISH AND WILDLIFE

1. Mammals

Mammals expected to occur in the riparian corridors of the study area include whitetail deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethica*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), woodchuck (*Marmota monax)*, red fox *(Vulpes fulva*), and Norway rat (*Rattus norvegicus*). Although juvenile whales may enter the bay, they are restricted to the deeper waters. Several species of dolphins and one or more species of small whales might occasionally occur off Union Beach, including bottle-nose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis)*, and short-finned blackfish (*Globicephala macrorhyncha*), a species of pilot whale. The area in the vicinity of Union Beach also contains a concentration of harbor seals (*Phoca vitulina*) in the winter (Kane pers. comm., 1999).

2. Birds

Migratory birds are a federal trust resource responsibility of the Service. Located strategically along the east coast flyway, Sandy Hook is an important stopover for migrating hawks, passerines, waterfowl, shorebirds, loons, and grebes. Raritan Bay harbors the largest concentration of greater scaup (*Aythya marila*) in New Jersey with flocks of 8 to 50 thousand observed (Kane and Kerlinger, 1994). Other waterfowl such as red-breasted merganser (*Mergus serrator)*, American wigeon (*Anas americana)*, canvasback (*A. valisineria)*, oldsquaw (*Clangula hyemalis*), and common goldeneye (*Bucephala clangula*) are numerous in migration and/or winter. Raritan Bay also hosts large numbers of horned grebes (*Podiceps auritus*) and common (*Gavia immer*) and red-throated loons (*G. stellata*), especially in migration. Great importance is also placed on the bay's mudflats and beaches for shorebirds. Raritan Bay's salt marshes harbor important populations of sharp-tailed sparrow (*Ammodramus caudacutus*), seaside sparrow (*A. maritimus*), clapper rail, herons, and winter populations of raptors (Kane and Kerlinger, 1994).

More specific to the Union Beach project area is information provided by Kane and Kerlinger (1994) regarding wildlife species documented at Chingarora, Flat, and East Creeks. The Chingarora Creek and associated Conaskonk Point, is rich in marine organisms and birds. The extensive salt marsh hosts resident clapper rail, green heron (*Butorides striatus*), fish crow (*Corvus ossifragus*), sharp-tailed sparrow, seaside sparrow, willet (*Catoptrophorus semipalmatus*), and marsh wren. Migrants regularly seen there include most terns, Bonaparte's gull (*Larus philadelphia*), waterfowl (especially greater scaup), raptors, horned lark (*Eremophila alpestris*), snow bunting (*Plectrophenax nivalis*), and shorebirds, including the rare Baird's sandpiper (*Calidris bairdii*), curlew sandpiper (*C. ferruginea*), marbled godwit (*Limosa fedoa*), hudsonian godwit (*L. haemastica*), and rare gulls, including black-headed gull (*Larus ridibundus)* and little gull (*L. minutus*). Additional residents found on the site include American oystercatcher (*Haematopus palliatus*), green heron, American black duck, and mallard (*Anas platyrhynchos*). Feeding herons and least tern (*Sterna albifrons)* (State-listed as endangered) are common in summer on the marsh and in the creeks. The least tern may attempt to breed on the beach near the creek mouth.

Flat Creek provides important natural habitats because of the marsh, mud flats, and stream channels. The habitat is suitable for clapper rail, Virginia rail (*Rallus limicola)*, marsh wren, and possibly least bittern (*Ixobrychus exilis)*. Green heron, American oystercatcher, and black skimmer (*Rynchops niger)* (State-listed endangered) feed at the creek mouth. Yellow-crowned night-heron (*Nycticorax violaceus)* (State-listed threatened) feed on fiddler crabs (*Uca* species) and green crab (*Carcinus maenas)* upstream in the creek. Double-crested cormorant (*Phalacrocorax auritus)*, brant (*Branta bernicla)*, American black duck, and lesser numbers of other waterfowl frequent the mouth. Birds found on the marsh include snowy egret (*Egretta thula)*, yellow-crowned night-heron, American black duck, sora rail (*Porzana carolina)*, and sharp-tailed sparrow. Shorebirds at this site include black-bellied plover (*Pluvialis squatarola)*, semipalmated plover (*Charadrius semipalmatus)*, greater yellowlegs (*Tringa melanoleuca)*, least sandpiper (*Calidris minutilla)*, ruddy turnstone (*Arenaria interpres)*, dunlin (*C. alpina)*, and American oystercatcher.

As previously mentioned, the entire bayshore from Flat Creek to Thorn's Creek consists of uninterrupted salt marsh and is the only place on the bayshore providing this cover type other than Sandy Hook and Conaskonk Point (Kane and Kerlinger, 1994). This distinction makes East Creek, which is in the middle of this stretch, a prime feeding area for waterfowl. Black-crowned night-heron (*N. nycticorax)* (State-listed as threatened, breeding population only), yellow-crowned night-heron, snowy egret, greater yellowlegs, American black duck, clapper rail, willet, and fish crow are found on the marsh. Double-crested cormorant, brant, American black duck, bufflehead (*Bucephala albeola)*, red-breasted merganser, and greater scaup feed at the creek mouth.

3. Fish

Littoral fishes were sampled near Union Beach at the mouth of Whale Creek by the NJDEP in 1982 and 1983 (U.S. Army Corps of Engineers, 1996). Whale Creek is 1 mile west of Keyport Harbor and would be representative of fish species expected to be in the Union Beach area. The most commonly recorded saltwater fish were stiped killifish (*Fundulus majalis*), bay anchovy (*Anchoa mitchilli*), mummichog (*F. heteroclitus*), Atlantic silverside (*Menidia menidia*), and bluefish (*Pomatomus saltatrix*) with smaller numbers of American eel (*Anguilla rostrata*), Atlantic needlefish (*Strongylura marina*), northern kingfish (*Menticirrhus saxatilis*), striped mullet (*Mugil cephalus*), and northern sennet (*Sphyraena borealis).* Freshwater fish recorded included banded sunfish (*Enneacanthus obesus*), pumpkinseed (*Lepomis gibbosus*), and white perch (*Morone americana*). A popular recreational fishing pier is located on the east bank of Matawan Creek in Keyport Harbor and produces frequent catches of "snapper" blues (small immature bluefish approximately 1 pound) and summer flounder (*Paralichthys dentatus*) up to 2 pounds. Other fish that likely occur in shallow waters of Raritan Bay include winter flounder (*Pleuronectes americanus*), windowpane flounder (*Scophthalmus aquosus*), and butterfish (*Peprilus triacanthus*).

The small size and degraded condition of Whale Creek precludes it from having a high species diversity or important fishery. Review of Service records revealed no historic evidence of anadromous fish spawning runs, although two individuals of blueback herring (*Alosa aestivalis*) were recorded at the mouth of Whale Creek during the above-mentioned NJDEP survey and might indicate that a remnant run exists in the area. Striped bass and American shad (*A. sapidissima*) frequent Raritan Bay and might conceivably, along with blueback herring and alewife (*A. pseudoharengus*), utilize Matawan Creek for spring runs (Bono, pers. comm., 1999). However, no survey of this creek has been conducted by either State or federal agencies (Russell, 1999).

4. Shellfish and Crustaceans

Historically, a major oyster bed existed in Raritan Bay off Keyport Harbor. Most of this bed was destroyed by over-harvesting and pollution during the early part of the last century. Approximately 10-12 years ago, some sign of oyster shell and possible recolonization of the Keyport bed were noted (Russell, 1999). The New York / New Jersey Harbor Baykeeper presently oversees an oyster recolonization program in Keyport Harbor and offshore from the Statue of Liberty. A third oyster bed is planned in the Navesink River (Stringer, pers. comm., 2002). Volunteers from approximately 35 sites in the local area grow oysters from seed that is then relocated as the oyster seed matures (Remaud, pers. comm., 2002).

Although no commercial shellfish beds were identified within the study area, the south shore of Raritan Bay is a very important shellfish foraging area for wintering waterfowl (Kane, pers. comm., 1999). Ettinger (1996) reported that sampling in the vicinity of Laurence Harbor about 2 miles west of Union Beach produced large numbers of the bivalve *Gemma gemma* and the softshell clam *Mya arenaria*; both species are utilized by waterfowl. A lobster (*Homarus americanus)* fishery exists in the deeper waters of Raritan Bay, but lobsters are apparently only occasional winter visitors to the Union Beach area with no commercial take (Ettinger, 1996).

5. Reptiles and Amphibians

Reptiles known to occur in the project area include the common garter snake (*Thamnophis sirtalis*), northern black racer (*Coluber constrictor constrictor*), eastern worm snake (*Carphohis amoenus)*, snapping turtle (*Chelydra serpentina*), diamondback terrapin (*Malaclemys terrapin*), eastern painted turtle (*Chrysemys picta)*, and eastern box turtle (*Terrapene carolina)* (Russell, 1999).

Amphibians known to occur in the freshwater portions of the project area include spring peeper (*Hyla crucifer)*, bullfrog (*Rana catesbeiana),* and Fowler's toad *(Bufo woodhousii).* The State-listed (endangered) eastern tiger salamander (*Abystoma tigrinum)* may occur in the area at the northern edge of its range (Russell, 1999).

D. ENDANGERED AND THREATENED SPECIES

1. Federally Listed Endangered and Threatened Species

There are known occurrences of the federally listed (threatened) piping plover (*Charadrius melodus)* and seabeach amaranth (*Amaranthus pumilus)* in the Sandy Hook Unit of Gateway National Recreational Area, located within 10 miles of the project area. These species are not expected to occur on the project site prior to beach reconstruction due to the current lack of suitable habitat.

Except for the above-mentioned species and an occasional transient bald eagle (*Haliaeetus leucocephalus*) or roseate tern (*Sterna dougallii*), no other federally listed or proposed endangered or threatened flora or fauna under Service jurisdiction are known to occur within the vicinity of the proposed project area. If additional information on federally listed species becomes available, or if project plans change, this determination may be reconsidered.

Current information regarding federally listed and candidate species occurring in New Jersey is enclosed, as well as addresses of State agencies that may be contacted for current site-specific information regarding federal candidate and State-listed species (Appendix A). The Service encourages federal agencies and other planners to consider federal candidate species in project planning.

The Service provides the above determination with respect to federally listed or proposed threatened or endangered flora and fauna under Service jurisdiction only. The proposed project may affect the marine environment of Raritan Bay. Principal responsibility for threatened and endangered marine species is vested with the National Marine Fisheries Services (NMFS). In a

March 6, 1999 letter to the Corps, the NMFS discussed species under its jurisdiction in the project area (Appendix B). Therefore, continued coordination with the NMFS is necessary to fulfill consultation requirements pursuant to Section 7(a)(2) of the ESA:

National Marine Fisheries Service
Habitat Conservation Division
Sandy Hook Laboratory
Highlands, New Jersey 07732
(732) 872-3023

2. State-Listed Endangered and Threatened Species

In a March 1, 2000 letter to the Northern Ecological Associates, Inc., the New Jersey Natural Heritage Program (NJNHP) identified records for occurrences of migratory shorebird concentration sites that may be in the project area, and occurrences of osprey that may be on or in the immediate vicinity of the project area (Appendix C).

Included with the March 1, 2000 NJHNP letter was a list of rare species from records in the general vicinity of the project site (within approximately 2 miles). This list includes rare occurrences located on and in the immediate vicinity of the site. Also included was a list of rare species and natural communities that have been documented from Monmouth County. The county list can be used as a master species list for directing further inventory work. If suitable habitat is present at the project area, the species have the potential to be present. Suitable habitat is present for the following State-listed species that utilize the coastal wetlands of the project area for feeding or resting: great blue heron (threatened), yellow-crowned night-heron (threatened), black-crowned night-heron (threatened, breeding population only), black skimmer (endangered), least tern (endangered), and osprey (threatened) (Kane and Kerlinger, 1994; Jenkins, pers. comm., 2002). Questions concerning the wildlife records or species mentioned may be directed to the New Jersey Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP).

V. PROJECT IMPACTS AND RECOMMENDED MITIGATIVE MEASURES

A. SERVICE MITIGATION POLICY

The Service's views and recommendations on this project are guided by its Mitigation Policy (Federal Register, Vol. 46, No. 15, January 23, 1981). This policy reflects the goal that the most important fish and wildlife resources should receive priority in mitigation planning. The term "mitigation" is defined as: (a) avoiding a negative impact altogether by not taking a certain action or parts of an action; (b) minimizing negative impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the negative impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating negative impacts over time; and, (e) compensating for negative impacts by replacing or providing substitute resources or habitats.

B. IMPACT ASSESSMENT WITH AND WITHOUT COMPENSATORY MITIGATION FOR SELECTED FLOOD CONTROL FEATURES

Even though the Selected Plan was specifically designed to avoid and minimize environmental impacts, some unavoidable adverse impacts would occur to natural resources. In accordance with NEPA requirements, the Corps, in consultation with the NMFS, the Service, and the NJDEP's LURP, selected the HEP to quantify impacts to wildlife evaluation species in terms of AAHUs and the EPW method to assess impacts to wetland functions and values in terms of FCUs. The HEP and EPW were used to assess impacts and mitigation for the selected flood control features with the exception of beach berm and dune construction, which was recommended later in planning (U.S. Army Corps of Engineers, 2002b). Based on the results of the HEP analysis for the four evaluation species, implementation of the Selected Plan (without mitigation) would result in the loss of approximately 0.4 AAHUs for black duck, 6.1 AAHUs for clapper rail, 1.7 AAHUs for marsh wren, and 3.7 AAHUs for yellow warbler (U.S. Army Corps of Engineers, 2002a). The project (without mitigation) would result in FCU losses after construction as follows: shoreline bank erosion control (-4.60), sediment stabilization (-5.81), water quality (-3.96), wildlife (-3.08), fish (tidal) (-2.17), and uniqueness / heritage (-5.80).

A screening analysis was conducted by the Corps to identify potential mitigation options and potential off-site and on-site mitigation areas. The screening analysis resulted in the identification of two on-site mitigation areas and three potential mitigation options: levee improvements, habitat improvements, and habitat conversions. It was determined that conversion of wetland cover types to other wetland cover types, and conversion of upland cover types to wetland cover types were the best mitigative options based on the potential gain in AAHUs and the potential mitigation sites available. Potential mitigation areas were identified in the East Creek and Flat Creek ecological study areas.

Based on the analysis of AAHU and FCU outputs, total cost, and incremental cost/output, the Corps identified Plan A of Mitigation Alternative 2 as the selected mitigation alternative.

Plan A of Mitigation Alternative 2:

Conversions	Flat Creek Wetland *Phragmites*:	10.0 acres Salt Marsh
		2.0 acres Wetland Scrub-Shrub
	East Creek Wetland *Phragmites*:	3.0 acres Wetland Scrub-Shrub
	Flat Creek Upland *Phragmites*:	2.5 acres Wetland Herbaceous/Scrub-Shrub
	Total Wetland:	15.0 acres
	Total Upland:	2.5 acres

Plan A of Mitigation Alternative 2 was determined to represent the best trade-off among evaluation species and among EPW functions, in that it maximizes benefits to most species and most wetland functions while minimizing net losses. Specifically, the selected mitigation plan would replace approximately: 4.4 of the 0.4 AAHUs lost for black duck (a gain of +4.0 AAHU), 4.2 of the 6.1 AAHUs lost for clapper rail (-1.9 AAHU), 3.2 of the 1.7 AAHUs lost for marsh wren (+1.5 AAHU), and 2.4 of the 3.7 AAHUs lost for yellow warbler (-1.3 AAHU). The net gain for marsh wren is of importance since the species is rated by the New Jersey Division of Fish and Wildlife as declining in New Jersey.

Wetland functions, using the EPW method, gain in FCUs for most functions except sediment stabilization (due to the high value of stabilization attributed to *Phragmites*, which would be converted to other vegetative cover types) and uniqueness / heritage, which was determined to be the least important attribute. Specifically, the proposed mitigation would replace: 6.15 of the 4.60 FCU lost for shoreline bank erosion control (+1.55 FCU), 2.10 of the 5.81 FCUs lost for sediment stabilization (-3.71 FCU), 6.93 of the 3.96 FCUs lost for water quality (+2.97 FCU), 7.15 of the 3.08 FCU, lost for the wildlife function (+4.07 FCU), 2.04 of the 2.17 FCUs lost for the fish (tidal) function (-0.13 FCU), and 2.50 of the 5.80 FCUs lost for uniqueness / heritage (-3.30 FCU).

As noted above, HEP and EPW results relate to project construction features as described above in Section II and were not used to evaluate impacts associated with beach berm and dune construction. The potential for adverse impacts from the beach berm and dune system are addressed in general terms below in section C (Resource Impacts Associated with Beach Reconstruction).

Based on the HEP and EPW results, the Service concurs with the selection of Plan A of Mitigation Alternative 2 as compensatory mitigation for the project's levees, floodwalls, retention ditches, and the surge barriers and pumping stations at Flat Creek and East Creek. The Service further recommends implementing strict erosion control practices to minimize adverse impacts from construction, to include construction under dry conditions and use of silt barriers to minimize sediment transport. The proposed mitigation plan was formulated to compensate for unavoidable adverse impacts associated with the above-mentioned flood control features and was not intended to mitigate adverse impacts associated with beach reconstruction. Potential impacts associated with beach nourishment and sand borrow are discussed below.

C. IMPACTS ASSOCIATED WITH BEACH RECONSTRUCTION

The Selected Plan with Mitigation as identified in the Corps (2002a) IAMA does not address potential impacts from construction of the more recently proposed beach berm and dune system, nor does it evaluate potential impacts to the borrow site. To determine the degree and significance of impacts associated with beach reconstruction, the Corps must fully evaluate the impacts to beach, nearshore, and offshore resources. Beach nourishment activities could adversely affect feeding habitat for shore birds and habitat for diamondback terrapins.

Nearshore resources in the intertidal zones and shallow waters should to be evaluated for potential impacts to invertebrates and other aquatic resources. Potential impacts to offshore species at the selected borrow area should also be addressed.

Although coastal areas are among the most productive and critical areas for fish and wildlife resources, beaches are often biologically impoverished and support only those species able to cope with constantly changing conditions. Beaches can generally be divided into upper, middle, and lower zones. The upper zone, extending from dune areas to just above the high water line is dry except during storm events or extra-high tides. Where human disturbance is not significant, this zone (along with the middle zone) provides nesting and feeding areas for shore birds. Due to extensive development along the New Jersey coast, natural dunes have been greatly diminished.

Influenced by tidal fluctuations, the middle beach zone is often submerged and animals are more susceptible to desiccation. Few species occur in this zone; however, there may be large numbers of adapted species. These include various copepods, ciliates, tardigrades, gastrotrichs, and turbellarians. In addition, amphipods, annelid worms, small clams, and more crabs (*Emerita*), as well as other molluscs and crustaceans can be expected to inhabit this zone. The lower beach zone is nearly continuously flooded and supports a rich and varied fauna that includes polychaetes, crustaceans, and molluscs. Small fish can also be found in this zone (U.S. Fish and Wildlife Service, 1989).

Activities associated with beach nourishment can be expected to cause at least temporary adverse impacts to fish and wildlife resources and their supporting ecosystems. Adverse environmental impacts may result from beach nourishment and will occur at the borrow site and at the deposition site.

An obvious impact of the placement of beach fill is habitat burial and, thus, the burial of benthos, such as amphipods, bivalves, crabs, isopods, polychaetes, and intertidal fauna. The magnitude of the impact to benthos and other fauna is dependent upon several factors: (1) the abundance and kinds of organisms present; (2) the quantity and quality of the material and how it is placed; and (3) the time of year the nourishment is undertaken.

Maintenance activities prolong the recovery period, turning short-term effects into long-term losses of faunal productivity. Less frequent maintenance is preferable, since it reduces the frequency of disturbance. Several steps may be taken to minimize the biological impacts of sand deposition. Consideration should be given to minimizing the percentage of fine sediments in the borrow material. This will minimize turbidity and siltation impacts on the offshore populations.

Minimizing or eliminating the use of large earth-moving machinery through the use of natural wave and current patterns to shape the beach profile could yield considerable reduction in environmental impacts (Reilly and Bellis, 1979).

The creation of additional sandy beaches implies a positive impact since species associated with this habitat could be expected to benefit from increased habitat availability. However, the increase in sandy beach area is likely to attract and hence, result in more intense use by humans. This would partly offset benefits for wildlife resources.

Dredging impacts may be generally categorized into water column impacts and impacts to the bottom substrate. Potential water column impacts include increased turbidity, decreased oxygen concentration, reduced light penetration, reduced photosynthetic oxygen production, release of toxic organic compounds and heavy metals, increased temperature, and increased salinity. These impacts vary with the magnitude and duration of the disturbance, physical and chemical characteristics of the sediment, water quality, and hydrologic characteristics of the waterbody. The type and condition of the dredging equipment also influences the impacts of dredging. Hopper dredge-overflow and clamshell dredging usually generate the highest turbidity and are of major concern (Allen and Hardy, 1980).

Potential adverse impacts to the bottom include: destruction of benthic organisms; altered benthic diversity following recolonization; changes in circulation patterns; modified sediment impact and deposition; changed nearshore wave refraction and diffraction patterns; creation of oxygen-depleted sinks; and creation of contaminant traps.

Depending upon the dredging technique employed, mortality could occur as organisms pass through the dredging apparatus or as a result of transport to an unsuitable environment. Burial of benthic organisms occurs from resuspended and redeposited sediments. Sessile species are eliminated from direct burial (U.S. Fish and Wildlife Service, 1989).

The Service views the shallow waters of southern Raritan Bay as of high value to fish and wildlife resources. In accordance with the Service's Mitigation Policy, our planning goal is no-net-loss of in-kind habitat value. No major long-term impacts to fish and wildlife resources would likely occur from beach nourishment; however, temporary impacts will occur to submerged aquatic vegetation (SAV) and shellfish beds with resultant displacement of wintering brant, American black duck, greater scaup, common goldeneye, and bufflehead. These impacts may last as long as 2 years and should be mitigated in kind. To mitigate lost shellfish beds, the Service recommends that the Corps increase structure in the impacted area through placement of oyster shell, which would facilitate recolonization of the area by various shellfish, including clams and, potentially, oysters. We also recommend to avoid creating excessively deep borrow pits, which may revert to anoxic conditions. Additional coordination will be needed with the NMFS, the New Jersey Division of Fish and Wildlife's Bureaus of Marine Fisheries and Shell Fisheries, and the Service as borrow site selection progresses.

Implementation of a beach berm should provide increased beach and intertidal habitat attractive to migratory shorebirds. The State-listed red knot (*Calidris canutus*) is known to occur as a spring and fall migrant. Any project that increases the availability of an intertidal zone should benefit this arctic-breeding species as well as other migratory shorebirds. Implementation of the beach berm and dune system would provide additional beach habitat for breeding terrapins, if beach areas are constructed above the levels of normal high tides. The grain size of the borrow material placed on Union Beach should be similar to the grain size that presently occurs there, to minimize the chances for rapid beach erosion and to promote recolonization of indigenous species, which serve as a prey base for migratory shorebirds. We also recommend development of a long-term monitoring plan to evaluate recolonization of nearshore and borrow areas, in coordination with the Service, NMFS, and the New Jersey Division of Fish and Wildlife.

Pursuant to requirements in section 305 (b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94-265), coordination should continue with the NMFS regarding any aspects of the proposed action that may adversely affect Essential Fish Habitat (EFH) identified under the Act. A list of species for which EFH has been designated is included in the NMFS March 26, 1999 correspondence (Appendix B).

D. ENDANGERED AND THREATENED SPECIES

The Service expects that, prior to dune construction and beach nourishment, nesting piping plovers or seabeach amaranth are unlikely to occur within the Union Beach project area because of a lack of sandy beach habitat and a low-energy bay shore environment. However, dune construction and beach nourishment may create suitable habitat for nesting piping plovers and seabeach amaranth. Although not anticipated, these species may occur within the project area after project implementation.

Threatened and endangered species and their habitats are afforded protection under Section 7(a)(2) of the ESA, which requires every federal agency, in consultation with the Service, to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. An assessment of potential direct, indirect, and cumulative impacts is required for all federal actions that may affect listed species. Because the proposed Union Beach project will be carried out by the Corps, further consultation pursuant to Section 7 of the ESA will be necessary if nesting piping plovers or seabeach amaranth are found to occur within the project area at any time over the life of the project.

The Service requests that the Corps take the following steps to ensure the protection of piping plovers and seabeach amaranth following project implementation:

1. Initiate a monitoring program, funded by the Corps, to survey for piping plovers and seabeach amaranth on beaches created or nourished by the Corps. Surveys to determine the presence or absence of these species should occur each year over the life of the project. Monthly piping plover surveys should commence beginning approximately March 15 each year, and may cease if no nesting activity (territorial displays, courting, nesting, or brood rearing) is detected by July 1. A survey for seabeach amaranth should

be conducted annually between August 15 and September 15. If no piping plovers or seabeach amaranth are detected, annual assessments by the Corps and Service will be conducted to reevaluate the necessity of continued monitoring. The Corps must report monitoring results to the Service and, for piping plovers, to the New Jersey Division of Fish and Wildlife, Endangered and Nongame Species Program (ENSP).

2. If piping plovers are documented to occur within the project area, ensure that the Borough of Union Beach initiates and sustains a management program for the protection of piping plover adults and chicks during the annual nesting and brood-rearing period (approximately March 15 through August 15). A copy of the Service's "Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act" (Guidelines) and a copy of the publication entitled "Endangered Beach-Nesting Bird Management on New Jersey's Municipal Beaches" are enclosed to assist the Borough in understanding its management responsibilities (Appendix D).

3. Initiate education and outreach programs within the Borough of Union Beach to ensure compliance with the Service's Guidelines. These programs should include participation by the Service and the ENSP, and should be targeted to municipal officials and staff directly responsible for recreation on municipal beaches (*e.g.*, lifeguards, law enforcement, maintenance workers).

4. If seabeach amaranth is documented to occur within the project area, coordinate with the Service to initiate and sustain a management program for the protection of seabeach amaranth. Management activities for this species may include use of string-and-post fencing to close areas of beach to vehicle and pedestrian traffic, outreach and education, monitoring, and participation in scientific research. The seabeach amaranth management program may be combined with the piping plover management program to be carried out by the Borough.

5. Re-initiate consultation with the Service pursuant to Section 7 of the ESA prior to subsequent beach renourishment.

If additional information on listed or proposed species becomes available or project plans change, the above determinations may be reconsidered. Information on federally listed species and candidate species for federal listing is updated continually, and new species may be added to the list of threatened and endangered plants and animals. Therefore, if the Selected Plan is not implemented within 1 year, the Service recommends that the Corps contact the Service to obtain an updated species list.

Lastly, the Service recommends coordinating with the New Jersey Division of Fish and Wildlife's ENSP to verify the presence or absence of osprey, yellow-crowned night-heron, black-crowned night-heron, least tern, or other State-listed species in the project area prior to construction. If these species are confirmed as present in the project impact areas, we recommend coordinating with the ENSP and the Service to implement any measures recommended by ENSP to avoid adverse impacts on these species.

VI. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

It is the view of the Service that project-related adverse impacts to fish and wildlife resulting from implementation of the Corps selected plan could be minimized to acceptable levels by incorporating the following into the final project design.

1. Implement Plan A of Mitigation Alternative 2 to compensate for adverse impacts associated with levees, floodwalls, retention ditches, and the surge barriers and pumping stations at Flat Creek and East Creek.

2. Develop a strict erosion and sediment control plan for any construction activities. Erosion and sediment runoff should be minimized by conducting all construction activities on shore under dry conditions. Silt barriers should be utilized to minimize the movement of sediment.

3. Evaluate impacts to beach, nearshore, and offshore biological resources from proposed beach renourishment, berm, and dune construction.

4. Minimize use of large earth-moving equipment to reduce impacts associated with beach nourishment; allow natural currents to slope the beach profile wherever feasible.

5. Mitigate any losses to shellfish beds by increasing structure (through shell placement) in borrow areas. Avoid creating excessively deep borrow sites, which may become anoxic. Coordinate with the Service, NMFS, and the State Bureaus of Marine Fisheries and Shellfisheries as selection of borrow sites progresses.

6. Use sand borrow material with similar grain size to that of the renourishment site to reduce chances of erosion and promote recolonization.

7. Develop and implement a long-term monitoring plan to evaluate project impacts to vertebrate and invertebrate species at the borrow site, nearshore intertidal and subtidal areas; coordinate the results with the appropriate federal and State agencies (the Service, the NMFS, and the New Jersey Division of Fish and Wildlife's Bureaus of Marine Fisheries and Shell Fisheries).

8. Continue to coordinate with the NMFS regarding any Essential Fish Habitat that may be affected by the proposed action.

9. Continue informal Section 7 consultation with the Service following project implementation regarding sea amaranth and the potential breeding status of piping plover, due to the close proximity of these two species at Sandy Hook.

10. Initiate a monitoring program to survey for piping plovers and seabeach amaranth on beaches nourished by the Corps. These surveys should occur each year over the life of the project. Monitoring results should be reported to the Service and to the New Jersey Division of Fish and Wildlife's ENSP.

11. Ensure that the Borough of Union Beach initiates and sustains a piping plover management program, if piping plovers are documented to occur within the project area, for the protection of adults and chicks during the nesting and brood-rearing period.

12. Initiate an education and outreach program with the Borough of Union Beach to ensure compliance with the Service's Guidelines for protection of nesting piping plovers.

13. Coordinate with the Service to initiate a management program for seabeach amaranth if the species is detected on the project site.

14. Re-initiate consultation with the Service pursuant to Section 7 prior to any subsequent renourishment.

15. Contact the Service to obtain an updated list of threatened and endangered plants and animals if the selected plan is not implemented within 2 years.

16. Coordinate with the State's ENSP prior to project construction to verify the presence or absence of osprey, yellow-crowned night-heron, black-crowned night-heron, least tern, or other State-listed species in the project area, and if present, institute measures (as recommended by ENSP) to avoid adverse impacts on these species.

VII. REFERENCES

A. LITERATURE CITED

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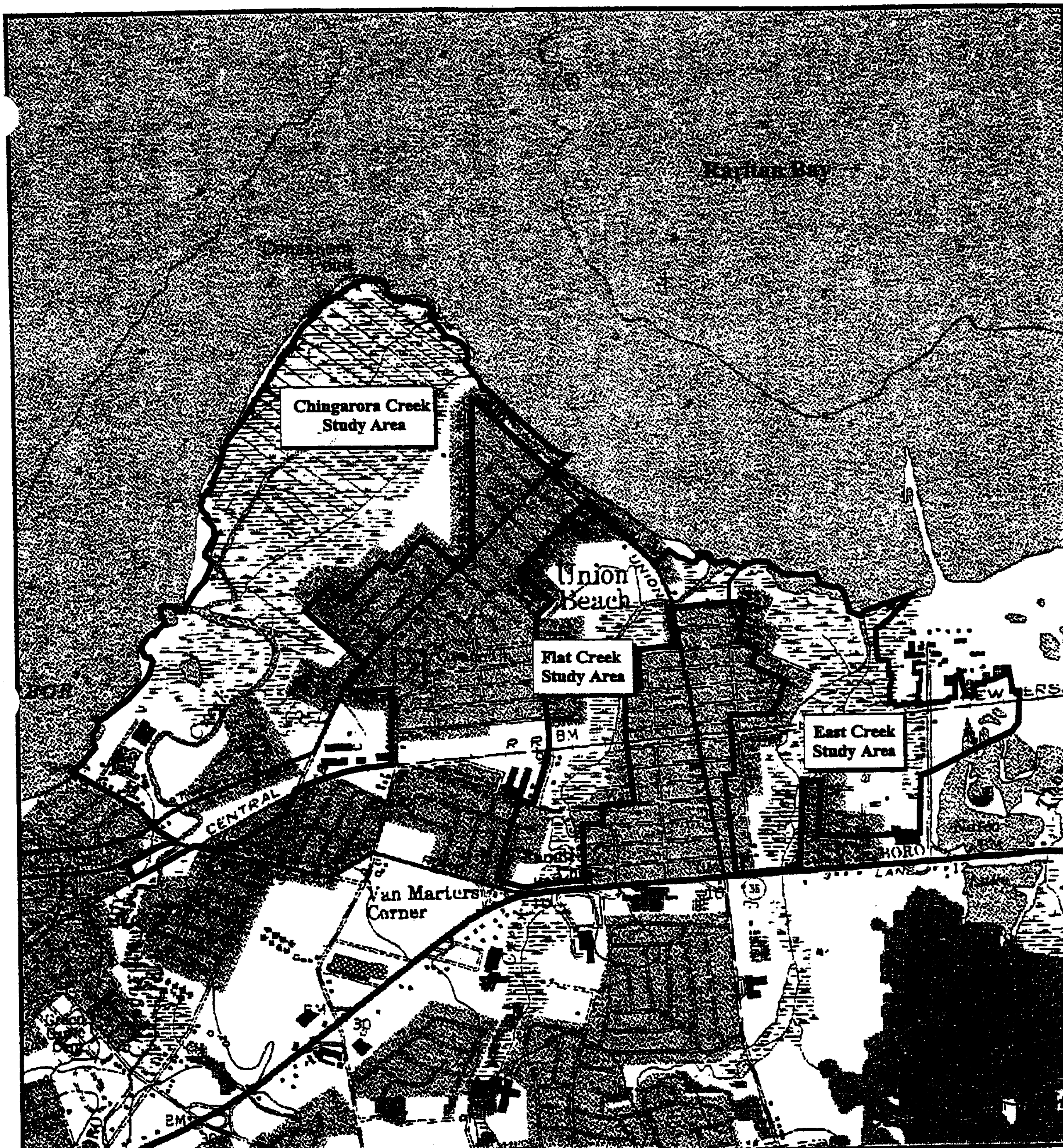
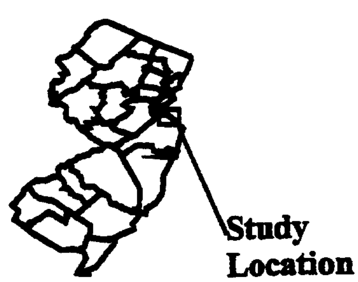
FIGURES

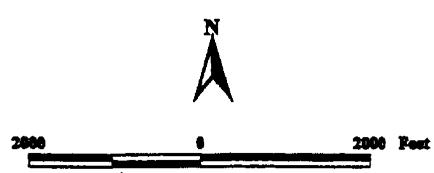
1. Site Location Map - Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, New Jersey

2a. Selected Plan Features: Chingarora Creek - Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, New Jersey

2b. Selected Plan Features: Flat and East Creeks - Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, New Jersey







Source: USGS 7.5 Minute Series
Topographic Quadrangle, Keyport, NJ-NY
1954 photorevised 1970

Figure 1. Site Location Map

Raritan Bay and Sandy Hook Bay
Hurricane and Storm Damage Reduction Study
Union Beach, New Jersey

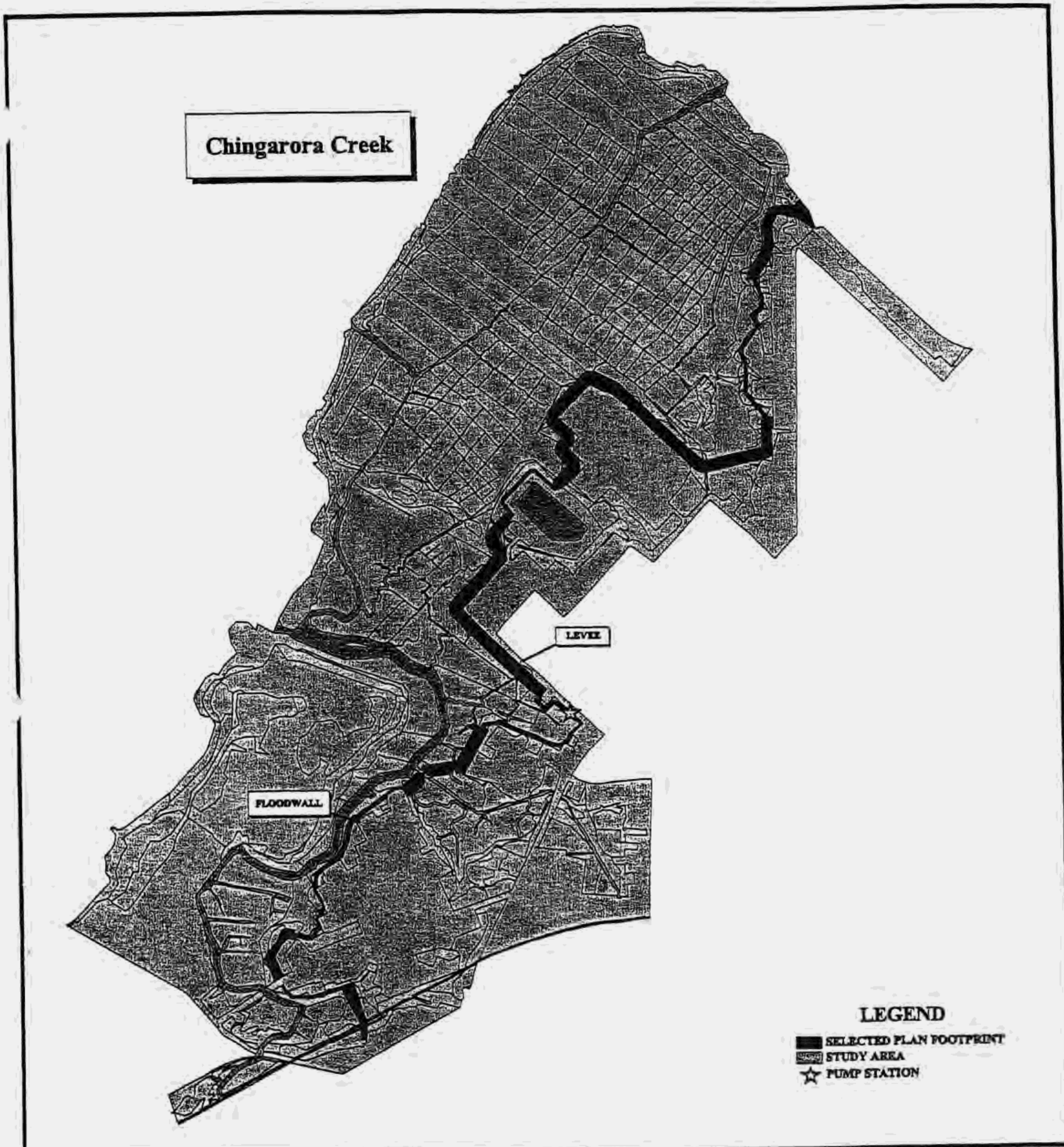
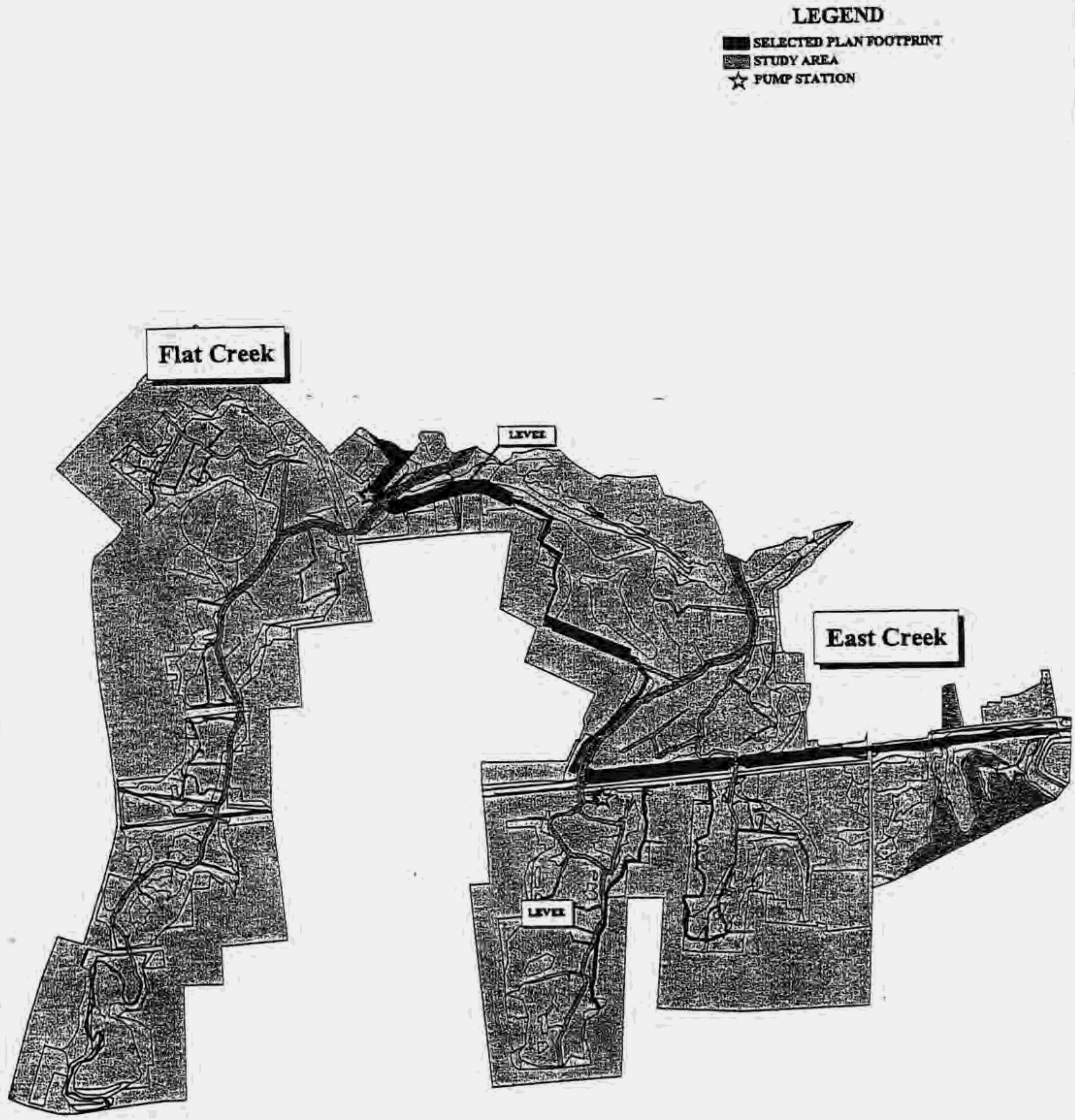


Figure 2a. Selected Plan Features:
Chingarora Creek

Raritan Bay and Sandy Hook Bay
Hurricane and Storm Damage Reduction Study
Union Beach, New Jersey



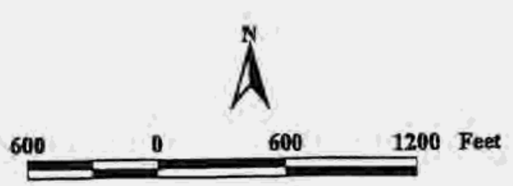


Figure 2b. Selected Plan Features: Flat and East Creeks

Raritan Bay and Sandy Hook Bay
Hurricane and Storm Damage Reduction Study
Union Beach, New Jersey

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APPENDICES

APPENDIX A

Federally Listed Endangered and Threatened Species
and Candidate Species in New Jersey

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW JERSEY

An **ENDANGERED** species is any species that is in danger of extinction throughout all or a significant portion of its range.

A **THREATENED** species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

	COMMON NAME	SCIENTIFIC NAME	STATUS
FISHES	**Shortnose sturgeon***	*Acipenser brevirostrum*	E
REPTILES	**Bog turtle**	*Clemmys muhlenbergii*	T
	Atlantic Ridley turtle*	*Lepidochelys kempii*	E
	Green turtle*	*Chelonia mydas*	T
	Hawksbill turtle*	*Eretmochelys imbricata*	E
	Leatherback turtle*	*Dermochelys coriacea*	E
	Loggerhead turtle*	*Caretta caretta*	T
BIRDS	**Bald eagle**	*Haliaeetus leucocephalus*	T
	Piping plover	*Charadrius melodus*	T
	Roseate tern	*Sterna dougallii dougallii*	E
MAMMALS	**Eastern cougar**	*Felis concolor couguar*	E+
	Indiana bat	*Myotis sodalis*	E
	Gray wolf	*Canis lupus*	E+
	Delmarva fox squirrel	*Sciurus niger cinereus*	E+
	Blue whale*	*Balaenoptera musculus*	E
	Finback whale*	*Balaenoptera physalus*	E
	Humpback whale*	*Megaptera novaeangliae*	E
	Right whale*	*Balaena glacialis*	E
	Sei whale*	*Balaenoptera borealis*	E
	Sperm whale*	*Physeter macrocephalus*	E

	COMMON NAME	SCIENTIFIC NAME	STATUS
INVERTEBRATES	Dwarf wedgemussel	*Alasmidonta heterodon*	E
	Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	T
	Mitchell satyr butterfly	*Neonympha m. mitchellii*	E+
	American burying beetle	*Nicrophorus americanus*	E+
PLANTS	Small whorled pogonia	*Isotria medeoloides*	T
	Swamp pink	*Helonias bullata*	T
	Knieskern's beaked-rush	*Rhynchospora knieskernii*	T
	American chaffseed	*Schwalbea americana*	E
	Sensitive joint-vetch	*Aeschynomene virginica*	T
	Seabeach amaranth	*Amaranthus pumilus*	T

STATUS:			
E	endangered species	PE	proposed endangered
T	threatened species	PT	proposed threatened
+	presumed extirpated**		

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.

** Current records indicate the species does not presently occur in New Jersey, although the species did occur in the State historically.

Note: for a complete listing of Endangered and Threatened Wildlife and Plants, refer to 50 CFR 17.11 and 17.12.

For further information, please contact:

U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Building D
Pleasantville, New Jersey 08232
Phone: (609) 646-9310
Fax: (609) 646-0352

Revised 12/06/00

FEDERAL CANDIDATE SPECIES IN NEW JERSEY

CANDIDATE SPECIES are species that appear to warrant consideration for addition to the federal List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the U.S. Fish and Wildlife Service encourages federal agencies and other planners to give consideration to these species in the environmental planning process.

SPECIES	SCIENTIFIC NAME
Bog asphodel	*Narthecium americanum*
Hirst's panic grass	*Panicum hirstii*

Note: For complete listings of taxa under review as candidate species, refer to Federal Register Vol. 64, No. 205, October 25, 1999 (Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species).

Revised 11/99

FEDERAL CANDIDATE AND STATE-LISTED SPECIES

Candidate species are species under consideration by the U.S. Fish and Wildlife Service (Service) for possible inclusion on the List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the Service encourages federal agencies and other planners to consider federal candidate species in project planning.

The New Jersey Natural Heritage Program maintains the most up-to-date information on federal candidate species and State-listed species in New Jersey and may be contacted at the following address:

Mr. Thomas Breden
Natural Heritage Program
Division of Parks and Forestry
P.O. Box 404
Trenton, New Jersey 08625
(609) 984-0097

Additionally, information on New Jersey's State-listed wildlife species may be obtained from the following office:

Dr. Larry Niles
Endangered and Nongame Species Program
Division of Fish and Wildlife
P.O. Box 400
Trenton, New Jersey 08625
(609) 292-9400

If information from either of the aforementioned sources reveals the presence of any federal candidate species within a project area, the Service should be contacted to ensure that these species are not adversely affected by project activities.

Revised 08/00

APPENDIX B

National Marine Fisheries Service Correspondence of March 26, 1999
Regarding Federally Listed Species and Managed Species
Under NMFS Jurisdiction in the Project Area

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

MAR 26 1999

Mr. Frank Santomauro, P.E.
Chief, Planning Division
Department of the Army
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0900

Dear Mr. Santomauro:

Reference is made to your letter dated November 5, 1998 requesting informal consultation pursuant to Section 7 of the Endangered Species Act for the Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey Combined Erosion Control and Shoreline Protection Project. The Scoping Document included with your letter indicates that beach nourishment is a component of the proposed project. As a result, the potential impacts to the nearshore shallows of Raritan Bay and any offshore borrow sites must be addressed in the environmental documentation for this project. Additional comments have been provided on this project in our letter dated September 2, 1998.

Several species of sea turtles and marine mammals, such as the threatened loggerhead sea turtle (Caretta caretta), and the endangered Kemp's ridley (Lepidochelys kempii), green (Chelonia mydas) and leatherback (Dermochelys coriacea), may be in the project area from June through November. Endangered right whales (Eubalaena glacialis) and humpback whales (Megaptera novaeangliae) may be found in coastal waters of New Jersey during the late winter through early spring. Fin whales (Balaenoptera physalus), the most likely species to occur in the coastal waters of New Jersey, may also be found in the area year round.

Recent information indicates a potential for interactions between federally protected species and dredging activities in the Bight Apex. Hopper dredges conducting maintenance dredging in the federal navigation channels in Delaware Bay and in the southeast have lethally taken sea turtles. In August 1997, a loggerhead sea turtle (Caretta caretta) was taken lethally by a hopper dredge conducting beach nourishment off Monmouth County, New Jersey. Thus, the use of hopper dredges in the New York Bight Apex when sea turtles may be present necessitates initiation of formal Section 7 consultation.

In December 1995, the National Marine Fisheries Service (NMFS) issued a Biological Opinion for Beach Nourishment Projects - South Shore of Long Island and Northern New Jersey Shore, Sandy Hook to Manasquan. Several potential borrow sites for the beach nourishment projects were identified in the biological opinion. The individual and cumulative effects of the use of the identified borrow sites on federally protected sea turtles and marine mammals have been evaluated in this document and an Incidental Take Statement was issued. However, because the Army Corps of Engineers (ACOE) has not identified a borrow site or the quantity of sand needed for this project, we cannot determine if this project is within the scope of the existing biological opinion. As a result, a final determination on ESA issues cannot be made. Based upon the available information, we recommend that the ACOE prepare a biological assessment for all the proposed shore protection/flood control projects planned for the Raritan and Sandy Hook bayshore area. We will continue to coordinate with your office as more project specific details become available to insure compliance with Section 7 of the ESA.

The 1996 Sustainable Fisheries Act amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) require the designation of essential fish habitat (EFH) for federally managed species of fish and shellfish. A list of species for which EFH will be designated in the Northeast is attached. The EFH designations for the New England Fishery Management Council's Northeast Multispecies Fisheries Management Plan have been approved, and the remaining designations are scheduled to be approved this spring. Under the provisions of the MSFMCA, federal agencies are required to consult with the NMFS regarding any action they authorize, fund, or undertake that may adversely affect EFH. Final and preliminary designations indicate that the EFH for several species, including winter flounder (Pleuronectes americanus), summer flounder (Paralichthys dentatus), windowpane flounder (Scophthalmus aquosus), black sea bass (Centropristis striata), scup (Stenotomus chrysops), Atlantic cod (Gadus morhua), Atlantic herring (Clupea harengus), Atlantic butterfish (Peprilus triacanthus), monkfish (Lophius americanus) red hake (Urophycis chuss), whiting (Merluccius bilinearis), witch flounder (Glyptocephalus cynoglossus), yellowtail flounder (Pleuronectes ferrugineus), bluefish (Pomatomus saltatrix), dusky shark (Carcharhinus obscurus), sandbar shark (Carcharhinus plumbeus), tiger shark (Galeocerdo cuvier) and surf clams (Spisula solidissima), may be designated either in the project area or at the offshore borrow sites. As a result, the impacts of the project on EFH must be addressed. We will continue to work with your staff as the EFH designations are finalized to insure compliance with the EFH consultation requirements.

We look forward to continued coordination with your office on this project. If you would like to discuss this matter further, please contact Ms. Karen Greene at our Sandy Hook field office at 732-872-3023.

Sincerely,

Jon C. Rittgers
Acting Regional Administrator

Attachment

kmg.unionbch.re 992

cc: EPA - Region II
FWS - Pleasantville
NJDEP - Land Use
Milford - Haley

ATTACHMENT A

NORTHEAST REGION

LIST OF MANAGED SPECIES FOR WHICH ESSENTIAL FISH HABITAT HAS BEEN DESIGNATED

New England Fisheries Management Council
American plaice - *Hippoglossoides platessoides*
Atlantic cod - *Gadus morhua*
Atlantic halibut - *Hippoglossus hippoglossus*
Atlantic herring - *Clupea harengus*
Atlantic salmon - *Salmo salar*
Atlantic sea scallop - *Placopecten magellanicus*
haddock - *Melanogrammus aeglefinus*
monkfish (goosefish)- *Lophius americanus*
offshore hake - *Merluccius albidus*
ocean pout - *Macrozoarces americanus*
pollock - *Pollachius virens*
redfish - *Sebastes marinus*
red hake - *Urophycis chuss*
silver hake (whiting) - *Merluccius bilinearis*
white hake - *Urophycis tenuis*
windowpane flounder - *Scophthalmus aquosus*
winter flounder - *Pleuronectes americanus*
witch flounder - *Glyptocephalus cynoglossus*
yellowtail flounder -*Pleuronectes ferrugineus*

Mid-Atlantic Fisheries Management Council
Atlantic butterfish - *Peprilus triacanthus*
Atlantic mackerel - *Scomber scombrus*
black sea bass - *Centropristis striata*
bluefish - *Pomatomus saltatrix*
long finned squid - *Loligo pealei*
ocean quahog - *Arctica islandica*
scup - *Stenotomus chrysops*
short finned squid - *Illex illecebrosus*
spiny dogfish - *Squalus acanthias*
summer flounder - *Paralichthys dentatus*
surf clam - *Spisula solidissima*
tilefish - *Lopholatilus chamaeleonticeps*

National Marine Fisheries Service Highly Migratory Species
albacore - *Thunnus alalunga*
bigeye tuna - *Thunnus obesus*
bluefin tuna - *Thunnus thynnus*
Skipjack tuna - *Katsuwonus pelamis*
swordfish - *Xiphias gladius*

yellowfin tuna - *Thunnus albacares*
blue marlin - *Makaira nigricans*
white marlin - *Tetrapturus albidus*

<u>Sharks</u>

tiger - *Galeocerdo cuvier*
scalloped hammerhead - *Sphyrna lewini*
sandbar - *Carcharhinus plumbeus*
sand tiger - *Odontaspis taurus*
dusky -*Carcharhinus obscurus*
basking - *Cetorhinus maximus*
silky - *Carcharhinus falciformis*
white - *Carcharodon carcharias*
Atlantic sharpnose - *Rhizoprionodon terraenovae*
Atlantic angel - *Squatina dumerili*
shortfin mako - *Isurus oxyrinchus*
longfin mako - *Isurus paucus*
porbeagle - *Lamma nasus*
thresher - *Alopias vulpinus*
blue - *Prionace glauca*

South Atlantic Fisheries Management Council

cobia - *Rachycentron canadum*
golden crab - *Chaeceon fenneri*
king mackerel - *Scomberomorus cavalla*
red drum - *Sciaenops ocellatus*
Spanish mackerel - *Scomberomorus maculatus*

APPENDIX C

State-Listed Endangered and Threatened Species in New Jersey

and

Office of Natural Lands Management's Natural Heritage Program
Rare Species Information

ew Jersey Division of Fish and Wildlife

nserve
vildlife

ivision of Fish & Wildlife
ngered & Nongame Species Program

Endangered and Threatened Wildlife of New Jersey

dangered Species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, -exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in New ey.

eatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate.

updated 3/18/02

BIRDS			
Endangered		**Threatened**	
ittern, American	*Botaurus lentiginosos**	Bobolink	*Dolichonyx oryzivorus*
Eagle, bald	*Haliaeetus leucocephalus* BR **	Eagle, bald	*Haliaeetus leucocephalus* NB **
alcon, peregrine	*Falco peregrinus*	Hawk, Cooper's	*Accipiter cooperii*
wk, northern	*Accipiter gentilis**	Hawk, red-shouldered	*Buteo lineatus* NB
rebe, pied-billed	*Podilymbus podiceps**	Night-heron, black-crowned	*Nycticorax nycticorax**
Harrier, northern	*Circus cyaneus**	Night-heron, yellow-crowned	*Nyctanassa violaceus*
awk, red-shouldered	*Buteo lineatus* BR	Knot, red	*Calidris canutus*
Owl, short-eared	*Asio flammeus**	Osprey	*Pandion haliaetus**
lover, piping	*Charadrius melodus***	Owl, barred	*Strix varia*
andpiper, upland	*Batramia longicauda*	Owl, long-eared	*Asio otus*
hrike, loggerhead	*Lanius ludovicianus*	Rail, black	*Laterallus jamaicensis*
kimmer, black	*Rynchops niger* BR	Skimmer, black	*Rynchops niger* NB
Sparrow, Henslow's	*Ammodramus henslowii*	Sparrow, grasshopper	*Ammodramus savannarum**
parrow, vesper	*Pooecetes gramineus* BR	Sparrow, Savannah	*Passerculus sandwichensis**
Tern, least	*Sterna antillarum*	Sparrow, vesper	*Pooecetes gramineus* NB
ern, roseate	*Sterna dougallii***	Woodpecker, red-headed	*Melanerpes erythrocephalus*
Wren, sedge	*Cistothorus platensis*		
*Only breeding population considered endangered or threatened			
**Federally endangered or threatened			
BR - Breeding population only; NB - non-breeding population only			

REPTILES			
Endangered		Threatened	
Rattlesnake, timber	*Crotalus h. horridus*	Snake, northern pine	*Pituophis m. melanoleucus*
Snake, corn	*Elaphe g. guttata*	Turtle, Atlantic green	*Chelonia mydas***
Turtle, bog	*Clemmys muhlenbergii*	Turtle, wood	*Clemmys insculpta*
Atlantic Hawksbill	*Eretmochelys imbricata***		
Atlantic Leatherback	*Dermochelys coriacea***		
Atlantic Loggerhead	*Caretta caretta***		
Atlantic Ridley	*Lepidochelys kempi***		
**Federally endangered or threatened			

AMPHIBIANS			
Endangered		Threatened	
Salamander, blue-spotted	*Ambystoma laterale*	Salamander, eastern mud	*Pseudotriton montanus*
Salamander, eastern tiger	*Ambystoma tigrinum*	Salamander, long-tailed	*Eurycea longicauda*
Salamander, Tremblay's	*Ambystoma tremblayi*		
Treefrog, pine barrens	*Hyla andersonii*		
Treefrog, southern gray	*Hyla chrysocelis*		

INVERTEBRATES			
Endangered		Threatened	
e American burying	*Nicrophorus mericanus***	Beetle, northeastern beach tiger	*Cincindela d. dorsalis***
pper, bronze	*Lycaena hyllus*	Floater, triangle (mussel)	*Alasmidonta undulata*
loater, brook (mussel)	*Alasmidonta varicosa*	Elfin, frosted (butterfly)	*Callophrys irus*
ater, green (mussel)	*Lasmigona subviridis*	Fritillary, silver-bordered (butterfly)	*Bolaria selene myrina*
kipper, arogos (butterfly)	*Atrytone arogos arogos*	Lampmussel, eastern (mussel)	*Lampsilis radiata*
ipper, Appalachian grizzled butterfly)	*Pyrgus wyandot*	Lampmussel, yellow (mussel)	*Lampsilis cariosa*
		Mucket, tidewater (mussel)	*Leptodea ochracea*
		Mussel, dwarf wedge	*Alasmidonta heterodon***
		Pondmussel, eastern (mussel)	*Ligumia nasuta*
		Satyr, Mitchell's (butterfly)	*Neonympha m. mitchellii***
		White, checkered (butterfly)	*Pontia protodice*
		**Federally endangered or threatened	

MAMMALS	
Endangered	
Bat, Indiana	*Myotis sodalis***
Bobcat	*Lynx rufus*
Whale, black right	*Balaena glacialis***
Whale, blue	*Balaenoptera musculus***
Whale, fin	*Balaenoptera physalus***
Whale, humpback	*Megaptera novaeangliae***
Whale, sei	*Balaenoptera borealis***
Whale,sperm	*Physeter macrocephalus***
Woodrat, eastern	*Neotoma floridana*
**Federally Endangered	

FISH	
Endangered	
Sturgeon, shortnose	*Acipenser brevirostrum***
**Federally Endangered	

-ists of New Jersey's endangered and nongame wildlife species are maintained by the DEP's Division of Fish and Wildlife's Endangered and ;ame Species Program. These lists are used to determine protection and management actions necessary to ensure the survival of the e's endangered and nongame wildlife. This work is made possible through voluntary contributions received through Check-off donations to Endangered Wildlife Conservation Fund on the New Jersey State Income Tax Form, the sale of Conserve Wildlife License Plates, and ltions. For more information about the Endangered and Nongame Species Program or to report a sighting of endangered or threatened ife, contact the Endangered and Nongame Species, NJ Division of Fish and Wildlife, P.O. Box 400, Trenton, NJ 08625-0400, or call 609- -9400.

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
Division of Parks and Forestry
Office of Natural Lands Management
Natural Heritage Program
P.O. Box 404
Trenton, NJ 08625-0404
Tel. #609-984-1339
Fax. #609-984-1427

Robert C. Shinn, Jr.
Commissioner

March 1, 2000

Brad Schaeffer
Northern Ecological Associates, Inc.
451 Presumpscot Street
Portland, ME 04103

Re: USACOE Union Beach Flood Control Project

Dear Mr. Schaeffer:

Thank you for your data request regarding rare species information for the above referenced project site in Union Beach and Keyport Boroughs, Monmouth County.

The Natural Heritage Data Base has records for occurrences of migratory shorebird concentration site that may be on the site, for osprey that may be on or in the immediate vicinity of the site, and another occurrence for osprey that may be in the immediate vicinity of the site. The attached lists provide more information about these occurrences. **Because some species are sensitive to disturbance or sought by collectors, this information is provided to you on the condition that no specific locational data are released to the general public. This is not intended to preclude your submission of this information to regulatory agencies from which you are seeking permits.**

Also attached is a list of rare species from records in the general vicinity of the project site (within approximately two miles). This includes the rare occurrences located on and in the immediate vicinity of the site. Also attached is a list of rare species and natural communities that have been documented from Monmouth County. This county list can be used as a master species list for directing further inventory work. If suitable habitat is present at the project site, these species have potential to be present. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend you contact the Division of Fish, Game and Wildlife, Endangered and Nongame Species Program.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Thomas F. Breden
Supervisor

cc: Lawrence Niles
Thomas Hampton
NHP File No. 00-4007442

NATURAL LANDS MANAGEMENT

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

The quantity and quality of data collected by the Natural Heritage Program is dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. Some natural areas in New Jersey have never been thoroughly surveyed. As a result, new locations for plant and animal species are continuously added to the data base. Since data acquisition is a dynamic, ongoing process, the Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of New Jersey. Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The attached data is provided as one source of information to assist others in the preservation of natural diversity.

This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Land Use Regulation Program, P.O. Box 401, Trenton, NJ 08625-0401.

This cautions and restrictions notice must be included whenever information provided by the Natural Heritage Database is published.

POSSIBLY ON PROJECT SITE

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

THE NEW JERSEY NATURAL HERITAGE DATABASE

IE	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
Other types									
GRATORY SHOREBIRD CENTRATION SITE	MIGRATORY SHOREBIRD CONCENTRATION SITE				G?	S?	1982-10-??	Y	MOUTH OF CHINGARORA CREEK ON RARITAN BAY, AT NORTHEAST BOUNDARY OF KEYPORT BORO. WITHIN KEYPORT HARBOR.

Records Processed

ON OR IN IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

...ME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
... Vertebrates									
...NDION HALIAETUS	OSPREY		T/T		G5	S2B	1987-??-??	Y	LOCATED AT THE BASE OF THE SPIT BETWEEN CONASKONK POINT AND POINT COMFORT.

Records Processed

IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

E	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
Vertebrates									
DION HALIAETUS	OSPREY		T/T		G5	S2B	1987-??-??	Y	LOCATED AT THE END OF THE SPIT BETWEEN CONASKONK PT. AND POINT COMFORT.

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GENERAL VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

IE	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
Vertebrates								
:TANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON		T/T		G5	S2B	1996-09-??	Y
IDION HALIAETUS	OSPREY		T/T		G5	S2B	1987-??-??	Y
IDION HALIAETUS	OSPREY		T/T		G5	S2B	1987-??-??	Y
IDION HALIAETUS	OSPREY		T/T		G5	S2B	1987-??-??	Y
:RNA ANTILLARUM	LEAST TERN		E		G4	S1B	1986-SUMMR	Y
Other types								
IRATORY SHOREBIRD ICENTRATION SITE	MIGRATORY SHOREBIRD CONCENTRATION SITE				G?	S?	1982-10-??	Y

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1999

MONMOUTH COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN THE NEW JERSEY NATURAL HERITAGE DATABASE

	NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
tebrates	ACCIPITER COOPERII	COOPER'S HAWK		T/T		G5	S3B,S4N
	AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/S		G5	S2B
	BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		G5	S1B
	CHARADRIUS MELODUS	PIPING PLOVER	LT	E		G3	S1B
	CLEMMYS INSCULPTA	WOOD TURTLE		T		G4	S3
	CLEMMYS MUHLENBERGII	BOG TURTLE	LT	E		G3	S2
	CROTALUS HORRIDUS HORRIDUS	TIMBER RATTLESNAKE		E		G4T4	S2
	DOLICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2B
	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	E		G4	S1B,S2N
	HYLA ANDERSONII	PINE BARRENS TREEFROG		E		G4	S3
	MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		T/T		G5	S2B,S2N
	NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON		T/T		G5	S2B
	PANDION HALIAETUS	OSPREY		T/T		G5	S2B
	PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2B,S4N
	PITUOPHIS MELANOLEUCUS MELANOLEUCUS	NORTHERN PINE SNAKE		T		G4T4	S3
	PODILYMBUS PODICEPS	PIED-BILLED GREBE		E/E		G5	S1B,S3N
	POOECETES GRAMINEUS	VESPER SPARROW		E		G5	S1B,S2N
	RYNCHOPS NIGER	BLACK SKIMMER		E		G5	S1B
	STERNA ANTILLARUM	LEAST TERN		E		G4	S1B
	STRIX VARIA	BARRED OWL		T/T		G5	S3B
cosystems	COASTAL DUNE WOODLAND	COASTAL DUNE WOODLAND				G2G3	S1
	FLOODPLAIN FOREST	FLOODPLAIN FOREST				G4	S3?
	MARITIME FOREST	MARITIME FOREST				G3?	S1
nvertebrates	APAMEA APAMIFORMIS	A NOCTUID MOTH				G4	S2S4

MONMOUTH COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

THE NEW JERSEY NATURAL HERITAGE DATABASE

	NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
	CALLOPHRYS HENRICI	HENRY'S ELFIN				G5	S3S4
	CALLOPHRYS IRUS	FROSTED ELFIN				G3	S2S3
	CHYTONIX SENSILIS	A NOCTUID MOTH				G4	S1S3
	CICINDELA DORSALIS DORSALIS	NORTHEASTERN BEACH TIGER BEETLE	LT	E		G4T2	S1
	ENALLAGMA RECURVATUM	PINE BARRENS BLUET				G3	S3
	LIBELLULA AURIPENNIS	GOLDEN-WINGED SKIMMER				G5	S1S2
	METARRANTHIS PILOSARIA	COASTAL SWAMP METARRANTHIS				G3G4	S3S4
	NEONYMPHA AREOLATA SEPTENTRIONALIS	A SATYR				G4T3T4	S3
	PAPAIPEMA NECOPINA	SUNFLOWER BORER MOTH				G4?	SH
	PYGARCTIA ABDOMINALIS	YELLOW EDGED PYGARCTIA				G3G4	SH
	SPEYERIA APHRODITE	APHRODITE FRITILLARY				G5	S2S3
	SPEYERIA IDALIA	REGAL FRITILLARY				G3	SX
	ZALE CUREMA	A NOCTUID MOTH				G3G4	SU
Other types							
	MIGRATORY SHOREBIRD CONCENTRATION SITE	MIGRATORY SHOREBIRD CONCENTRATION SITE				G?	S?
Vascular plants							
	AGASTACHE NEPETOIDES	YELLOW GIANT HYSSOP				G5	S2
	AMARANTHUS PUMILUS	SEA-BEACH PIGWEED	LT	E		G2	SH
	ARTEMISIA CAMPESTRIS SSP CAUDATA	WILD WORMWOOD				G5T5	S2
	ASCLEPIAS RUBRA	RED MILKWEED			LP	G4G5	S2
	ASCLEPIAS VARIEGATA	WHITE MILKWEED				G5	S2
	ASTER INFIRMUS	CORNEL-LEAVED ASTER				G5	S2
	ASTER RADULA	LOW ROUGH ASTER		E		G5	S1
	CACALIA ATRIPLICIFOLIA	PALE INDIAN PLANTAIN		E		G4G5	S1

MONMOUTH COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
CALAMAGROSTIS PICKERINGII	PICKERING'S REEDGRASS		E		G4	S1
CALAMOVILFA BREVIPILIS	PINE BARREN REEDGRASS			LP	G4	S4
CAREX BARRATTII	BARRATT'S SEDGE			LP	G3G4	S4
CAREX CUMULATA	CLUSTERED SEDGE		E		G4?	SH
CAREX POLYMORPHA	VARIABLE SEDGE		E		G3	S1
CERATOPHYLLUM ECHINATUM	SPINY COONTAIL		E		G4?	S1
CRATAEGUS CALPODENDRON	PEAR HAWTHORN		E		G5	S1
CRATAEGUS SUCCULENTA	FLESHY HAWTHORN		E		G5	S1
CYPERUS LANCASTRIENSIS	LANCASTER FLATSEDGE				G5	S1
CYPERUS POLYSTACHYOS	COAST FLATSEDGE		E		G5	S1
DESMODIUM HUMIFUSUM	TRAILING TICK-TREFOIL		E		G1G2Q	SH
DIODIA VIRGINIANA	LARGER BUTTONWEED		E		G5	S1
DIRCA PALUSTRIS	LEATHERWOOD				G4	S2
ERIOCAULON PARKERI	PARKER'S PIPEWORT				G3	S2
FRAXINUS PROFUNDA	PUMPKIN ASH		E		G4	S1
GENTIANA AUTUMNALIS	PINE BARREN GENTIAN			LP	G3	S3
GLAUX MARITIMA	SEA-BEACH MILKWORT		E		G5	SH
HELONIAS BULLATA	SWAMP-PINK	LT	E	LP	G3	S3
HYDROCOTYLE VERTICILLATA	WHORLED PENNYWORT				G5	S2
JUNCUS CAESARIENSIS	NEW JERSEY RUSH		E	LP	G2	S2
LIATRIS SCARIOSA VAR NOVAE-ANGLIAE	NORTHERN BLAZING STAR		E		G5?T3	SH
LIMOSELLA SUBULATA	MUDWEED		E		G4?	S1
LINUM INTERCURSUM	SANDPLAIN FLAX		E		G4	S1
LISTERA AUSTRALIS	SOUTHERN TWAYBLADE			LP	G4	S2
LUZULA ACUMINATA	HAIRY WOODRUSH		E		G5	S1
LYGODIUM PALMATUM	CLIMBING FERN			LP	G4	S2
MYRIOPHYLLUM TENELLUM	SLENDER WATER-MILFOIL		E		G5	S1
ONOSMODIUM VIRGINIANUM	VIRGINIA FALSE-GROMWELL		E		G4	S1
PHORADENDRON SEROTINUM	MISTLETOE			LP	G5	S2

MONMOUTH COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

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NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
PLANTAGO MARITIMA	SEA-SIDE PLANTAIN				G5	S2
PLANTAGO PUSILLA	SLENDER PLANTAIN		E		G5	SH
PLATANTHERA PERAMOENA	PURPLE FRINGELESS ORCHID		E		G5	S1
POLYGONUM GLAUCUM	SEA-BEACH KNOTWEED		E		G3	S1
PYCNANTHEMUM TORREI	TORREY'S MOUNTAIN MINT		E		G2	S1
PYROLA CHLORANTHA	GREENISH-FLOWERED WINTERGREEN		E		G5	S1
RANUNCULUS CYMBALARIA	SEA-SIDE CROWFOOT		E		G5	SH
RHYNCHOSPORA GLOBULARIS	GRASS-LIKE BEAKED RUSH		E		G5	S1
RHYNCHOSPORA KNIESKERNII	KNIESKERN'S BEAKED RUSH	LT	E	LP	G1	S1
RHYNCHOSPORA PALLIDA	PALE BEAK RUSH				G3	S3
RUMEX HASTATULUS	HEART-WINGED SORRELL				G5	SX.1
SAGITTARIA AUSTRALIS	SOUTHERN ARROW HEAD		E		G5	S1
SALIX LUCIDA	SHINING WILLOW				G5	S2
SCIRPUS MARITIMUS	SALT MARSH BULRUSH		E		G5	SH
SCLERIA MINOR	SLENDER NUT RUSH			LP	G4	S4
TRIGLOCHIN MARITIMUM	SEA-SIDE ARROW-GRASS		E		G5	S1
UVULARIA PUBERULA VAR NITIDA	PINE BARREN BELLWORT		E		G5T3?	S2
VERBENA SIMPLEX	NARROW-LEAVED VERVAIN		E		G5	S1

91 Records Processed

APPENDIX D

Guidelines for Managing Recreational Activities
in Piping Plover Breeding Habitat on the U.S. Atlantic Coast
to Avoid Take Under Section 9 of the Endangered Species Act

and

Endangered Beach Nesting Bird Management
on New Jersey's Municipal Beaches

GUIDELINES FOR MANAGING RECREATIONAL ACTIVITIES IN PIPING PLOVER BREEDING HABITAT ON THE U.S. ATLANTIC COAST TO AVOID TAKE UNDER SECTION 9 OF THE ENDANGERED SPECIES ACT

Northeast Region, U.S. Fish and Wildlife Service
April 15, 1994

The following information is provided as guidance to beach managers and property owners seeking to avoid potential violations of Section 9 of the Endangered Species Act (16 U.S.C. 1538) and its implementing regulations (50 CFR Part 17) that could occur as the result of recreational activities on beaches used by breeding piping plovers along the Atlantic Coast. These guidelines were developed by the Northeast Region, U.S. Fish and Wildlife Service (Service), with assistance from the U.S. Atlantic Coast Piping Plover Recovery Team. The guidelines are advisory, and failure to implement them does not, of itself, constitute a violation of the law. Rather, they represent the Service's best professional advice to beach managers and landowners regarding the management options that will prevent direct mortality, harm, or harassment of piping plovers and their eggs due to recreational activities.

Some land managers have endangered species protection obligations under Section 7 of the Endangered Species Act (see section I below) or under Executive Orders 11644 and 11989[1] that go beyond adherence to these guidelines. Nothing in this document should be construed as lack of endorsement of additional piping plover protection measures implemented by these land managers or those who are voluntarily undertaking stronger plover protection measures.

This document contains four sections: (I) a brief synopsis of the legal requirements that afford protection to nesting piping plovers; (II) a brief summary of the life history of piping plovers and potential threats due to recreational activities during the breeding cycle; (III) guidelines for protecting piping plovers from recreational activities on Atlantic Coast beaches; and (IV) literature cited.

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[1] Executive Order 11644, Use of Off-Road Vehicles on the Public Lands and Executive Order 1989, Off-Road Vehicles on Public Lands pertain to lands under custody of the Secretaries of Agriculture, Defense, and Interior (except for Indian lands) and certain lands under the custody of the Tennessee Valley Authority.

I. LEGAL CONSIDERATIONS

Section 9 of the Endangered Species Act (ESA) prohibits any person subject to the jurisdiction of the United States from harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting listed wildlife species. It is also unlawful to attempt such acts, solicit another to commit such acts, or cause such acts to be committed. A "person" is defined in Section 3 to mean "an individual, corporation, partnership, trust, association, or any other private entity; or any officer, employee, agent, department, or instrumentality of the Federal Government, of any State, municipality, or political subdivision of a State, or of any foreign government; any State, municipality, or political subdivision of a State; or any other entity subject to the jurisdiction of the United States." Regulations implementing the ESA (50 CFR 17.3) further define "harm" to include significant habitat modification or degradation that results in the killing or injury of wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. "Harass" means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Penalties for violations of Section 9 are provided in Section 11 of the ESA; for threatened species, these penalties include fines of up to $25,000, imprisonment for not more than six months, or both.

Section 10 of the ESA and related regulations provide for permits that may be granted to authorize acts prohibited under Section 9, for scientific purposes or to enhance the propagation or survival of a listed species. States that have Cooperative Agreements under Section 6 of the ESA, may provide written authorization for take that occurs in the course of implementing conservation programs. For example, State agencies have authorized certain biologists to construct predator exclosures for piping plovers. It is also legal for employees or designated agents of certain Federal or State agencies to take listed species without a permit, if the action is necessary to aid sick, injured, or orphaned animals or to salvage or dispose of a dead specimen.

Section 10 also allows permits to be issued for take that is "incidental to, and not the purpose of, carrying out an otherwise lawful activity" if the Service determines that certain conditions have been met. An applicant for an incidental take permit must prepare a conservation plan that specifies the impacts of the take, steps the applicant will take to minimize and mitigate the impacts, funding that will be available to implement these steps, alternative actions to the take that the applicant considered, and the reasons why such alternatives are not being utilized.

Section 7 of the ESA may be pertinent to beach managers and landowners in situations that have a Federal nexus. Section 7 requires Federal agencies to consult with the Service (or National Marine Fisheries Service for marine species) prior to authorizing, funding, or carrying out activities that may affect listed species. Section 7 also requires that these agencies use their authorities to further the conservation of listed species. Section 7 obligations have caused Federal land management agencies to implement piping plover protection measures that go beyond those required to avoid take, for example by conducting research on threats to piping plovers. Other examples of Federal activities that may affect piping plovers along the Atlantic Coast, thereby triggering Section 7 consultation, include permits for beach nourishment or disposal of dredged material (U.S. Army Corps of Engineers) and funding of beach restoration projects (Federal Emergency Management Authority).

Piping plovers, as well as other migratory birds such as least terns, common terns, American oystercatchers, laughing gulls, herring gulls, and great black-backed gulls, their nests, and eggs are also protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712). Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting such conduct. Violators may be fined up to $5000 and/or imprisoned for up to six months.

Almost all States within the breeding range of the Atlantic Coast piping plover population list the species as State threatened or endangered (Northeast Nongame Technical Committee 1993). Various laws and regulations may protect State-listed species from take, but the Service has not ascertained the adequacy of the guidelines presented in this document to meet the requirements of any State law.

II. LIFE HISTORY AND THREATS FROM HUMAN DISTURBANCE

Piping plovers are small, sand-colored shorebirds that nest on sandy, coastal beaches from South Carolina to Newfoundland. Since 1986, the Atlantic Coast population has been protected as a threatened species under provisions of the U.S. Endangered Species Act of 1973 (U.S. Fish and Wildlife Service 1985). The U.S. portion of the population was estimated at 875 pairs in 1993 (U.S. Fish and Wildlife Service 1993). Many characteristics of piping plovers contribute to their susceptibility to take due to human beach activities.

LIFE HISTORY

Piping plovers begin returning to their Atlantic Coast nesting beaches in mid-March (Coutu et al. 1990, Cross 1990, Goldin 1990, MacIvor 1990, Hake 1993). Males establish and defend territories and court females (Cairns 1982). Eggs may be present on the beach from mid-April through late July. Clutch size is generally four eggs, and the incubation period[2] usually lasts for 27-28 days. Piping plovers fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial[3] (Wilcox 1959, Cairns 1982). They may move hundreds of yards from the nest site during their first week of life (see Table 1, Summary of Chick Mobility Data). Chicks remain together with one or both parents until they fledge (are able to fly) at 25 to 35 days of age. Depending on date of hatching, flightless chicks may be present from mid-May until late August, although most fledge by the end of July (Patterson 1988, Goldin 1990, MacIvor 1990, Howard et al. 1993).

Piping plover nests are situated above the high tide line on coastal beaches, sand flats at the ends of sandspits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover areas cut into or between dunes. They may also nest on areas where suitable dredge material has been deposited. Nest sites are shallow scraped depressions in substrates ranging from fine grained sand to mixtures of sand and pebbles, shells or cobble (Bent 1929, Burger 1987a, Cairns 1982, Patterson 1988, Flemming et al. 1990, MacIvor 1990,

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[2] "Incubation" refers to adult birds sitting on eggs, to maintain them at a favorable temperature for embryo development.

[3] "Precocial" birds are mobile and capable of foraging for themselves within several hours of hatching.

Strauss 1990). Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (Ammophila breviligulata) or other vegetation (Patterson 1988, Flemming et al. 1990, MacIvor 1990). Plover nests may be very difficult to detect, especially during the 6-7 day egg-laying phase when the birds generally do not incubate (Goldin 1994).

Plover foods consist of invertebrates such as marine worms, fly larvae, beetles, crustaceans or mollusks (Bent 1929, Cairns 1977, Nicholls 1989). Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines[4], and shorelines of coastal ponds, lagoons or salt marshes (Gibbs 1986, Coutu et al. 1990, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu et al. 1990, McConnaughey et al. 1990, Loegering 1992, Goldin 1993, Hoopes 1993) and by stage in the breeding cycle (Cross 1990). Adults and chicks on a given site may use different feeding habitats in varying proportion (Goldin et al. 1990). Feeding activities of chicks may be particularly important to their survival. Cairns (1977) found that piping plover chicks typically tripled their weight during the first two weeks post-hatching; chicks that failed to achieve at least 60% of this weight gain by day 12 were unlikely to survive. During courtship, nesting, and brood rearing, feeding territories are generally contiguous to nesting territories (Cairns 1977), although instances where brood-rearing areas are widely separated from nesting territories are not uncommon (see Table 1). Feeding activities of both adults and chicks may occur during all hours of the day and night (Burger 1993) and at all stages in the tidal cycle (Goldin 1993, Hoopes 1993).

THREATS FROM NONMOTORIZED BEACH ACTIVITIES

Sandy beaches that provide nesting habitat for piping plovers are also attractive recreational habitats for people and their pets. Nonmotorized recreational activities can be a source of both direct mortality and harassment of piping plovers. Pedestrians on beaches may crush

[4] Wrack is organic material including seaweed, seashells, driftwood and other materials deposited on beaches by tidal action.

eggs (Burger 1987b, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Unleashed dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980).

Pedestrians may flush incubating plovers from nests (see Table 2, Summary of Data on Distances at Which Plovers React to Disturbance), exposing eggs to avian predators or causing excessive cooling or heating of eggs. Repeated exposure of shorebird eggs on hot days may cause overheating, killing the embryos (Bergstrom 1991). Excessive cooling may kill embryos or retard their development, delaying hatching dates (Welty 1982). Pedestrians can also displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Fireworks are highly disturbing to piping plovers (Howard et al. 1993). Plovers are particularly intolerant of kites, compared with pedestrians, dogs, and vehicles; biologists believe this may be because plovers perceive kites as potential avian predators (Hoopes et al. 1992).

THREATS FROM MOTOR VEHICLES

Unrestricted use of motorized vehicles on beaches is a serious threat to piping plovers and their habitats. Vehicles can crush eggs (Wilcox 1959; Tull 1984; Burger 1987b; Patterson et al. 1991; United States of America v. Breezy Point Cooperative, Inc., U.S. District Court, Eastern District of New York, Civil Action No. CV-90-2542, 1991; Shaffer and Laporte 1992), adults, and chicks. In Massachusetts and New York, biologists documented 14 incidents in which 18 chicks and 2 adults were killed by vehicles between 1989 and 1993 (Melvin et al. 1994). Goldin (1993) compiled records of 34 chick mortalities (30 on the Atlantic Coast and 4 on the Northern Great Plains) due to vehicles. Many biologists that monitor and manage piping plovers believe that many more chicks are killed by vehicles than are found and reported (Melvin et al. 1994). Beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding plovers than available nesting and feeding habitat can support. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions during chick-rearing periods have been combined with protection of nests from predators (Goldin 1993; S. Melvin, pers. comm., 1993).

Typical behaviors of piping plover chicks increase their vulnerability to vehicles. Chicks frequently move between the upper berm or foredune and feeding habitats in the wrack line and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Eddings et al. 1990, Strauss 1990, Howard et al. 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes et al. 1992, Goldin 1993). Wire fencing placed around nests to deter predators (Rimmer and Deblinger 1990, Melvin et al. 1992) is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed (see Table 1).

Vehicles may also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes et al. 1992, Goldin 1993).

III. GUIDELINES FOR PROTECTING PIPING PLOVERS FROM RECREATIONAL DISTURBANCE

The Service recommends the following protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks.

MANAGEMENT OF NONMOTORIZED RECREATIONAL USES

On beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users are present in numbers that could harm or disturb incubating plovers, their eggs, or chicks, areas of at least 50 meter-radius around nests above the high tide line should be delineated with warning signs and symbolic fencing[5]. Only persons engaged in rare species monitoring, management, or research activities should enter posted areas. These areas should remain fenced as long as viable eggs or unfledged chicks are present. Fencing is intended to prevent accidental crushing of nests and repeated flushing of

[5]"Symbolic fencing" refers to one or two strands of light-weight string, tied between posts to delineate areas where pedestrians and vehicles should not enter.

incubating adults, and to provide an area where chicks can rest and seek shelter when large numbers of people are on the beach.

Available data indicate that a 50 meter buffer distance around nests will be adequate to prevent harassment of the majority of incubating piping plovers. However, fencing around nests should be expanded in cases where the standard 50 meter-radius is inadequate to protect incubating adults or unfledged chicks from harm or disturbance. Data from various sites distributed across the plover's Atlantic Coast range indicates that larger buffers may be needed in some locations (see Table 2). This may include situations where plovers are especially intolerant of human presence, or where a 50 meter-radius area provides insufficient escape cover or alternative foraging opportunities for plover chicks.[6]

In cases where the nest is located less than 50 meters above the high tide line, fencing should be situated at the high tide line, and a qualified biologist should monitor responses of the birds to passersby, documenting his/her observations in clearly recorded field notes. Providing that birds are not exhibiting signs of disturbance, this smaller buffer may be maintained in such cases.

On portions of beaches that receive heavy human use, areas where territorial plovers are observed should be symbolically fenced to prevent disruption of territorial displays and courtship. Since nests can be difficult to locate, especially during egg-laying, this will also prevent accidental crushing of undetected nests. If nests are discovered outside fenced areas, fencing should be extended to create a sufficient buffer to prevent disturbance to incubating adults, eggs, or unfledged chicks.

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[6] For example, on the basis of data from an intensive three year study that showed that plovers on Assateague Island in Maryland flush from nests at greater distances than those elsewhere (Loegering 1992), the Assateague Island National Seashore established 200 meter buffers zones around most nest sites and primary foraging areas (Assateague Island National Seashore 1993). Following a precipitous drop in numbers of nesting plover pairs in Delaware in the late 1980's, that State adopted a Piping Plover Management Plan that provided 100 yard buffers around nests on State park lands and included intertidal areas (Delaware Department of Natural Resources and Environmental Control 1990).

Pets should be leashed and under control of their owners at all times from April 1 to August 31 on beaches where piping plovers are present or have traditionally nested. Pets should be prohibited on these beaches from April 1 through August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.

Kite flying should be prohibited within 200 meters of nesting or territorial adult or unfledged juvenile piping plovers between April 1 and August 31.

Fireworks should be prohibited on beaches where plovers nest from April 1 until all chicks are fledged.

MOTOR VEHICLE MANAGEMENT

The Service recommends the following minimum protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks on beaches where vehicles are permitted. Since restrictions to protect unfledged chicks often impede vehicle access along a barrier spit, a number of management options affecting the timing and size of vehicle closures are presented here. Some of these options are contingent on implementation of intensive plover monitoring and management plans by qualified biologists. It is recommended that landowners seek concurrence with such monitoring plans from either the Service or the State wildlife agency.

Protection of Nests

All suitable piping plover nesting habitat should be identified by a qualified biologist and delineated with posts and warning signs or symbolic fencing on or before April 1 each year. All vehicular access into or through posted nesting habitat should be prohibited. However, prior to hatching, vehicles may pass by such areas along designated vehicle corridors established along the outside edge of plover nesting habitat. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers are disturbed by passing or parked vehicles, or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

If data from several years of plover monitoring suggests that significantly more habitat is available than the local plover population can occupy, some suitable habitat may be left unposted if the following conditions are met:

1. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:

A. Estimates the number of pairs likely to nest on the site based on the past monitoring and regional population trends.

AND

B. Delineates the habitat that will be posted or fenced prior to April 1 to assure a high probability that territorial plovers will select protected areas in which to court and nest. Sites where nesting or courting plovers were observed during the last three seasons as well as other habitat deemed most likely to be pioneered by plovers should be included in the posted and/or fenced area.

AND

C. Provides for monitoring of piping plovers on the beach by a qualified biologist(s). Generally, the frequency of monitoring should be not less than twice per week prior to May 1 and not less than three times per week thereafter. Monitoring should occur daily whenever moderate to large numbers of vehicles are on the beach. Monitors should document locations of territorial or courting plovers, nest locations, and observations of any reactions of incubating birds to pedestrian or vehicular disturbance.

AND

2. All unposted sites are posted immediately upon detection of territorial plovers.

Protection of Chicks

Sections of beaches where unfledged piping plover chicks are present should be temporarily closed to all vehicles not deemed essential. (See the provisions for essential vehicles below.) Areas where vehicles are prohibited should include all dune, beach, and intertidal habitat within the chicks' foraging range, to be determined by either of the following methods:

1. The vehicle free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 2000 meter-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles.

OR

2. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:

A. Provides for monitoring of all broods during the chick-rearing phase of the breeding season and specifies the frequency of monitoring.

AND

B. Specifies the minimum size of vehicle-free areas to be established in the vicinity of unfledged broods based on the mobility of broods observed on the site in past years and on the frequency of monitoring. Unless substantial data from past years show that broods on a site stay very close to their nest locations, vehicle-free areas should extend at least 200 meters on each side of the nest site during the first week following hatching. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, but in no case should it be reduced to less than 100 meters on each side of the brood. In some cases, highly mobile broods may require protected areas up to 1000 meters, even where they are intensively monitored. Protected areas should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles. In a few cases, where several years of data documents that piping plovers on a particular site feed in only certain habitat types, the Service or the State wildlife management agency may provide written concurrence that vehicles pose no danger to plovers in other specified habitats on that site.

Timing of Vehicle Restrictions in Chick Habitat

Restrictions on use of vehicles in areas where unfledged plover chicks are present should begin on or before the date that hatching begins and continue until chicks have fledged. For purposes of vehicle management, plover chicks are considered fledged at 35 days of age or when observed in sustained flight for at least 15 meters, whichever occurs first.

When piping plover nests are found before the last egg is laid, restrictions on vehicles should begin on the 26th day after the last egg is laid. This assumes an average incubation period of 27 days, and provides a 1 day margin of error.

When plover nests are found after the last egg has been laid, making it impossible to predict hatch date, restrictions on vehicles should begin on a date determined by one of the following scenarios:

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

OR

2) Without intensive monitoring: Restrictions should begin on May 15 (the earliest probable hatch date). If the nest is discovered after May 15, then restrictions should start immediately.

If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If ruts are present that are deep enough to restrict movements of plover chicks, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

Essential Vehicles

Because it is impossible to completely eliminate the possibility that a vehicle will accidently crush an unfledged plover chicks, use of vehicles in the vicinity of broods should be avoided whenever possible. However, the Service recognizes that life-threatening situations on the beach may require emergency vehicle response. Furthermore, some "essential vehicles" may be required to provide for safety of pedestrian recreationists, law enforcement, maintenance of public property, or access to private dwellings not otherwise accessible. On large beaches, maintaining the frequency of plover monitoring required to minimize the size and duration of vehicle closures may necessitate the use of vehicles by plover monitors.

Essential vehicles should only travel on sections of beaches where unfledged plover chicks are present if such travel is absolutely necessary and no other reasonable travel routes are available. All steps should be taken to minimize number of trips by essential vehicles through chick habitat areas. Homeowners should consider other means of access, eg. by foot, water, or shuttle services, during periods when chicks are present.

The following procedures should be followed to minimize the probability that chicks will be crushed by essential (non-emergency) vehicles:

1. Essential vehicles should travel through chick habitat areas only during daylight hours, and should be guided by a qualified monitor who has first determined the location of all unfledged plover chicks.

2. Speed of vehicles should not exceed five miles per hour.

3. Use of open 4-wheel motorized all-terrain vehicles (ATVs) or non-motorized all-terrain bicycles is recommended whenever possible for monitoring and law enforcement because of the improved visibility afforded operators.

4. A log should be maintained by the beach manager of the date, time, vehicle number and operator, and purpose of each trip through areas where unfledged chicks are present. Personnel monitoring plovers should maintain and regularly update a log of the numbers and locations of unfledged plover chicks on each beach. Drivers of essential vehicles should review the log each day to determine the most recent number and location of unfledged chicks.

Essential vehicles should avoid driving on the wrack line, and travel should be infrequent enough to avoid creating deep ruts that could impede chick movements. If essential vehicles are creating ruts that could impede chick movements, use of essential vehicles should be further reduced and, if necessary, restricted to emergency vehicles only.

SITE-SPECIFIC MANAGEMENT GUIDANCE

The guidelines provided in this document are based on an extensive review of the scientific literature and are intended to cover the vast majority of situations likely to be encountered on piping plover nesting sites along the U.S. Atlantic Coast. However, the Service recognizes that site-specific conditions may lead to anomalous situations in which departures from this guidance may be safely implemented. The Service recommends that landowners who believe such situations exist on their lands contact either the Service or the State wildlife agency and, if appropriate, arrange for an on-site review. Written documentation of agreements regarding departures from this guidance is recommended.

In some unusual circumstances, Service or State biologists may recognize situations where this guidance provides insufficient protection for piping plovers or their nests. In such a case, the Service or the State wildlife agency may provide written notice to the landowner describing additional measures recommended to prevent take of piping plovers on that site.

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Endangered Beach Nesting Bird Management on New Jersey's Municipal Beaches

United States Department of the Interior
Fish and Wildlife Service

New Jersey Department of Environmental Protection
Division of Fish, Game and Wildlife
Endangered and Nongame Species Program

Doreen Curtin

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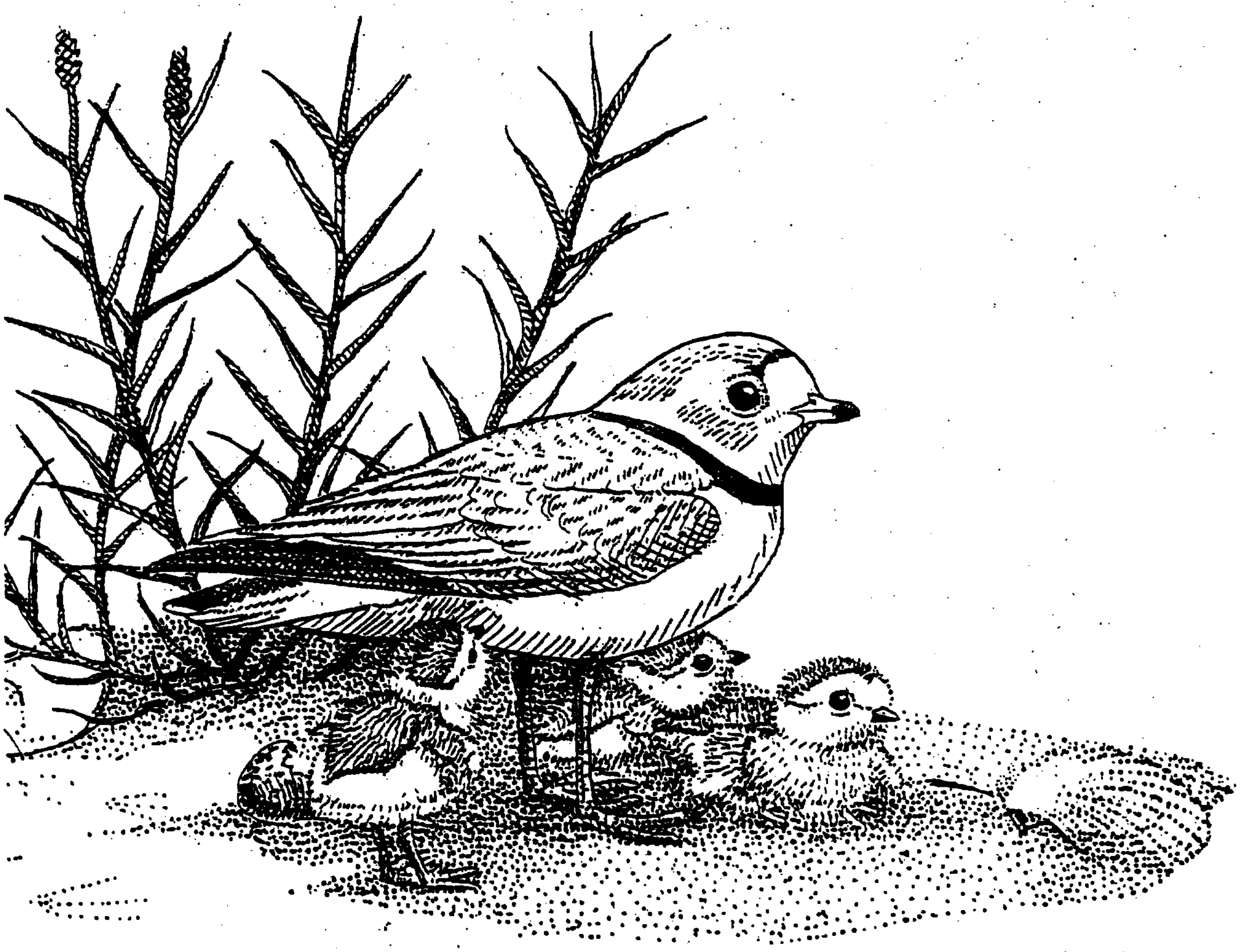

Wayne Trimm

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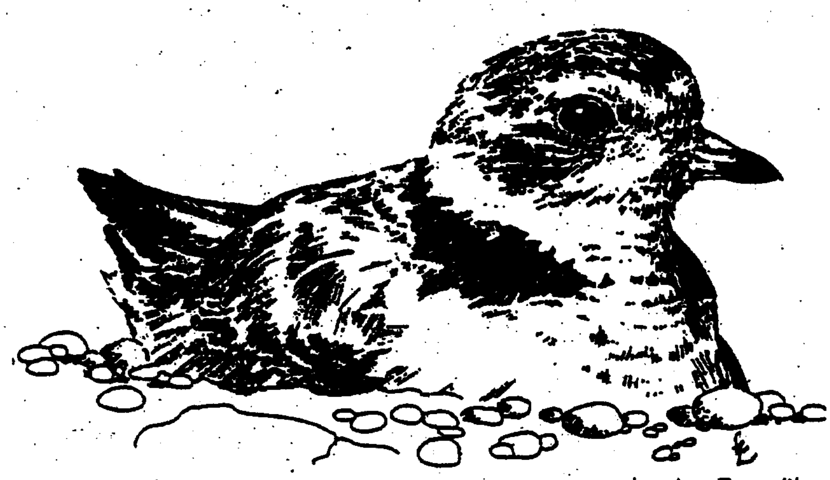


Louise Zemaitis

Introduction

New Jersey's beach nesting birds, the piping plover, least tern, and black skimmer, are among the most unique and critically imperiled wildlife resources of our barrier islands. Together, the New Jersey Division of Fish, Game and Wildlife and the U.S. Fish and Wildlife Service share stewardship responsibility for these endangered birds. Encouraging beach managers to share in this responsibility is critical to ensuring that these endangered birds are enjoyed by future generations of "Jersey Shore" visitors and residents.

The New Jersey Division of Fish, Game and Wildlife and the U.S. Fish and Wildlife Service have produced this booklet to assist beach managers in managing coastal beaches for the benefit of people and wildlife. This booklet contains general information about the biology of the birds, state and federal regulations, current beach nesting bird management, and beach maintenance practices. The information contained in this booklet should be used as an initial guide by municipal managers when conducting beach maintenance and shore protection projects. Beach managers should also seek guidance from state and federal wildlife biologists on specific issues pertaining to New Jersey's endangered beach nesting birds to ensure that the needs of the public and wildlife are met.

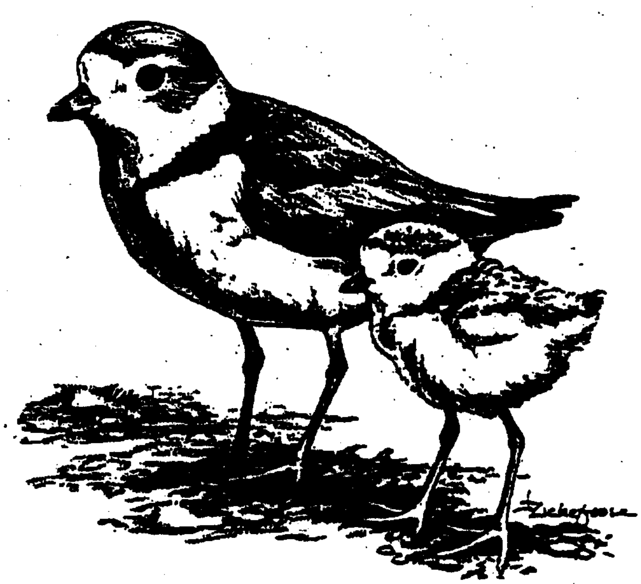
New Jersey's Endangered Beach Nesting Birds

The piping plover, least tern, and black skimmer nest on New Jersey's coastal beaches and bay islands. Collectively, biologists refer to these species as beach nesting birds. Their preference for nesting on open, sandy beaches puts the birds in constant conflict with humans competing for the same space.

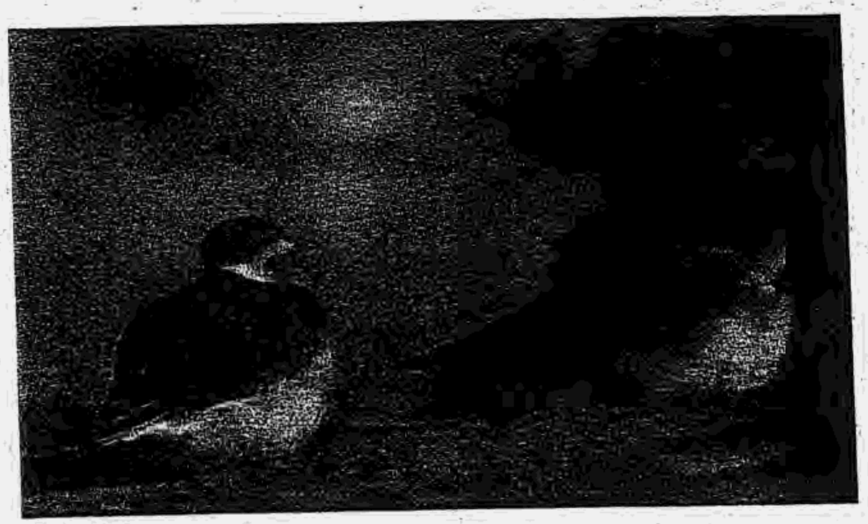
Market and plume hunting decimated populations of the birds in the early 1900's. The passage of the Migratory Bird Treaty Act of 1918 stopped the hunting of these species and populations began to recover. Available data suggest that the most recent population declines began in the late 1940s or early 1950s. Loss of habitat, due to an increase in development after World War II and human disturbance from recreational beach use during the breeding season, pushed the birds to the edge of existence once again.

The piping plover, least tern, and black skimmer are now protected under state laws. The New Jersey Department of Environmental Protection listed the least tern and black skimmer as endangered species in 1979 and added the piping plover in 1984. The piping plover is also listed as a threatened species pursuant to the federal Endangered Species Act of 1973.

Beach nesting birds are intensively protected on their breeding grounds and human disturbance is actively managed. Piping plovers, least terns and black skimmers can be found nesting in New Jersey from Cape May to Sandy Hook between April and September.



Beach Nesting Bird Management



Effective partnerships with municipal public beach managers is integral to the success of beach nesting birds.

Clay Meyers

The New Jersey Division of Fish, Game and Wildlife has been managing beach nesting birds since the mid 1970s. Over the past two decades the intensity of protective management has increased along with the recreational pressures affecting the birds. Many conservation organizations, agencies, and volunteers provide assistance in all aspects of protection and management.

The U.S. Fish and Wildlife Service has established recovery goals for the Atlantic Coast piping plover population. New Jersey's management and protection efforts are designed to meet these goals. The Division of Fish, Game and Wildlife's Endangered and Nongame Species Program has set a population objective for least terns and black skimmers of at least 2,000 birds of each species distributed over traditional nesting areas.

Wildlife managers employ a wide variety of techniques to increase the nesting success of the beach nesting birds. Investigating new approaches for providing better protection to the birds while providing for recreational interests of the public is an ongoing process. Effective partnerships with municipal and public beach managers is integral to the success of the Endangered Beach Nesting Bird Management Program.

Restricting Access

Wildlife managers and volunteers erect symbolic fencing (posts, string, and flagging) around traditional nesting areas and individual nests. Snow fence is occasionally used to create corridors in areas of heavy human use to direct traffic around or through nesting areas. Wildlife managers also use wire pasture fence to surround large colonies of birds to provide increased protection from predators and human disturbance. "Area Closed" signs are posted around nesting area perimeters to alert the public to the nesting birds.

Patrolling

Biologists monitor beaches at least once a week to check for nests, observe incubating birds, and document the progress of the chicks. Volunteers and wildlife managers patrol nesting areas on weekends and holidays to reduce the potential for trespassing into the nesting areas and harassment of the birds. New Jersey Division of Fish, Game and Wildlife Conservation Officers and U.S. Fish and Wildlife Service personnel frequently patrol nesting areas as well.

Predator Control

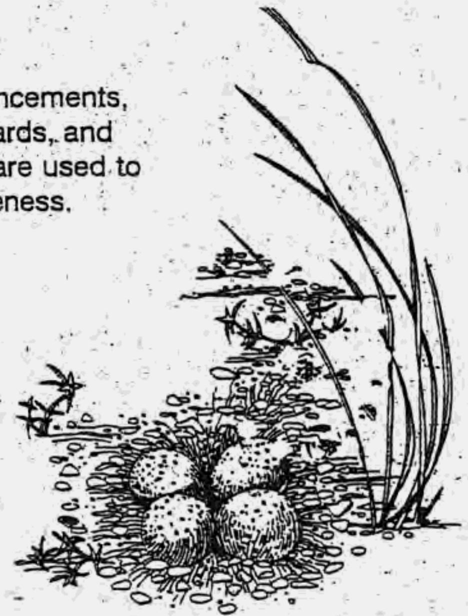
Wire predator exclosures are used to help protect piping plover nests from predation by foxes, dogs, and cats. The wire fence allows the plover to move freely to and from the nest site while prohibiting access of larger animals. Once the plover eggs hatch, the chicks are immediately mobile and leave the protection of the exclosure making them vulnerable to predation. Exclosures can not be used in least tern and black skimmer colonies due to the number and proximity of nests. Removal of large predators from specific sites may be necessary to protect the birds, nests, and chicks when other methods of control prove ineffective.

Information and Education

Volunteers and wildlife managers educate beach goers about the birds by providing informational brochures as they patrol nesting areas. Informational signs are placed in strategic locations near nesting areas to educate the public about specific issues relating to the birds, including actions the public can take to help protect the birds.

Public service announcements, press releases, billboards, and educational displays are used to increase public awareness.

Piping plovers make a shallow nest depression in the sand, above the high tide line, often lining it with shell fragments to add camouflage for the eggs.



Julie Zickefoose

New Jersey Division of Fish, Game & Wildlife

Educational signs remind people to "share the shore."

Regulations Protecting Beach Nesting Birds

Beach nesting birds and their habitats are protected by state and federal regulations. The piping plover, least tern, and black skimmer are protected by the New Jersey Endangered Species Conservation Act (NJESCA). As a federally listed species, the piping plover is additionally protected by the provisions of the federal Endangered Species Act (ESA) of 1973 (97 Stat. 884, as amended: 16 U.S.C. 1531 et. seq.).

Regulations that Prohibit Harming or Harassing Beach Nesting Birds

Federal Regulations

Section 9 (a)(1) of the ESA affords protection to endangered species by prohibiting "take." The ESA defines "take" to include harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect; or to attempt to engage in any of these activities. U.S. Fish and Wildlife Service regulations that codify provisions of the ESA (50 CFR Part 17) further define "harass" to mean any intentional or negligent act or omission which creates the likelihood of injury to protected wildlife. "Harm" is defined as any act which actually kills or injures wildlife. Violations of Section 9 of the ESA can be prosecuted as criminal or civil offenses and are punishable by fines up to $25,000.00 or prison terms up to one year per violation.

State Regulations

The NJESCA (NJSA 23:2A-6) extends protection to all three species of beach nesting birds. It is similar to federal legislation by prohibiting taking of any regulated non-game animal species. By definition, "taking" includes harassment, disturbance, or destruction of nests, eggs, or chicks of any beach nesting bird species. Violations of the NJESCA are punishable by fines of from $100.00 to $3,000.00 per violation.

Regulations that Protect the Habitat of Beach Nesting Birds

Federal Regulations

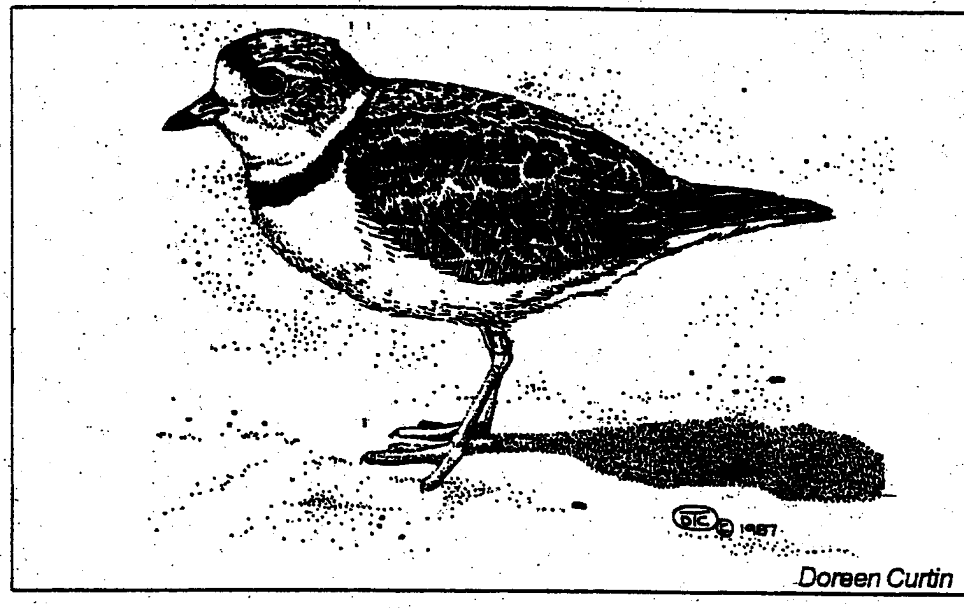
Section 7(a)(2) of the ESA affords protection to piping plover habitat by requiring every federal agency, in consultation with the U.S. Fish and Wildlife Service, to insure that any action a federal agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of listed species. The most common application of this provision of the ESA relevant to beach nesting birds deals with coastal projects that are funded with federal dollars (including those funded by the Federal Emergency Management Administration). The provisions of Section 7 also extend to any project for which a federal agency must issue a permit (e.g. Section 404 permit from the U.S. Army Corp of Engineers).

Section 9 of the ESA provides for protection of piping plover habitat by prohibiting significant habitat modification or destruction.

State Regulations

The NJESCA does not specifically provide for the protection of endangered species habitat. However, habitat protection for beach nesting birds is provided through various land use regulations that are included in Rules on Coastal Resources and Development (N.J.A.C. 7:7E - 1.1 et seq.). These rules prohibit the development of endangered or threatened species habitats in a coastal area unless it can be demonstrated that the proposed development will not adversely affect habitat through direct or secondary impacts.

Piping Plover Facts



Doreen Curtin

Piping plovers arrive in New Jersey in late March and are nesting by late April. Adults and young can be seen foraging in the tidal zone through early September.

Scientific Name: *Charadrius melodus*

Status
The piping plover was listed as an endangered species in New Jersey in 1984 under the NJESCA. The Atlantic coast piping plover population was added to the federal List of Endangered and Threatened Wildlife as a threatened species in 1986.

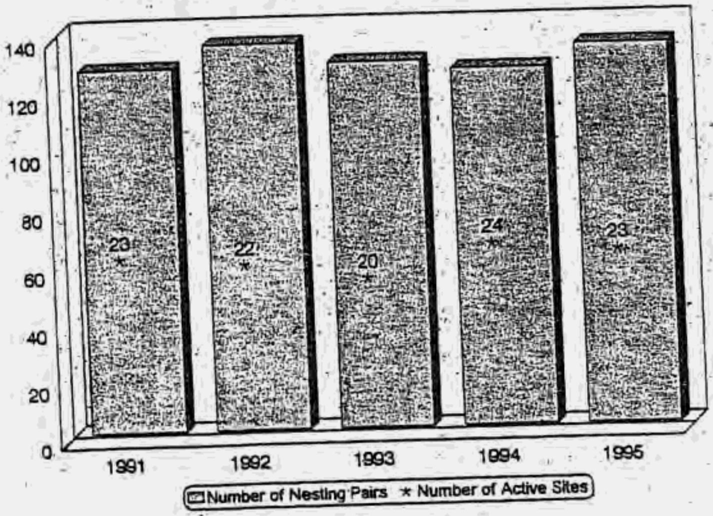
Threats
Human disturbance by recreational beach users during the breeding season is the primary threat to the piping plover. Other threats include vehicles and flooding. Predation, especially by human-introduced (rats, dogs, and cats) or human-encouraged (fox, raccoons, and skunks) species has a significant influence on reproductive success. Coastal development and the subsequent stabilization of the dynamic beach ecosystem by seawalls, groins, and jetties have also resulted in destruction and alteration of suitable nesting habitat.

Physical Description
The piping plover is a small, robin-sized shorebird that has a dry-sand colored back, white front, orange beak with a black tip, black brow and collar, and orange legs. Plovers feed on small invertebrates such as crustaceans, marine worms, and insect larvae along the surf zone, wrack line, and in the dunes.

Nesting Habitat
Piping plovers nest on sandy coastal beaches above the high tide line and occasionally sandy fill on bay islands. They are often found near inlets where the food source is plentiful. Plovers depend on the natural dynamics of the beach for creating nesting habitat. Nests are typically located within washover and blow-out areas of dunes, on gently sloping foredunes, and the flat, shelly berm (beach front). These areas are created by periodic storm action. Nests are usually found in areas with little or no vegetation. Occasionally a nest will be located within stands of American beach grass (*Ammophila breviligulata*) or sea rocket (*Cakile endentula*).

Courtship
Piping plovers arrive on New Jersey beaches in late March and begin establishing individual pair territories. The male plovers stake out a territory and display with flight and song to attract a mate. He will make numerous shallow depressions in the sand, called scrapes. The female will choose a scrape to serve as the nest. The pair may place small bits of shell into the nest. Chasing of the female and rapid "marching" precedes mating.

PIPING PLOVER POPULATION IN NEW JERSEY 1991-1995



Egg Laying

Eggs are laid in late April to mid-May. If the initial nest is lost the pair may renest. Pairs may be on eggs into early July. Plovers almost always lay four eggs (may be less for renests). The eggs are sand-colored with dark splotches. This coloration pattern camouflages the eggs against the sand and shell background of the nest. Both of the adults will incubate the eggs for approximately 28 days.

Care of Young

Young plovers are downy when hatched and able to leave the nest within hours. The chicks feed themselves while the parents watch over them (precocial). The adult birds will stand or sit over their young to shelter them from the sun or inclement weather. Most young are flying by the 4th of July (approximately 25-30 days after hatching), although, with renesting, flightless chicks may be on the beach until August.

Nest/Chick Defense

Adults try to lure intruders away from nests or young by moving a safe distance away and pretending to be injured (feigning or "broken-wing" display). Adults will also dive at small predators such as crows and ghost crabs. The chicks will crouch down, motionless, and wait for the "all clear" signal from the parents, making chicks vulnerable to being crushed by moving vehicles.

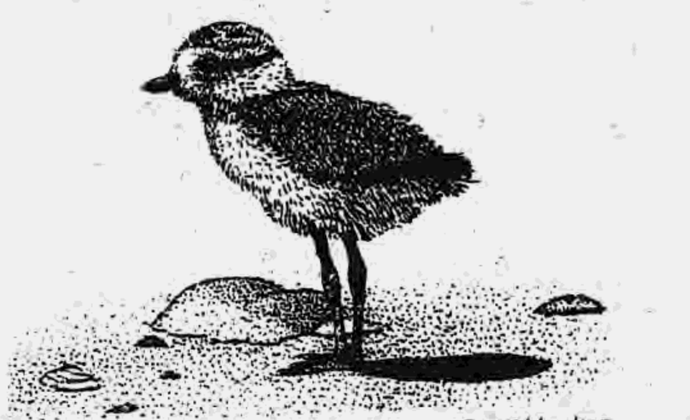
Range

There are three distinct piping plover populations in North America: Inland - on lakes, reservoirs, and rivers in the Midwest and Great Plains; Great Lakes region; and Atlantic coast - North Carolina to Newfoundland. In New Jersey piping plovers breed from Cape May to Sandy Hook. At the start of migration in mid-July, plovers from other Atlantic coast states begin to arrive and are joined by the New Jersey plover families. By late September piping plovers are gone from most New Jersey beaches. Piping plovers can be found wintering along the coast from Texas to North Carolina.

Population

The New Jersey piping plover population has averaged 122 nesting pairs over the past 9 years (1987-1995).

Piping plover chicks are able to leave the nest within hours of hatching and can be seen feeding along side of their parents.



Scott Hecker

Piping Plover Population in New Jersey 1991-1995

	1991		1992		1993		1994		1995	
Site	# Pairs	# Fledged per pair	# Pairs	# Fledged per pair	# Pairs	# Fledged per pair	# Pairs	# Fledged per pair	# Pairs	# Fledged per pair
Sandy Hook	20	1.15	21	1.67	25	1.80	36	1.94	43	1.33
Mantoloking	7	1.71	6	2.67	4	1.50	5	0.80	4	1.75
Barnegat Light	7	0.71	9	1.44	12	0.67	9	1.22	6	0.33
Loveladies	1	0.00	0		0		1	3.00	1	3.00
Holgate	16	1.81	22	0.95	14	0.43	15	0.40	10	0.70
Little Beach	13	1.00	15	1.73	19	1.11	10	0.30	15	0.33
North Brigantine	0		0		0		0		1	0.00
Brigantine	17	0.65	12	0.33	8	0.38	5	1.60	6	0.67
Waverly	0		0		1	0.00	2	1.50	3	0.67
Ocean City	–		–		–		3	0.00	3	0.67
Corson's Inlet State Park	6	1.00	7	0.14	5	1.20	5	0.00	3	0.33
Strathmere	5	0.20	5	0.60	6	0.33	3	0.67	2	0.50
Whale Beach	9	1.00	6	0.17	4	1.00	4	1.50	5	0.00
Sea Isle City	9	0.89	8	0.75	6	1.00	6	0.83	5	1.60
Townsends Inlet	1	1.00	3	0.67	1	1.00	1	0.00	0	
Avalon North	1	2.00	4	1.50	5	0.40	4	1.25	3	2.00
Avalon Dunes	7	0.00	5	0.40	3	0.00	1	4.00	2	0.00
North Wildwood	0		3	0.00	5	0.00	2	0.00	2	0.00
Hereford Inlet	1	0.00	0		0		0		0	
Coast Guard - EECEN	2	0.00	0		0		1	0.00	0	
Coast Guard - TRACEN	3	1.33	6	0.33	6	0.67	7	1.29	6	1.00
S. Cape May Meadows	1	0.00	2	2.50	3	1.33	4	1.75	12	0.75
Total # of Pairs	126	0.96	134	1.07	127	0.93	124	1.18	132	0.81
# Nesting Sites	23		22		20		24		23	

Least Tern Facts

Least terns will protect their nests and young by dive bombing intruders or hovering above and defecating.

Doreen Curtin

Scientific Name: ***Sterna antillarum***

Status
New Jersey listed the least tern as an endangered species in 1979. The California and Inland populations were added as endangered to the federal List of Endangered and Threatened Wildlife in 1985.

Threats
Human disturbance during the nesting season by recreational beach users is the primary factor involved in the poor reproductive success of least terns. Other threats include vehicles and flooding. Predation, especially by human-introduced (rats, dogs, and cats) or human-encouraged (fox, raccoons, and skunks) species has a tremendous effect on reproduction in tern colonies. Coastal development and the subsequent stabilization of the dynamic beach ecosystem by seawalls, groins, and jetties have resulted in the destruction and alteration of suitable nesting habitat.

Physical Description
The smallest of the terns, the least tern can be identified by the distinctive white forehead, black eye line, and orange-yellow bill. Terns feed on small fish and crustaceans that are caught by plunge diving.

Nesting Habitat
Least terns nest on sandy beaches above the high tide line and occasionally on sandy fill on bay islands. Although usually found near abundant food sources at inlets and estuaries, least terns often forage miles from the nesting colony. Terns prefer flat, sandy, shell-covered, sparsely vegetated areas for nesting. Natural dynamics of the beach ecosystem and severe storms create suitable nesting areas as waves scour the beach.

Courtship
The terns arrive in early to mid-May and begin forming nesting groups called colonies. Colonies can range in size from a few birds to several hundred. Males will court the females by offering small fish while shaking their heads from side to side. The female may accept the "gift" and mate with the male. Terns make shallow depressions in the sand, called scrapes. One of the scrapes will be chosen as the nest and eggs will be laid.

Egg Laying
In late May to mid-June (later for renesting after initial nest loss) one to three eggs are laid. The eggs are sand-colored with dark splotches that create a camouflaged effect in the sandy nest. These markings make the eggs vulnerable to accidental crushing by people or vehicles. Both parents will share

incubation of the eggs for approximately 21 days.

Care of Young

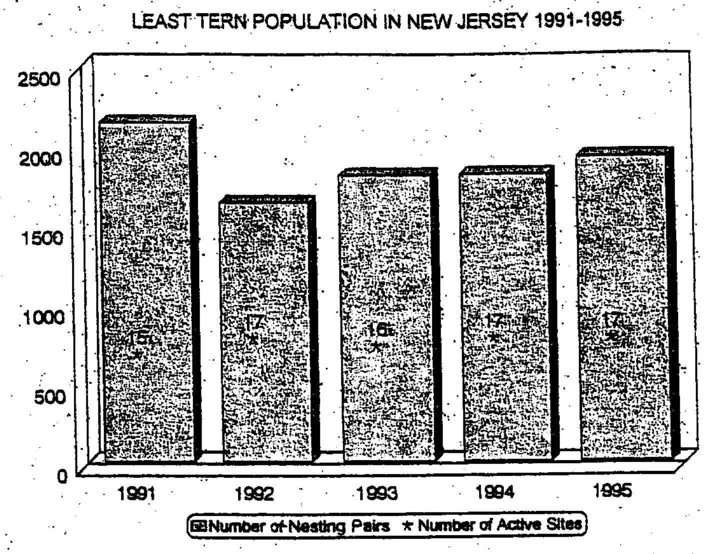
The chicks are downy when hatched and able to leave the nest within hours. Food is brought to the young by the parents. The adult terns will stand or sit over their young to shelter them from the sun or inclement weather. Chicks may be seen wandering around the colony. Most young are flying by early to mid-July (approximately two to three weeks after hatching), but are still dependent on their parents for food for several weeks while learning to catch fish. Fledged young may still receive food when they leave the nesting grounds in late July and August.

Nest/Chick Defense

The entire colony of terns will participate in defense against predators and human intruders by dive bombing or hovering inches above the intruder and defecating. The pale-colored chicks will lie flat in the sand for camouflage, making chicks vulnerable to being crushed by humans or vehicles.

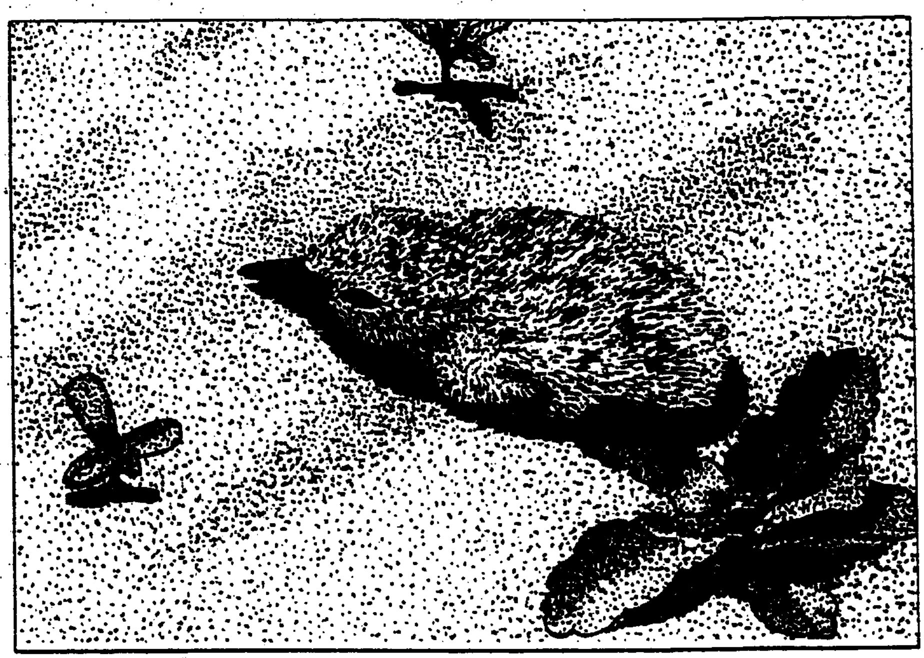
Range

There are three distinct least tern populations in North America: Pacific - southern Mexico to San Francisco; Inland - on lakes, reservoirs, and rivers in Midwest and Great Plains; Atlantic - Florida to Maine and Texas and throughout the Caribbean. In New Jersey least terns breed from Cape May to Newark Harbor. They can be found wintering in the extreme southern U.S. and Central and South America.



Population

New Jersey's least tern population averages around 1,600 to 2,200 individuals during the breeding season.

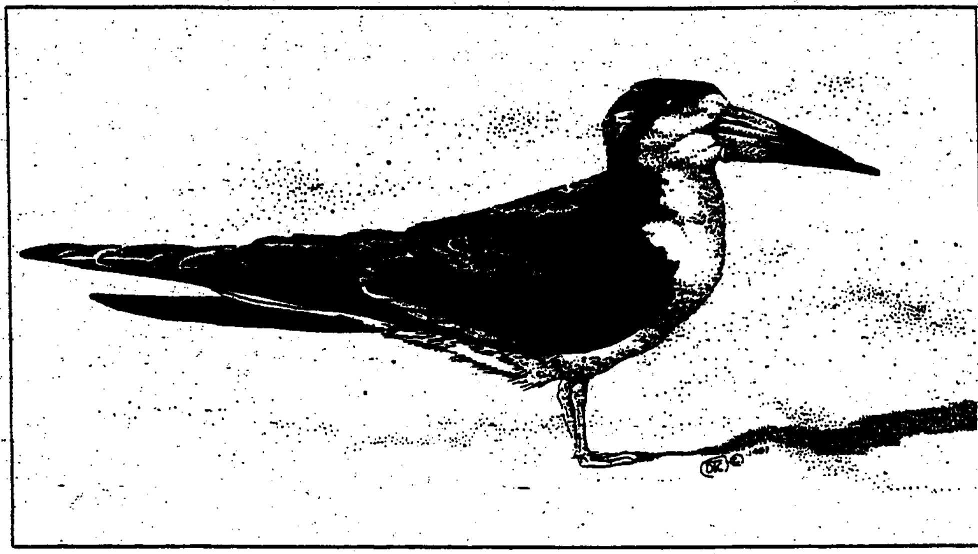


To guard against danger, pale-colored least tern chicks will lie flat in the sand for camouflage making them vulnerable to being crushed by humans or vehicles.

Scott Hecker

Black Skimmer Facts

Black skimmers nest in colonies ranging in number from a few to several hundred on sandy beaches or back-bay islands.



Doreen Curtin

Scientific Name: ***Rynchops niger***

Status
The black skimmer was listed as an endangered species under the NJESCA in 1979.

Threats
Human disturbance during the breeding season by recreational beach users is the primary cause of nesting failure. Predation, especially by human-introduced (rats, dogs, and cats) or human-encouraged (fox, raccoons, and skunks) species is a major factor in nest and chick loss. Vehicles and flooding are also contributing factors to reproductive failure. The black skimmer population decline, since the enactment of protection laws, is due to habitat loss and disturbance during the breeding season.

Physical Description
The black skimmer resembles a gull-like bird with a black back, white underside, and extremely long, narrow wings. The most distinguishing characteristic is the long, flat, black-tipped red bill with the lower mandible being longer than the upper. Small fish and crustaceans are caught by skimming the water with the lower bill; hence the name, black skimmer.

Nesting Habitat
The black skimmer nests on sandy beaches, back-bay and inlet sandy islands, and marsh islands on wrack mats. Skimmers nest in colonies ranging in number from a few to several hundred. Flat, sandy areas with little vegetation is the preferred nesting habitat.

Courtship
Arriving in May, the skimmers begin establishing nesting colonies. The skimmers make shallow depressions in the sand, called scrapes. A scrape will be chosen as the nest site.

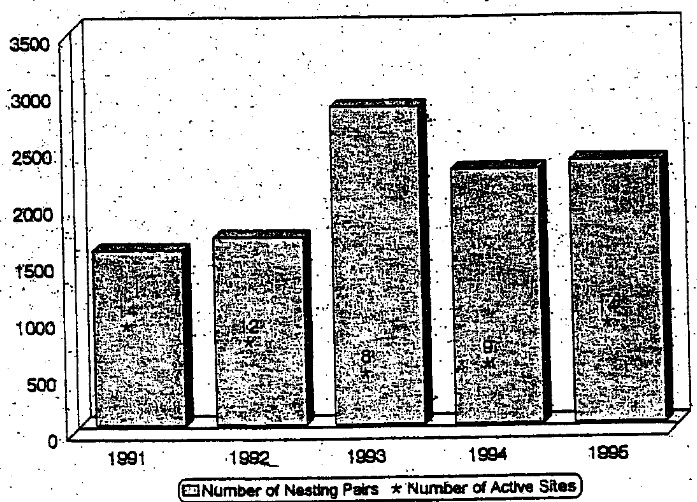
Egg Laying
Eggs are laid in early June and sometimes later if renesting occurs after a nest loss. Two to five eggs are laid and both adults incubate the eggs for approximately 22 days.

Care of Young
Young are downy when hatched and able to leave the nest within hours. Chicks are first fed food regurgitated to the ground and later given whole fish. Young skimmers fledge in about 24 days from hatching (mid-July to mid-August). The young skimmer's bill is even in length until it reaches adult size.

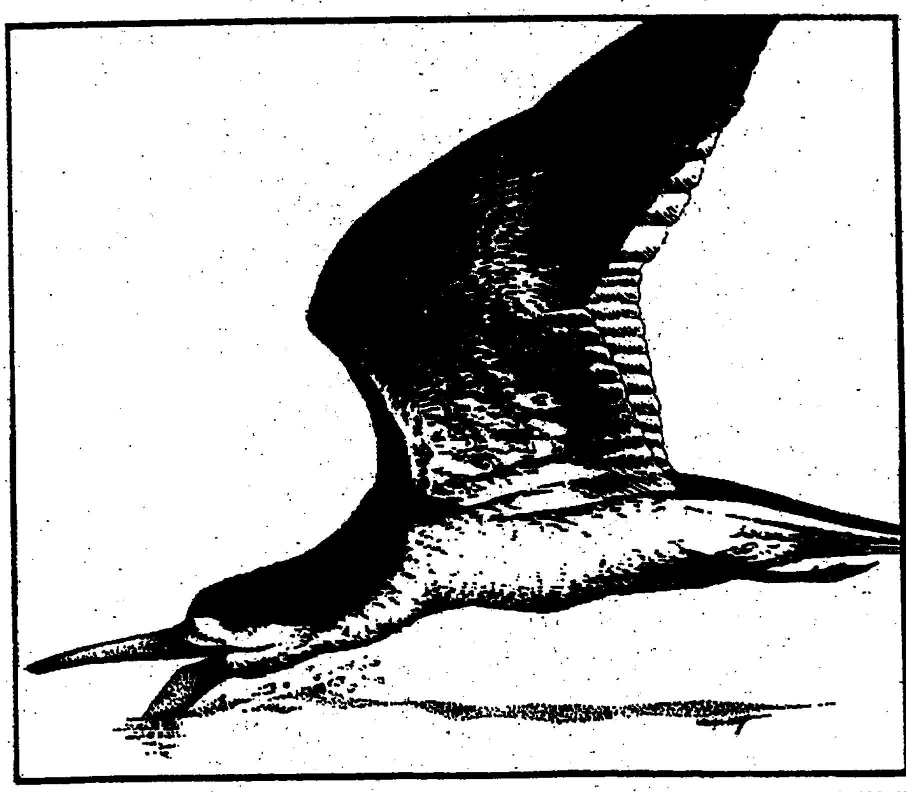
Iest/Chick Defense
/hen alarmed the whole colony will take ight and circle the nesting area while some ndividuals will flop on their abdomens retending to have broken wings. Black kimmers are often found nesting with ommon or least terns which are very ag- ressive nest defenders. This co-nesting is n advantage to the skimmer colony. The ale-colored skimmer chicks will lay flat, ften covering themselves with sand, to hide rom the danger. This survival behavior nakes them vulnerable to being crushed by eople or vehicles.

Range
Skimmers are found from South America to Cape Cod. In New Jersey, nesting occurs in Cape May and Ocean Counties. The birds winter from the southeastern U.S. to south- ern Chile and central Argentina.

BLACK SKIMMER POPULATION IN NEW JERSEY 1991-1995



Population
The New Jersey black skimmer population ranges from 1600 to 2000 individuals.

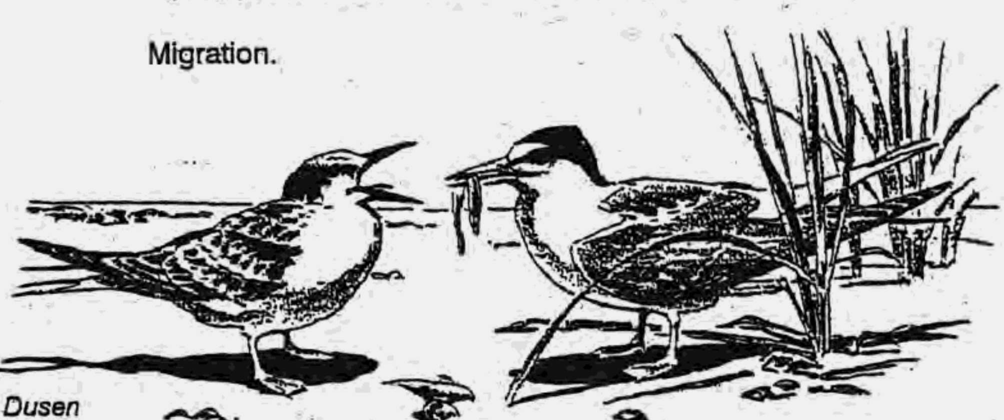


The unique feeding habit of catching small fish and crustaceans by skimming the water with the lower bill gave the black skimmer its name.

Wendy Wolf

Beach Nesting Birds Calendar Of Events

Mid-March	First piping plovers arrive on beaches.
Mid-April	Piping plovers establish territories. Fencing and signs are erected around traditional nesting areas.
Late April	First piping plovers lay eggs.
Early May	Least terns and black skimmers begin arriving.
Mid-May	Most piping plovers are on eggs. Least tern colonies are forming. Black skimmer colonies are forming.
Late May	First piping plover chicks hatch. Many least tern colonies have formed. Some birds are on eggs.
Memorial Day	First major effects of human disturbance to nesting birds due to long holiday weekend. Biologists and volunteers begin patrolling nesting areas.
Early June	Least terns begin to nest in earnest. Some black skimmers are nesting. Piping plover chicks are on the beach.
Mid/Late June	First piping plover chicks fledge. Least tern chicks begin to hatch. Some black skimmer chicks hatch.
July 4th	Busiest holiday weekend of the season presents great disturbance to nesting birds and young chicks.
Early/Mid-July	Most piping plovers and least terns have fledged.
Late July/ Mid-August	Black skimmers are fledging. Piping plovers and least terns are staging for migration.
Mid-August/ Mid-September	Migration.



Barry Van Dusen

Municipal Involvement

A significant proportion of the state's beach nesting birds nest on municipal beaches. Consequently, actions taken by coastal municipalities to manage their beaches for recreation and storm protection have ramifications, both positive and negative, for beach nesting birds. Cooperation between wildlife managers and municipal managers is critical to reducing and eliminating the negative effects of beach management while developing and encouraging practices that are beneficial. The survival of endangered beach nesting birds in New Jersey depends on this cooperation.

Beach Management Activities

Beach Cleaning/Vehicle Use

Mechanical raking or dragging of the beach has become routine in most coastal communities. Specialized vehicles or trucks are used on many beaches to empty trash receptacles. Occasionally volunteer groups will conduct beach clean-ups where litter is hand picked. Vehicle use by the beach patrol, public works employees, police, and concessionaires can have significant impacts on the nests and chicks of beach nesting birds.

New Jersey Division of Fish, Game & Wildlife

Vehicles may crush nests or young and destroy feeding habitat.

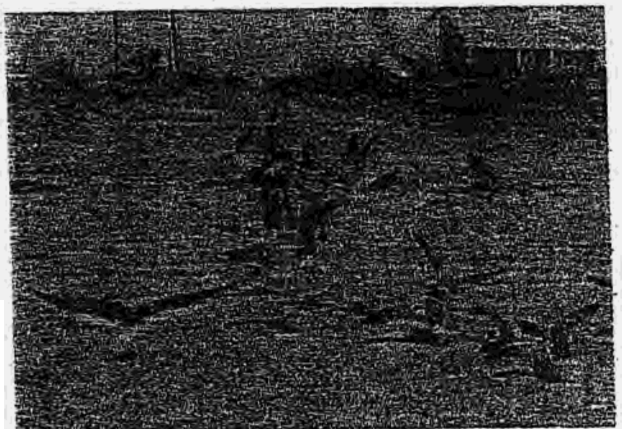
Threats to Beach Nesting Birds

- Family groups are scattered.
- Feeding habitat (wrack) is destroyed.
- Vehicles may crush nests or young.
- Tire ruts may trap young birds.
- People collecting trash in or near nesting areas disturb or crush nests.

Encouraged Practices To Avoid Threats:

- Remain 5 yards from posted areas and at least 10 yards from the dunes (whether posted or not).
- Be alert and learn to identify the birds and their behavior patterns.
- Leave small areas of wrack in front of posted areas where possible.
- Drive 10 miles per hour or less.
- Operate vehicles on the hard-packed beach between trash pick-up locations and for all other purposes whenever possible.
- Schedule volunteer beach clean-ups prior to nesting season.

atural predators
encouraged
humans.



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Pets and Predators

Naturally occurring predators such as gulls, foxes, and rats are encouraged by certain practices, especially leaving food scraps on beach. People often permit domestic dogs and cats to roam at will. Unwanted cats are abandoned and become feral.

Threats to Beach Nesting Birds:

- Young and adults are harassed and preyed upon.
- Eggs are eaten or crushed and nests may be abandoned.
- Birds regard a dog anywhere on the beach as a predator forcing them to leave nests and young unattended.
- Harassment may cause nesting birds or colonies to abandon nest sites.

Encouraged Practices To Avoid Threats:

- Trash cans should be placed as far from nesting areas as possible and be equipped with lids.
- Consider establishing and enforcing prohibitions on feeding gulls.
- Actively remove predators (live-traps can be used in cooperation with state and county animal control officials).
- Have the local animal control agency initiate a feral cat removal program.

Special Beach Uses

Recreational activities such as volleyball and kite flying can interfere with nesting or feeding birds. The storage of catamarans on the beach in prime nesting habitat increases the chance of vehicles destroying nests or young. Concessionaires increase vehicle and human activity in certain areas.

Threats To Beach Nesting Birds:

- People or balls can crush nests.
- Intense human activity near the nesting areas causes disturbance to nesting birds.
- The birds regard kites as flying predators.
- Crashing kites may fall into nesting areas causing egg destruction or colony abandonment.
- Vehicles setting out catamarans may crush eggs or young.

Encouraged Practices To Avoid Threats:

- Establish official recreational areas for different beach uses away from nesting areas.
- Encourage the use of official recreational areas.
- Have concessionaires set up operations well away from nesting areas.
- Provide concessionaires with information about beach nesting birds and ask for cooperation in protecting the birds.

Access Paths

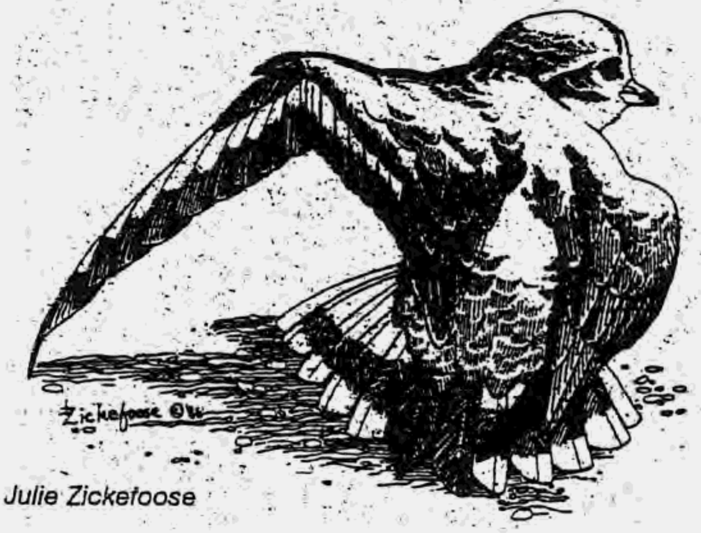
Increased human activity is concentrated on access paths and vehicle access roads. Occasionally, the birds will nest next to or in an access path.

Threats To Beach Nesting Birds:

- The increased activity near nesting areas may cause the birds to abandon the site.
- Nests located on access paths can be destroyed.

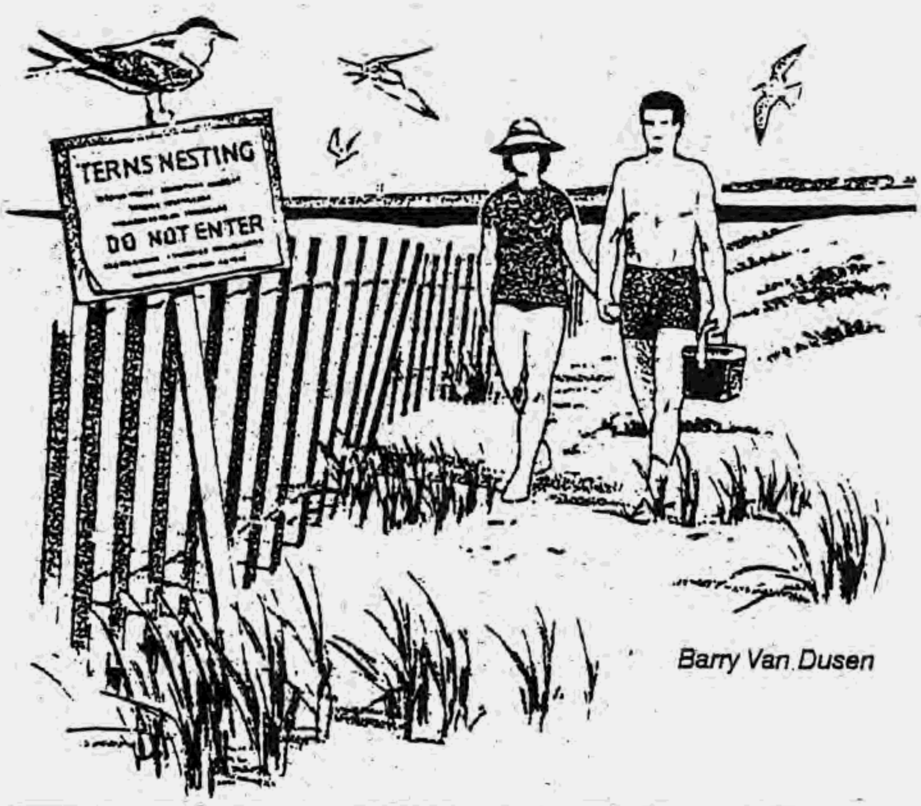
Encouraged Practices To Avoid Threats:

- Closure or rerouting of the access path may be necessary.



Julie Zickefoose

Plovers try to lure intruders away from nests or young by pretending to be injured.



Barry Van Dusen

Wildlife managers employ a wide variety of techniques, such as symbolic and snow fencing, to increase the nesting success of beach nesting birds.

Beach Protection and Restoration Projects

The U.S. Fish and Wildlife Service and the New Jersey Division of Fish, Game and Wildlife recognize the necessity and value of beach protection projects, such as dune building and planting, beach restoration, and construction of groins and jetties. These projects are important components in the strategy to protect New Jersey's valuable coastal areas. However, in certain circumstances, some coastal protection projects may not be compatible with endangered beach nesting birds. Less potentially harmful alternatives may be available. Careful planning and evaluation of such projects is needed. The following guidelines are offered.

Dune Management

Maintenance of dune systems is critical to coastal management. Dune systems are a natural alternative to beach protection with many benefits over the use of hard structures, such as bulkheads. Strategies for building and maintaining dunes can be beneficial to the coastal community as well as to beach nesting birds. Dune systems with natural features such as blowouts and overwash areas provide more suitable habitat for beach nesting birds than straight line systems. Attempts to build additional dunes in areas with well developed dune systems may reduce available habitat as well as reduce recreational beach areas while providing no additional storm protection.

Routinely, beach managers erect snow fence to provide dune protection or building. In areas where dunes are eroded or absent, mechanical creation of dunes may be conducted. Beach grass is usually planted after either of these dune management strategies to provide dune stabilization.

New Jersey Division of Fish, Game & Wildlife

Proper placement of snow fence can create nesting habitat for beach nesting birds while still protecting the coastal community.

Threats To Beach Nesting Birds:

- Snow fencing creates straight line dunes without natural breaks (results in reduced nesting habitat).
- Straight line fence doesn't allow for washover areas (preferred nesting habitat) to be created .
- Erecting fences, creating dunes, or planting dune grasses during the nesting season may destroy nests or disturb nesting birds.
- By creating dunes, natural breaks and washovers in dune system are filled in, resulting in loss of nesting habitat.
- The steep slope on mechanically created dunes makes them unsuitable for nesting sites.
- Young chicks can't negotiate the steep slopes of newly created dunes.
- Existing habitat may be damaged in areas where sand is being harvested.
- Natural breaks and washovers in dunes are filled in.
- Birds will not nest in heavily vegetated areas.
- Heavily vegetated areas provide cover for predators.

Encouraged Practices To Avoid Threats

- Erect snow fence in zig-zag pattern with breaks in the line of fence.
- Place fence in uneven rows.
- Allow for natural breaks in man-made dunes if not posing a threat to structures.
- Create dunes with a gradual incline and flattened peak.
- When planting dune grass, allow some areas to become vegetated naturally.
- Some heavily vegetated areas can be thinned.
- Reduce or eliminate fertilization practices.
- Refer to *Restoration of Sand Dunes Along the Mid-Atlantic Coast* (Available from the Soil Conservation Service, Somerset County, NJ, 1992).

Emergency Beach Repair Projects

Beach Nourishment Projects

Beach nourishment projects generally provide valuable habitat for beach nesting birds. Terns and plovers have frequently used portions of "new" beach following completion of a project. The critical aspect of any beach fill project near nesting habitat is timing.

Erosion Control Structures

Beach nesting birds depend on natural beach dynamics. Changes over the course of a year can improve or damage nesting habitat. Groins and jetties alter the natural dynamics, often leading to downdrift erosion of habitat

New Jersey Division of Fish, Game & Wildlife

Beach nourishment projects generally provide valuable habitat for beach nesting birds. The critical aspect is timing.

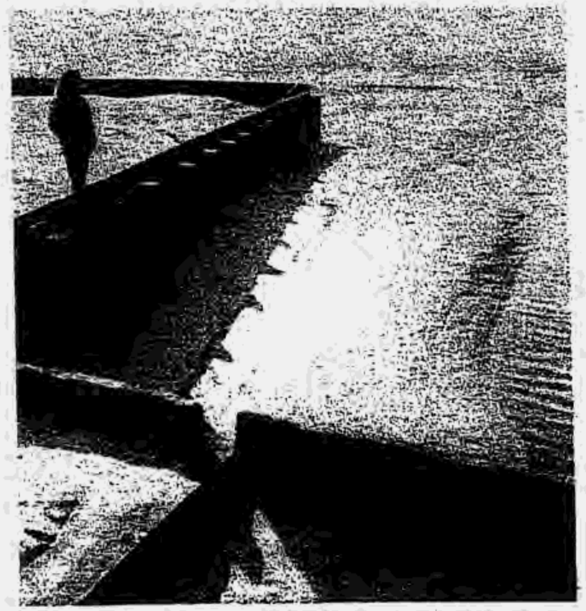
while over-stabilizing updrift areas. Hard structures should be considered only after careful evaluation of all options and potential impacts.

Major Storm Damage

Major storms can dramatically change coastal beaches. Habitat for beach nesting birds can be created or destroyed. Beach management practices following storms should be evaluated for their usefulness in protecting against future storms and the effects on beach nesting bird habitat.

Threats To Beach Nesting Birds:

- Projects occurring during the nesting season may destroy or disturb nesting or interfere with rearing of young.
- Structures may cause adverse effects to current nesting habitat.
- Repairing major storm damage may destroy habitat that was created during the storm.
- Eroded beaches provide narrow or no nesting habitat.



New Jersey Division of Fish, Game & Wildlife

Hard structures, such as bulkheads, groins and jetties, can cause habitat loss by contributing to beach erosion and vegetation encroachment.

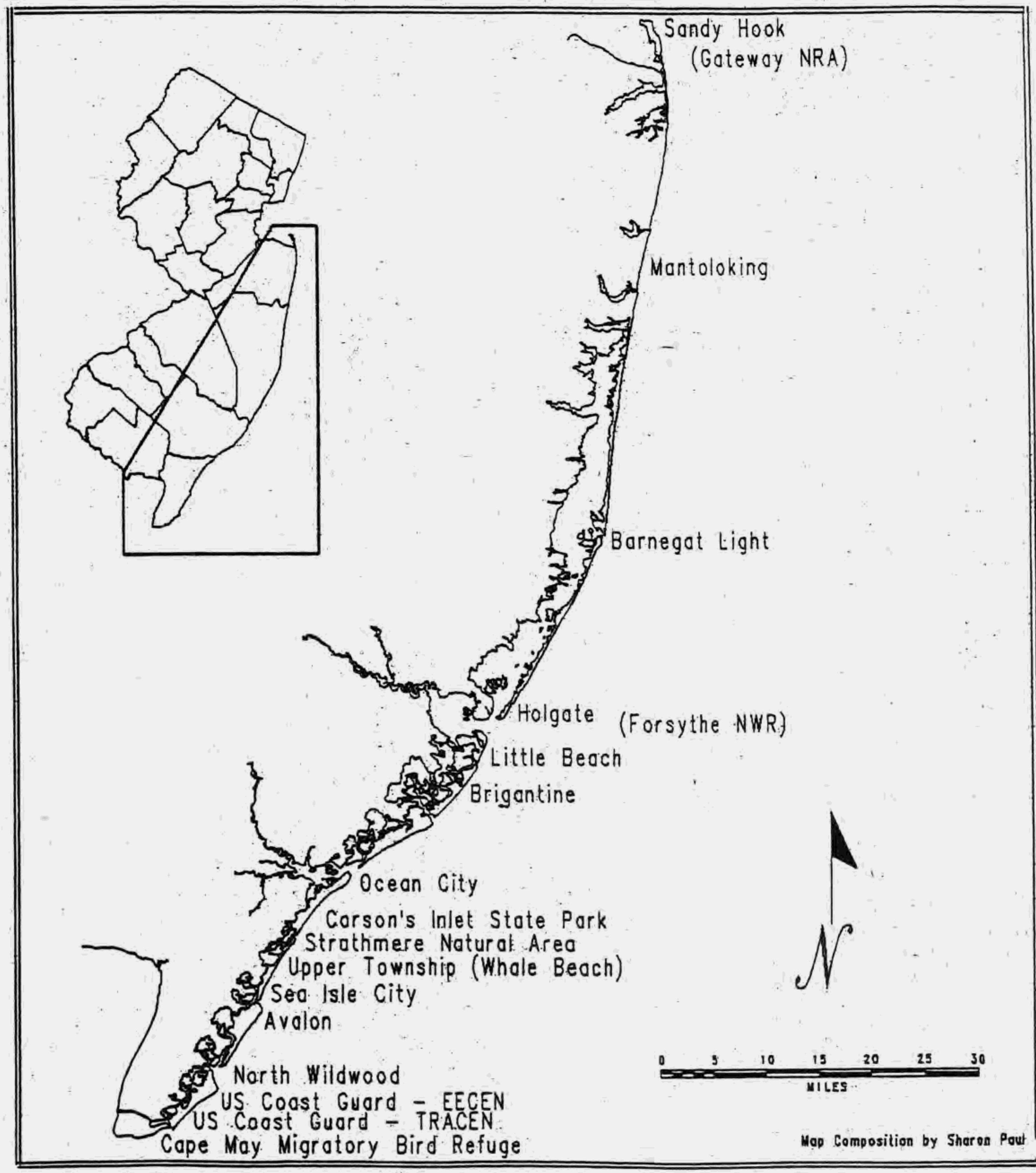
Encouraged Practices To Avoid Threats:

- Schedule projects to avoid the nesting season (generally April 1 to August 15).
- Seek input from New Jersey Division of Fish, Game & Wildlife and U.S. Fish & Wildlife Service biologists.
- Carefully evaluate options to standard repair methods if options are not a threat to structures.
- Consider alternatives to placing snow fence or using other repair methods on narrow beaches if there is no threat to property.

Wildlife managers use billboards and other educational displays to increase public awareness.

New Jersey Division of Fish, Game & Wildlife

New Jersey Endangered Beach Nesting Bird Areas



APPENDIX E

Coordination with the New Jersey Division of Fish and Wildlife

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://njfieldoffice.fws.gov

In Reply Refer to:

FP-02/08

JUL 11 2002

Robert McDowell, Director
New Jersey Division of Fish and Wildlife
CN400
Trenton, New Jersey 08625

Dear Mr. McDowell:

Enclosed is the U.S. Fish and Wildlife Service's (Service) Draft Fish and Wildlife Coordination Act Report entitled *Raritan Bay and Sandy Hook Bay Hurricane and Storm Damage Reduction Study, Union Beach, Monmouth County, New Jersey.* This constitutes the Service's draft report on fish and wildlife impacts that can be expected to result from the Army Corps of Engineers (Corps) proposed plan. This report has been prepared pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*) and is for inclusion in the Corps forth-coming feasibility report.

The Service's report contains an assessment of the proposed plan and recommendations for the protection of fish and wildlife resources. Please provide a letter of comment including indication of concurrence, or lack thereof, within 30 days from the date of this letter. If there are any questions concerning this report, please contact John Staples or Allen Jackson of my staff at (609) 646-9310, extension 18 or 23, respectively. Thank you for your assistance in this matter.

Sincerely,

Clifford G. Day
Supervisor

Enclosure

Responses to the USFWS' "OTHER COMMENTS AND RECOMMENDATIONS" from December 2014 letter.

1. The FWCA requires consultation with the Service and the fish and wildlife agencies of States where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted ... or otherwise controlled or modified" be conducted by any agency under a Federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources." According to the New Jersey Coastal Zone Management Rules (N.J.A.C. 7:7E), development of endangered or threatened wildlife or plant species habitat (any wildlife or plant species on official Federal or State lists of endangered or threatened species, or under active consideration for State or Federal listing) is prohibited unless it can be demonstrated, through an Endangered or Threatened Wildlife or Plant Species Impact Assessment as described at N.J.A.C. 7:7E-3C.2, that endangered or threatened wildlife or plant species habitat would not directly or through secondary impacts be adversely affected on the relevant site or in the surrounding area. Applicants for development of sites that contain or abut areas mapped as endangered or threatened wildlife species habitat on the Landscape Maps shall either demonstrate compliance with this rule by conducting an Endangered or Threatened Wildlife Species Impact Assessment in accordance with N.J.A.C. 7:7E-3C.2; or demonstrate that the proposed site is not endangered or threatened wildlife species habitat and this rule does not apply by conducting an Endangered or Threatened Wildlife Species Habitat Evaluation in accordance with N.J.A.C. 7:7E-3C.3. On pages 505-514 found in Volume 3 of the Corps' Final Feasibility Report, the New Jersey Office of Natural Lands Management, Natural Heritage Program provided a list of Federal and State-listed plants and animals inclusive of species of special concern known to occur within or in the vicinity of the study area. The aforementioned impact assessment and habitat evaluations are not included in the Corps documents and reports provided to date. The Service recommends that such assessments and evaluations be completed, and conservation measures be provided for review prior to project implementation.

District Response: The New York District acknowledges the NJ regulation and agrees with the USFWS recommendation to coordinate with the New Jersey Office of Natural Lands Management, Natural Heritage Program. All coordination on these issues would occur during PED.

USFWS Response to the Corps: Acknowledged. Please provide the Corps' completed assessments and evaluations to the USFWS once coordination with the NJ Natural Heritage is completed.

2. Please provide an update on proposed direct and indirect wetland impacts and clarify whether the Corps still proposes mitigation consisting of creating or enhancing 17.5 acres of wetlands (Plan A of Mitigation Alternative 2). Also please indicate whether a 4.84-acre, 20-foot wide retention ditch is still proposed as part of the mitigation package.

District Response: The draft supplemental environmental assessment (EA) characterizes the extent to which implementing the 2016 HSLRR proposed project could cause direct and indirect effects to wetlands. The District proposes to mitigate 20.2 acres of wetland impacts as described in the HSLRR and draft supplemental EA. The 4.84-acre, 20-foot wide retention ditch is no longer part of the mitigation package.

USFWS response to the Corps: Acknowledged.

3. If the Corps is still proposing temporary stormwater storage areas by digging out wetlands, please define these impacts to wetlands within the mitigation proposal.

District Response: The areal extent of impacts to wetlands from implementing the 2016 HSLRR proposed project have been quantified at 20.2 acres; mitigation for all of this area will be defined further in PED, but will be included.

USFWS response to the Corps: Acknowledged.

4. Please provide an update on selection of the preferred sand borrow area. Avoid potential borrow areas in the vicinity of Sandy Hook. Assess regional sediment transport patterns so not to adversely impacts Sandy Hook shorelines (threatened and endangered species habitat). The Service also recommends that the Corps renew coordination with the New Jersey Bureaus of Marine Fisheries and Shellfisheries regarding potential adverse impacts to resources managed by these Bureaus.

District Response: The preferred sand borrow area remains unchanged from the 2003 FS/FEIS.

USFWS response to the Corps: The USFWS supports the continued use of this borrow area. Please inform the USFWS of any changes.

5. Please provide an update on more recent economic analyses that would warrant implementing buy-outs and other non-structural alternatives.

District Response: The HSLRR provides current economic analyses buy-outs and other non-structural alternatives.

USFWS response to the Corps: Acknowledged.

6. Pursuant to the Coastal Barrier Resource Act (P.L. 97-348, as amended; 16 U.S.C. 3501 *et seq.*), the Corps was advised to allocate a State/local cost share to the portion of project within the Coast Barrier Resource System Unit NJ-04 unit. Please provide an update on this issue.

District Response: The 2016 HSLRR and supplemental EA provide an update of the results of coordination on the Coastal Barrier Resource Act and the changes to the Coastal Barrier Resource System Unit NJ-04 boundary that resulted from coordination on this project.

USFWS response to the Corps: the USFWS acknowledges completion of consultation pursuant to the CBRA.

7. Implementation of a flood control project in nearby Keansburg resulted in heavy spread of the invasive common reed (*Phragmiles australis*) throughout the associated tidal wetlands, causing loss of suitable habitat for a number of native plants and wildlife species. While the Corps proposed five years of monitoring at the mitigation sites to ensure a successful establishment of native vegetation, it only proposes two years of pre- and post-construction monitoring of storm gates and tide levels within project-modified wetlands. The Service recommends that the Corps also collect baseline data on pre-and post-constructed wetland vegetation, pledging control actions if data suggest increase of common reed stands in *Spartina* marsh over time. Also, please document how the constructed levees, ditches, and swales will not be colonized by invasive plant species.

District Response: The monitoring of indirect effects to vegetation as a result of implementing the 2016 HSLRR proposed project will be addressed in PED.

USFWS response to the Corps: The USFWS continues to strongly support implementing all measures to maintain or enhance the functions and values of these tidal wetlands over time.

8. Apply the New Jersey Endangered and Nongame Species *Landscape for Birds on New Jersey Barrier Islands* (available at: http://www.state.nj.us/dep/fgw/ensp/literature.htm) and the January 2014 *Standards for Soil Erosion and Sediment Control in New Jersey* (available at: http://www.nj.gov/agriculture/divisions/anr/pdf/2014NJSoilErosionControlStandardsComplete.pdf) to stabilize the interior side of proposed beach berms.

District Response: The applicability and implementation of recommendations for the stabilization of the interior side of proposed beach berms in accordance with the cited NJ standard will be addressed in PED.

USFWS response to the Corps: Acknowledged.

9. The Service recommends that the Corps assess adverse impacts to fish and larvae and mitigate these impacts, including the following items. Document if the proposed storm gates will affect in-stream fish. Describe if and how will pumps impact fish and fish larvae blocked by the gates.

District Response: The 2003 FEIS asserted: "Based on the results of a hydrological model to predict tidal flows and losses through constructed features, the gates have all been designed to cause no significant reduction or change in normal tidal flows (USACE, 2003). Therefore, the tidal wetlands in the study area are expected to receive the same frequency and levels of tidal inundation (USACE, 2003).

USFWS response to the Corps: Acknowledged.

10. Groins cause sand suspended in the current to be deposited on the up-drift side. As the current then continues around the groin, it becomes turbulent and contributes to erosion on the down-drift side of the groin. Please explain which measures the Corps will undertake to prevent down-drift beach erosion.

District Response: Measures to monitor and prevent down-drift beach erosion will be addressed in PED.

USFWS response to the Corps: Acknowledged.

11. Identify whether the Corps has considered the use of reef balls as submerged breakwaters.

District Response: If appropriate, the use of reef balls as submerged breakwaters will be addressed in PED.

USFWS response to the Corps: Acknowledged.

12. Assess cumulative impacts associated with flood control projects within the Raritan and Sandy Hook Bays.

District Response: Section 4.24 of the 2003 FEIS addressed cumulative effects and the supplemental EA also addresses cumulative effects.

USFWS response to the Corps: Acknowledged.

13. In letters dated September 5, 2003, January 28, 2004, and March 3,2004, the National Marine Fisheries Service (NMFS) provided comments indicating that the Corps had not completed the required Essential Fish Habitat assessment pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265 as amended), as well as consultation pursuant to the ESA. Please provide an update on the status of the assessment and consultation required by the NMFS.

District Response: Consultation with NMFS is underway and is anticipated to be complete in January 2017.

USFWS Response to the Corps: Acknowledged. Please provide this information to the USFWS once consultation with the NMFS and EFH assessment are completed.

U.S. Fish and Wildlife Service Final 2b Report
District Response to Recommendation to the Final 2b Report
Union Beach, New Jersey

1. Service Recommendation #1: Coordinate with this Service office, the ENSP, and the NJNHP during the design phase of project planning to avoid adverse effects to State-listed species and State species of concern through the use of appropriate conservation measures such as buffers and seasonal restrictions.

The District Response: In general the District agrees with this recommendation if it is a requirement of the New Jersey Department of Environmental Protection's (NJDEP) Coastal Zone Management (CZM) Federal Consistency Statement.

2. Service Recommendation #2: Survey suitable habitats in the Study area during appropriate times of year to determine presence or absence of State-listed and other sensitive plant species, using information provided by NJNHP as a basis for further inventory work.

The District Response: See the District Response to Service Recommendation #1 above.

3. Service Recommendation #3: Implement Plan A of Mitigation Alternative 2 to compensate for adverse impacts associated with levees, floodwalls, retention ditches, and the surge barriers and pumping stations at Flat Creek and East Creek. Provide for Service participation in monitoring of mitigation areas.

The District Response: As stated in the District Response to Service Recommendation #1 in the draft 2b report, the District concurs with this recommendation. The selected mitigation plan is Alternative 2A. The District intends to coordinate with the Service in the development of monitoring protocols in the mitigation areas.

4. Service Recommendation #4: Continue wetland avoidance and minimization efforts during the design phase of the project, through both careful design of the proposed levee/floodwall (*i.e.*, increased use of floodwalls, and decreased use of levees), and periodic re-assessment of non-structural alternatives (*i.e.*, buy-outs, zoning).

The District Response: The alternative analysis conducted in the feasibility phase maximized avoidance and minimization impacts to wetlands. The Selected Plan is expected to receive Congressional authority for its construction. During the next phase, which is Pre-construction, Engineering and Design (PED), the District will endeavor to further minimize and avoid impacts to wetlands where feasible and practicable. The District in general agrees with this recommendation.

5. Service Recommendation #5: Develop a strict erosion and sediment control plan for any construction activities. Erosion and sediment runoff should be minimized by

conducting all construction activities on shore under dry conditions. Silt barriers should be utilized to minimize the movement of sediment.

The District Response: As stated in the District Response to Service Recommendation #2 in the draft 2b report, the District concurs with this recommendation. Once the construction contract has been awarded, the contractor will be responsible for obtaining a Soil Erosion and Sediment Control permit from the Freehold Soil Conservation District and take the responsibility for its implementation with QA/QC by District construction personnel and inspections by the representatives from the Freehold Soil Conservation District.

6. Service Recommendation #6: Fully restore temporary wetland impacts to pre-construction grades and hydrologic conditions, and revegetate these areas with appropriate native species. Monitor the success of post-construction restoration for at least 3 years; 5 years in areas where the project impacts involve *Spartina*-dominated marsh.

The District Response: In general the District agrees with this recommendation and plans to restore all temporary impacts to wetlands to pre-construction conditions. The District intends to monitor the restoration of temporary impacts to wetlands for a period of 3 consecutive years after construction.

7. Service Recommendation #7: Work with this Service office to verify a lack of hydrologic wetland impacts from levee/floodwall construction through an expanded tidal marsh monitoring plan, and develop contingency plans to rectify any adverse effects that may be documented.

The District Response: The District will be implementing a tidal marsh monitoring plan to monitor and document hydrological functions, in the wetlands that are associated with the protected side of the storm gates of the Selected plan. All indirect impacts, such as modification of hydrology due to levee/floodwall construction, were analyzed and are addressed by the Selected Mitigation plan. At this time the District does not recognize a need for an expanded marsh monitoring plan. The District does not concur with this recommendation

8. Service Recommendation #8: Work with this Service office and appropriate State agencies during the design phase of the project to ensure that selected construction methods and practices minimize in-stream impacts during storm gate and sluice gate installation, and design these proposed structures to minimize hardening and other alterations of the tidal creek beds and banks.
The District Response: The District agrees with this recommendation and plans to include its coordination and receive input from the interagency HEP/EPW team in the

development of the compensatory mitigation plan and the development of biological monitoring protocols.

9. Service Recommendation #9: Work with this Service office during the design phase of the project to characterize upland impacts (*i.e.*, acreage of disturbed land versus intact forest), and to avoid impacts to higher-quality upland wildlife habitats wherever possible.

The District Response: These analyses were already performed in cooperation with the Service, NJDEP and NMFS as part of the HEP procedure. All impacts to upland areas were included and were properly mitigated for as part of the Selected Plan, which was agreed to by the interagency HEP/EPW team. The District does not concur with this recommendation.

10. Service Recommendation #10: Prepare and implement a plan to avoid burial of *Phragmites* rhizomes along the levee; monitor the levees, ditch/swales, and pending areas for invasive plant and animals species for at least 5 years following construction; and take corrective control actions if invasive species are documented along the line of protection.

The District Response: The District agrees with most of this recommendation. *Phragmites* rhizomes within the Selected Plan's levee and floodwall footprint are scheduled for removal as part of construction. The levees and floodwalls are expected to act like barriers to prevent the spread of *Phragmites* into the unprotected natural coastal marsh habitat. The District plans to monitor the levees for *Phragmites* encroachment and their subsequent removal for 3 consecutive years following construction. Ditches, swales and ponding areas were projected to convert to wetland *Phragmites* habitat as part of the HEP/EPW investigation, and accordingly their wetland function and wildlife value impacts were accounted for their inclusion as part of the Selected Plan's compensatory mitigation plan.

11. Service Recommendation #11: Continue to coordinate with the NMFS to conclude consultation pursuant to Section 7 of the ESA, and regarding any EFH that may be affected by the proposed action.

The District Response: The District agrees with this recommendation and plans to continue its on-going consultation with the NMFS pursuant to the Section 7 of the ESA and any necessary EFH concerns.

12. Service Recommendation #12: Use sand borrow material with similar grain size to that of the renourishment site to reduce chances of erosion, minimize turbidity, and promote quick re-colonization by a similar faunal community to that impacted.

The District Response: As stated in the District Response to Service Recommendation #6 in the draft 2b report, the District concurs with this recommendation. The results of

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our grain size analysis has concluded that the material at the borrow site to be used for initial construction is of compatible size of sand to sand at the placement area.

13. Service Recommendation #13. Limit ocean-side dune stabilization (*i.e.*, vegetation planting, sand fencing) to the minimum necessary for storm protection, and plant a low-density, high-diversity assemblage of native species when dune planting is required.

The District Response: The District will take this recommendation under advisement and plans to continue its on-going coordination with the Service to further discuss this recommendation in the development of detailed plans and specifications of a dune planting plan. The District feels that ocean-side dune stabilization can be accomplished with minimal affects to piping plovers and seabeach amaranth. Sea Bright and Monmouth Beach, New Jersey are an example where co-existence can be accomplished.

14. Service Recommendation #14: Plant the landside of dunes with warm seasonal grasses and a mixture of salt tolerant shrubs. Coordinate with the local Soil Conservation District for guidance. Avoid non-native species, particularly invasive plants, and tress and shrubs that may provide perches for shorebird predators.

The District Response: The District agrees with this recommendation and as discussed in 13 above, the District plans to continue its on-going coordination with the Service to further discuss this recommendation in the development of detailed plans and specifications of a dune planting plan.

15. Service Recommendation #15: Work with this Service office during the design phase of the project to assess and mitigate any wetland and other impacts from the construction of groins and revetments.

The District Response: The District agrees to work with the Service during the PED phase. Impact analysis and appropriate mitigation in relationship to the construction of groins and revetments has already been performed in accordance with the interagency HEP/EPW team. In addition, mitigation includes an inter-tidal and near shore biological monitoring program to quantify the re-colonization rates in terms of diversity, abundance and biomass of benthic organisms

16. Service Recommendation #16: Schedule construction of the beach, dune, and associated structures during those times of year when impacts to benthic fauna would be minimized, and to avoid impacts to breeding anadromous fish, horseshoe crabs, shorebirds, and diamondback terrapins.

The District Response: Studies for this EIS do not indicate a need for seasonal restrictions. Reasonable consideration of feasible avoidance and minimization of impacts through scheduling has already been considered and will continue to be coordinated with the appropriate resource and regulatory agencies.

17. Service Recommendation #17: Implement the intertidal and borrow area monitoring plans proposed in the DEIS; coordinate the results with the appropriate federal and State agencies (the Service, the NMFS, and the NJDFW Bureaus of Marine Fisheries and Shell Fisheries).

The District Response: The District agrees with this recommendation and plans to coordinate the biological monitoring results with the above stated agencies.

18. Service Recommendation #18: Minimize use of large earth-moving equipment to reduce impacts associated with beach nourishment; allow natural currents to slope the beach profile wherever feasible.

The District Response: As stated in the District Response to Service Recommendation #4 in the draft 2b report, the District concurs with this recommendation. As part of the construction contract, the District will permit the contractor to use construction equipment at their discretion as needed to fulfill the contract. Once the construction template has been reached, natural currents will slope the beach profile accordingly.

19. Service Recommendation #19: Mitigate any losses to shellfish beds in borrow areas and nearshore areas by increasing structure through shell placement.

The District Response: At this time, the District does not agree with this recommendation. Results from benthic sampling do not indicate any significant beds of shellfish at either the placement area or at the borrow areas.

20. Service Recommendation 20: Work with this Service office to assess and monitor down-drift sedimentation impacts from beach nourishment through an expanded coastal processes monitoring plan, and develop contingency plans to rectify any adverse effects that may be documented.

The District Response: In general, the District agrees with this recommendation and plans to coordinate the results of the coastal processes monitoring plan.

21. Service Recommendation #21: Select the least damaging dredging equipment and practices, and avoid creating excessively deep borrow pits, which may revert to anoxic conditions.

The District Response: The use of a particular type of dredge will be governed by both economic and environmental feasibility. The dredge contractor will submit post construction surveys to ensure that the correct dredge plan has been followed, which will avoid deep pits with steep sided slopes. At this time the potential borrow areas are relative high spots when compared to their surrounding areas. This will reduce the potential for the development of anoxic conditions. The District in general agrees with this recommendation.

22. Service Recommendation #22. Determine if any federal (*i.e.*, NEPA, ESA, EFH assessment) or State review processes or authorizations need to be reassessed to authorize an expanded use of the Sea Bright borrow area for Raritan Bay shoreline beach nourishment.

<u>The District Response:</u> The District has determined that the use of the Sea Bright borrow area for the Union Beach project does not constitute an expanded use of its previously established capacity and utilization. Therefore all necessary investigation of the Sea Bright borrow areas have been conducted and no additional investigations are needed.

23. Service Recommendation #23. Amend the proposed monitoring plan for potential offshore borrow areas to include monitoring of waterfowl usage and foraging habits, and coordinate with this office and appropriate State natural resource agencies regarding waterfowl usage before initiating dredging at new borrow areas.

<u>The District Response:</u> At this time, the District will take this recommendation under advisement and plans to coordinate further with the Service to clarify the technical justification to a waterfowl usage and forging habitats component.

24. Service Recommendation #24: In cooperation with the Service and the National Park Service, assess potential disruptions of regional sediment transport patterns from use of existing and proposed borrow areas to determine if any Sandy Hook shorelines may be effected.

<u>The District Response:</u> The District agrees with this recommendation and will coordinate with the Service and the NPS in the development of a sediment transport model, if the potential borrow area adjacent to the Sandy Hook Channel meet geotechnical criteria.

25. Service Recommendation #25: Continue informal Section 7 consultation with the Service following project implementation regarding piping plovers and seabeach amaranth.

<u>The District Response:</u> The District agrees with this recommendation and plans to continue its on-going consultation with the Service regarding piping plovers and seabeach amaranth during the post-construction phase. It's the intent of the District to

develop and implement a post-construction monitoring program that is similar to that along the northern shoreline of New Jersey.

26. Service Recommendation #26: Initiate a monitoring program to survey for piping plovers and seabeach amaranth on beaches nourished by the Corps. These surveys should occur for at least 5 years after each nourishment unless suitable habitat is eliminated sooner by erosion, and the Service concurs in writing. Monitoring results should be reported to the Service and to the New Jersey Division of Fish and Wildlife's ENSP.

The District Response: In general the District agrees with this recommendation. However, the District plans to monitor for piping plovers and seabeach amaranth for only 3 consecutive years following construction. If plovers and/or seabeach amaranth are know to occur within the project footprint, the District will reinitiate consultation of Section 7 of the ESA.

27. Service Recommendation #27: Ensure that the Borough of Union Beach initiates and sustains a piping plover management program, if piping plovers are documented to occur within the project area, for the protection of adults and chicks during the nesting and brood-rearing period.

The District Response: The District does not agree with this recommendation because it lacks the Congressional authority to enforce the ESA. However, the District plans to cooperate with the Service to inform the Union Beach Borough officials that it's in their best interest and in the best interest of all of the stakeholders to participate in partnership to make every effort to avoid and minimize impacts to piping plovers.

28. Service Recommendation #28: Initiate an education and outreach program with the Borough of Union Beach to ensure compliance with the Service's Guidelines for protection of nesting piping plovers.

The District Response: See the District Response to Service Recommendation number 27 above.

29. Service Recommendation #29: Coordinate with this Service office to initiate a management program for seabeach amaranth if the species is detected on the project site.

The District Response: The District agrees with this recommendation and plans to continue its on-going consultation with the Service to develop appropriate protocols to monitor for seabeach amaranth if this species is detected within or adjacent to the footprint of the selected plan.

30. Service Recommendation #30: Re-initiate consultation with this Service office pursuant to Section 7 prior to any subsequent renourishment.

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The District Response: The District agrees with this recommendation and plans to re-initiate consultation with the Service pursuant to Section of the ESA at least 1 year prior to each periodic renourishment.

31. Service Recommendation #31: Contact the Service to obtain an updated list of threatened and endangered plants and animals if the selected plan is not implemented within 2 years.

The District Response: The District agrees with this recommendation.

32. Service Recommendation #32: Include State-listed and other beach species of concern in the Borough's endangered species management program.

The District Response: See the District Response to Service Recommendation #1 above.

From: Voisine, Matthew F CIV USARMY CENAN (US)
To: Popolizio, Carlo
Cc: Voisine, Matthew F CIV USARMY CENAN (US)
Subject: RE: [EXTERNAL] Re: Union Beach Supplemental EA and FWCAR
Date: Tuesday, 17 January, 2017 2:28:08 PM

Thanks Carlo. An email will suffice.

Matthew Voisine
Biologist
USACE- NY District
26 Federal Plaza
Room 2151
NY, NY 10278
917.790.8718 voice
212.264.0961 fax
matthew.voisine@usace.army.mil

-----Original Message-----
From: Popolizio, Carlo [mailto:carlo_popolizio@fws.gov]
Sent: Tuesday, 17 January, 2017 13:19
To: Voisine, Matthew F CIV USARMY CENAN (US) <Matthew.Voisine@usace.army.mil>
Subject: Re: [EXTERNAL] Re: Union Beach Supplemental EA and FWCAR

Hi Matthew,

we do not have substantial comments to offer. Would you like a formal letter or will an e-mail suffice?

On Fri, Jan 13, 2017 at 9:14 AM, Voisine, Matthew F CIV USARMY CENAN (US) <Matthew.Voisine@usace.army.mil <mailto:Matthew.Voisine@usace.army.mil> > wrote:

Thanks Carlo

Matthew Voisine
Biologist
USACE- NY District
26 Federal Plaza
Room 2151
NY, NY 10278
917.790.8718 voice
212.264.0961 fax
matthew.voisine@usace.army.mil <mailto:matthew.voisine@usace.army.mil>

-----Original Message-----
From: Popolizio, Carlo [mailto:carlo_popolizio@fws.gov <mailto:carlo_popolizio@fws.gov>]
Sent: Friday, 13 January, 2017 8:48
To: Voisine, Matthew F CIV USARMY CENAN (US) <Matthew.Voisine@usace.army.mil <mailto:Matthew.Voisine@usace.army.mil> >
Subject: Re: [EXTERNAL] Re: Union Beach Supplemental EA and FWCAR

Hi Matthew,

Happy New Year to you! I should have our review to you by the end of next week. Thanks, Carlo

On Tue, Jan 10, 2017 at 4:41 PM, Voisine, Matthew F CIV USARMY CENAN (US) <Matthew.Voisine@usace.army.mil <mailto:Matthew.Voisine@usace.army.mil> <mailto:Matthew.Voisine@usace.army.mil > > > wrote:

Carlo

Happy New Year.

Just checking in on the status of your review of our comments for the Union Beach project.

Thank you

Matthew Voisine
Biologist
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NY, NY 10278
917.790.8718 voice
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matthew.voisine@usace.army.mil <mailto:matthew.voisine@usace.army.mil> <mailto:matthew.voisine@usace.army.mil > >

-----Original Message-----
From: Voisine, Matthew F CIV USARMY CENAN (US)
Sent: Tuesday, 06 December, 2016 16:58
To: Popolizio, Carlo <carlo_popolizio@fws.gov <mailto:carlo_popolizio@fws.gov> <mailto:carlo_popolizio@fws.gov > > >
Cc: Voisine, Matthew F CIV USARMY CENAN (US) <Matthew.Voisine@usace.army.mil <mailto:Matthew.Voisine@usace.army.mil> <mailto:Matthew.Voisine@usace.army.mil > > >
Subject: RE: [EXTERNAL] Re: Union Beach Supplemental EA and FWCAR

Carlo

Somehow the response were left out of the documents. I have attached the responses for your review.

Thank you for your continued work with this project.

Matthew Voisine
Biologist
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matthew.voisine@usace.army.mil <mailto:matthew.voisine@usace.army.mil> <mailto:matthew.voisine@usace.army.mil > >

-----Original Message-----
From: Popolizio, Carlo [mailto:carlo_popolizio@fws.gov <mailto:carlo_popolizio@fws.gov>

<mailto:carlo_popolizio@fws.gov > >]
Sent: Tuesday, 06 December, 2016 14:40
To: Voisine, Matthew F CIV USARMY CENAN (US) <Matthew.Voisine@usace.army.mil <mailto:Matthew.Voisine@usace.army.mil> <mailto:Matthew.Voisine@usace.army.mil > > >
Subject: [EXTERNAL] Re: Union Beach Supplemental EA and FWCAR

Hi Matthew,

we had outstanding comments and recommendations in the attached letter dated December 14, 2014 that were pertinent to the project, but the letter does not appear in Appendix D "Pertinent Correspondence."

Carlo

On Mon, Dec 5, 2016 at 9:26 AM, Voisine, Matthew F CIV USARMY CENAN (US) <Matthew.Voisine@usace.army.mil <mailto:Matthew.Voisine@usace.army.mil> <mailto:Matthew.Voisine@usace.army.mil > > <mailto:Matthew.Voisine@usace.army.mil > <mailto:Matthew.Voisine@usace.army.mil > > > > wrote:

Carlo

I am following up on the Union Beach comments that USFWS had on the project. When the USACE reinitiated the Union Beach project we discussed how to address the FWCAR. The USFWS stated that there were outstanding comments not pertaining to the project that needed to be addressed. The USACE addressed those comments in the release of the Supplemental EA send on Oct 6 2016. Do you have any further comments and can the USACE use those comments and responses along with the original FWCAR as coordination?

Thank you

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Carlo Popolizio, Biologist
U.S. Fish and Wildlife Service

New Jersey Field Office
4 East Jimmie Leeds Road, Unit 4
Galloway, New Jersey 08205-4465
Phone (609) 382-5271
Fax (609) 646-0352

The warbling of birds and the grandeur and the beauties of the forest, the majestic clouds, the golden tints of a summer evening sky, and all the changes of nature combine to furnish ample matter for reflection to the contemplating youth.

Francis Assikinack (Blackbird) Ottawa

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The warbling of birds and the grandeur and the beauties of the forest, the majestic clouds, the golden tints of a summer evening sky, and all the changes of nature combine to furnish ample matter for reflection to the contemplating youth.

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APPENDIX J

MONITORING AND ADAPTIVE MANAGEMENT PLAN

1 INTRODUCTION

This Monitoring & Adaptive Management Plan was prepared for the Raritan Bay and Sandy Hook Bay, Hurricane Sandy Limited Reevaluation Report, Union Beach, New Jersey Supplemental Environmental Assessment (EA). Section 2036 of Water Resource Development Act (WRDA) 2007 directs the Secretary of the Army to ensure that the mitigation plan for each water resources project complies with the mitigation standards and policies established pursuant to the regulatory programs administered by the Secretary. This includes; 1) monitoring until successful, 2) criteria for determining ecological success, 3) a description of available lands for mitigation and the basis for the determination of availability, 4) the development of contingency plans (i.e., adaptive management), 5) identification of the entity responsible for monitoring; and 6) establish a consultation process with appropriate Federal and State agencies in determining the success of mitigation.

An effective monitoring program is necessary to assess the status and trends of ecological health and biota richness and abundance on a per project basis, as well as to report on regional program success within the United States. Assessing status and trends includes both spatial and temporal variations. Gathered information under this monitoring plan will provide insights into the effectiveness of current mitigation projects and adaptive management strategies, and indicate where goals have been met, if actions should continue, and/or whether more aggressive management is warranted.

Monitoring the changes at a project site is not always a simple task. Ecosystems, by their very nature, are dynamic systems where populations of organisms fluctuate with natural cycles. Water quality also varies, particularly as seasonal and annual weather patterns change. The task of tracking environmental changes can be difficult, and distinguishing the changes caused by human actions from natural variations can be even more difficult. This is why a focused monitoring protocol tied directly to the planning objectives needs to be followed.

1.1 Guidance

The following documents provide distinct USACE and New Jersey State policy and guidance that are pertinent to developing this monitoring and adaptive management plan:

1. Section 2036 of Water Resource Development Act (WRDA) 2007.
2. Section 906(d) of the Water Resources Development Act 1986 (33 U.S.C. 2283(d)), as amended.
3. ER 1105-2-100 dated 22 April 2000, Planning Guidance Notebook.
4. Compensatory Mitigation for Losses of Aquatic Resources; Final Rule; Federal Register, Volume 73, No. 70, April 10, 2008.
5. Conference Report to Accompany H.R. 1495, Report 110-280, dated July 31, 2007, Joint Explanatory Statement of the Committee of Conference.
6. New Jersey Department of Environmental Protection Mitigation Project Monitoring Reports Checklist for Completeness 1/2/13.

1.2 Project Area Description

The Union Beach project area is located in the northern portion of Monmouth County, New Jersey. It occupies a 1.8 square mile area of land along the coast of the Raritan Bay. The project area is defined by the Raritan Bay to the north, the Borough of Keansburg to the east, the Township of Hazlet to the south, and Chingarora Creek to the west. Flat Creek and East Creek both flow through sections of Union Beach; all creeks flow north into Raritan Bay. To the east of East Creek is a levee with a nominal crest elevation of +15 feet NGVD29, which is part an adjacent Federal project – the Raritan Bay and Sandy Hook Bay Beach Erosion and Hurricane Protection project for the Borough of Keansburg, North Middletown, and Laurence Harbor.

The western portion of Union Beach is characterized by low-lying marsh with some beach. The developed section of Union Beach at the Raritan Bay shoreline is lined by assorted bulkheads and seawalls. A locally constructed 1,850 foot long bulkhead parallels Front Street. The eastern shoreline of Union Beach is also characterized as an unprotected marsh.

The topography of Union Beach is characterized by low, flat terrain. Elevations range from 0 feet NGVD29 along the Raritan Bay coastline, to a maximum of approximately + 20 feet NGVD29 in the extreme southeastern and southwestern portions. Wide stretches of tidal marsh are located along the creeks and a portion of the bay shoreline.

The Borough's interior stormwater drainage system contains 38 outfalls. One outfall discharges directly into Raritan Bay, one into Natco Lake, ten into the marshlands along the western end of the Borough and four into the marshlands into the eastern edge. East Creek provides drainage for six stormwater outfalls and Flat Creek provides for 16 outfalls. The flat gradient of the streams and the low relief of the surrounding terrain make the project area extremely vulnerable to interior flooding during the periods of heavy rainfall. Severe thunderstorm activity in conjunction with high tides causes the creeks to overtop and spread their floodwaters within the broad floodplain.

1.3 Mitigation Site

The final Union Beach, New Jersey Final Feasibility Report/Final Environmental Impact Statement was completed/approved in Sept 2003 and with the Record of Decision signed in July 2008. The recommended plan included a 17. 5 acre mitigation plan that would convert 12.0 acres of wetland Phragmites in the Flat Creek area to 10.0 acres of salt marsh and 2 acres of wetland scrub-shrub habitat. Also in the Flat Creek area, 2.5 acres of upland Phragmites would be converted to wetland herbaceous/scrub shrub habitat. For the East Creek area, 3.0 acres of wetland dominated by Phragmites would be converted to wetland scrub-shrub habitat. The Selected Mitigation Plan was based on using functional assessment methodology (EPW and HEP), calculating Total EPW FCUs and HEP HUs impacted - 25.42 and 11.84, respectively.

The analysis as part of the preparation of the Draft HSLRR and Supplemental EA, noted that minor design changes and compliance with 2009 USACE Vegetation Management Policy resulted in an increase of the areal extent of wetlands affected by the HSLRR Recommended Plan. Due to the conceptual level estimate associated with the change in aerial impact, and due to the limited scope given as part of the HSLRR, a new functional assessment was not undertaken. It was noted in the HSLRR/Supplemental EA, that during PED (when there is more detailed data available), the functional assessment analysis will be updated to confirm if additional acreage may be required. If so, the Selected Mitigation Plan will be revised. However, due to the lower quality of the habitat to be impacted, it is not anticipated that there will be measurable increase in mitigation acreage needed.

1.4 Mitigation Costs

Costs for the 2003 EIS were estimated to be $2.2 million. Those costs were escalated to $3.2 million for 2017. The USACE and the NJDEP will be responsible for all costs.

2 MONITORING OBJECTIVES, STRATEGY AND PROCEDURES

2.1 Monitoring Objectives

- To support adaptive management of implemented mitigation project;
- To assess and justify adaptive management expenditures;
- To minimize costs and maximize benefits of future projects; and
- To determine “ecological success”, document, and communicate it.

The District would monitor the mitigation areas following completion of construction activities in order to evaluate the success of mitigation, and to take corrective actions, if necessary, to ensure success. Specifically, prior to implementation of the Selected Mitigation Plan, the District would develop a detailed monitoring plan that identifies the field variables that should be evaluated, the most appropriate field measurement methods, the recommended frequency, and duration of each field effort, the reporting requirements and schedule, and a cost estimate to implement the entire monitoring plan. The following sections present some of the performance criteria and potential corrective actions that would be identified in the mitigation monitoring plan.

2.2 Monitoring Strategy

All monitoring components of the monitoring strategy will continue to be refined as design and construction progresses and as coordination with regulatory agencies continues. This monitoring plan is based on feasibility level information.

The purpose of the monitoring plan for wetland restoration/creation is to:

- Provide in-kind wetland mitigation for the Union Beach project.
- Evaluate the success of the wetland restoration/creation; and
- Develop a better understanding of wetland restoration and creation opportunities and protection needs in the study area.

The ecological parameters that will be monitored during post-restoration periods at wetland restoration/creation sites are:

- Vegetation

- Soil Characteristics
- Hydrologic Regime

2.3 Monitoring Procedures

Post-restoration monitoring will begin four to five weeks after wetland restoration and or creation is completed and will continue each year for 3-5 years post restoration and determined successful by the Project Monitoring Team. This initial site visit will include an assessment of the construction site and photographic documentation of the completed restoration area. After this assessment, post-restoration monitoring will occur annually for 3-5 years, assessing all ecological parameters that are listed above. Post-restoration monitoring will seek to assess the success of the restored habitat using the protocols proposed in 2000 by the National Oceanic and Atmospheric Administration (NOAA) in their New York State Salt Marsh Restoration and Monitoring Guidelines Report and the requirements stated in the New Jersey Department of Environmental Protection Mitigation Project Monitoring Reports Checklist for Completeness 1/2/13. Protocols below have been modified from protocols used during other salt marsh and wildlife monitoring projects conducted by other resource agencies, as well as those followed by USACE.

The monitoring protocol will progress towards showing 85 percent survival and 85 percent area coverage of mitigation plantings or target hydrophytes (target hydrophytes are noninvasive native species to the area and similar to ones identified on the mitigation planting plan). Monitoring will progress to document the development of hydric soils and a hydrologic regime across the mitigation site. Lastly monitoring will conclude to submit a field wetland delineation of the project based on the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989) showing the exact acreage of the mitigation areas.

If the restored site is not showing progress to meet the requirements of 85% vegetation cover, additional native vegetation will be planted to meet this goal. If, in the unlikely event, a native, sustainable ecosystem cannot be established within 5 years at the site, changes and modifications to the project site will be initiated immediately by restoration ecologists. A redesign of the site will continue to occur on an ongoing basis in response to project failure. A new monitoring plan will be redrawn by USACE to accommodate these changes and monitor the success of the alteration.

The following are monitoring procedures that will provide the information necessary to evaluate the success of the project. A number of these procedures are applicable to multiple performance measures and habitat. Further refinement of these procedures will be completed by USACE and its sponsors prior to the pre-construction monitoring period.

2.3.1 Vegetation Monitoring Methods

Vegetation would be monitored in both the spring and fall to document conditions that indicate if there is at least 85% coverage of planted vegetation or target hydrophytes or to show a trend toward potential success. Sampling methods would include random circular plot sampling for woody vegetation and quadrate plot sampling for emergent vegetation.

2.3.1.1 Random circular plot sampling

Protocol would call for typically twenty foot radius plots; however in areas of high planting density ten foot radius plots may be utilized. Plot locations would be chosen using a simple random sampling procedure. Data recorded at each plot for both herbaceous and woody species include; species name, percent area coverage, and dominance. For woody species, additional data included whether the species was planted or is a recruit, number of live, and number of dead stems, average height, and plant health. Plant health would be rated as “E” representing excellent health (plant is thriving and has little to no signs of herbivory), “G” representing good health (plant is healthy and may have some herbivory), “F” representing fair health (plant is moderately healthy and may have moderate herbivory), and “P” representing poor health (plant is dying and/or has heavy herbivory).

2.3.1.2 Quadrate sampling

Protocol for emergent vegetation would consist of one square meter quadrate plots along random transects lines no more than 15 meters apart. At each transect, one quadrat will be randomly placed within the low marsh along the transect line and the existing vegetation of the plot will be monitored. Quadrats will be placed on either side (randomly chosen) within one meter of the measuring tape. Once placed, the meter mark on the upper and lower edge of each quadrat will be marked permanently with stakes (rebar) and recorded on the measuring tape in meters. Plant species, plant height, stem density, flowering density, and percent cover data will be collected within each plot. A narrative description of plant health will also be collected. The exact location and side the quadrat will be placed on the transect line will be noted with a compass. This will facilitate relocating quadrats on subsequent monitoring visits. Each transect line and 1.0 m2 quadrat will be photographed facing channel-ward at the time of vegetation monitoring. All photographs must be taken at low tide, in the same spot, and at the same height.

2.3.2 Soil Sampling Method

Soils investigations would identify the existing characteristics of the surficial and subsurface soils at the site and perform the necessary laboratory analysis to determine organic content, pH macro and micro-nutrient content of the soil.

The soil characteristics of texture, color, and structure would be used to help determine the presence or absence of groundwater and/or frequency of surface inundation. Soil texture would be estimated in the field using the U.S. Department of Agriculture (USDA) classification system. Other characteristics such as redoximorphic features, relative moisture content, and structure would also be noted. Color would be described using Munsell color charts.

Soil samples would be analyzed for the following parameters: standard fertility analysis for soils (P, K, Mg, Ca, Zn, Cu, Mn, Fe, and B), soil pH and soil organic matter.

2.3.3 Hydrological Regime Monitoring Methods

A Hanna Instruments Multiparameter Portable Meter (or similar device) will be used to record several aquatic parameters including salinity, temperature, pH, dissolved oxygen, total dissolved solids (TDS), and electric conductivity (EC). Water quality monitoring will occur once a month from June through September. Sampling will occur at two locations within each project site. The sampling sites will be located at opposite ends of the site in order to get an accurate assessment of wetland functioning pre- and post- restoration within the project area. Water quality will be tested at approximately 1 hour prior to high tide, during the flood tide as the water is entering the wetland system.

Piezometers would be installed to assess seasonal depth to groundwater. Spot ground elevation surveys will be conducted in order to determine if topography is being maintained as designed. Flood tracking would be collected for comparison to flood conditions predicted by the HEC-RAS model used to develop the mitigation design, as well as to provide independent documentation of flood elevations required to inundate various wetland areas.

3 MONITORING RESPONSIBILITIES

The responsible parties for the monitoring will be the USACE and the NJDEP. Any standards presented in this plan are to be used as guidelines for evaluation. Closer investigation will be performed by the monitoring and adaptive management team which shall consist of the USACE and any other federal or state regulatory agency desiring participation. The regulatory agencies responsible for approving the restoration designs, monitoring protocols, and any required permitting for restoration activities is the NJDEP.

A yearly monitoring summary report would be drafted by the USACE that summarizes the data collected and determines if adaptive management is needed. Reports will be submitted to the NJDEP. A final monitoring report would be drafted in year five that details the results and demonstrates the establishment of a functioning wetland. Included in each report shall be the monitoring data, photographs, a brief summary of the collected data, and a discussion of the data collected.

4 ADAPTIVE MANAGEMENT

Adaptive management in the context of this project is an approach to resource management in which management goals remain the same, but management objectives and techniques may be modified in response to feedback (such as monitoring results) from the system being managed. Adaptive management recognizes that human knowledge regarding biological and physical systems are limited and that these systems may not always respond as expected. When a management or restoration project is to be implemented but there is some uncertainty regarding the response of the system to particular actions, adaptive management provides a way for management actions to respond to feedback from the system being managed.

Adaptive management will be implemented if specific restoration standards are not met or if it appears that actual conditions will diverge sufficiently far from the intended conditions to threaten the achievement of overall project goals. Funding for adaptive management will be included in the project cost estimates so that this option will be available in the future if needed.

The adaptive management program will consider the following conditions identified by the mitigation monitoring reports that may be limiting potential success.

- Roles current soil characteristics and topography are playing in the function of the site.
- Whether the vegetation species and sizes used during the initial planting are appropriate for site conditions
- Determining the impact invasive species and herbivory damage to the planted vegetation has had on the mitigation site, and potential remedies and evaluating the remedies.
- Review of site hydrology and particularly comparison of the severity and frequency of the flood events to the flood estimates used to develop the mitigation design.
- Review of restoration and enhancement habitat designs to identify where design may not be appropriate to the existing conditions.

4.1 Vegetation

After 2 years post-restoration, the monitoring protocol will integrate the standard of 85% vegetative cover with a broad functional assessment focusing on the four ecological parameters listed above. If the restored site fails to meet the requirements of 85% vegetation cover during the first 2 years, the additional native vegetation will be planted to meet this goal. Invasive species will be managed via physical removal and or the use of pesticides. If, in the unlikely event, a native, sustainable ecosystem cannot be established within 5 years at the site, changes and modifications to the project site will be initiated immediately by restoration ecologists. A redesign of the site will continue to occur on an ongoing basis in response to project failure. A new monitoring plan will be redrawn by the PDT to accommodate these changes and monitor the success of the alteration.

4.2 Soils

Soils would be evaluated for the potential benefit of soil modification (e.g. addition of clay to in-situ soil) to improve water retention after flood inundation.

4.3 Hydrological Regime

The hydrological regime will be evaluated so that induration and duration of flooding across the project sites is performing to maintain saturation levels determined necessary to maintain the wetlands. Changes may include altering drainage swales, employing some type of groundwater wicking method that could draw the groundwater closer to the root zone and provide hydrologic support to the wetlands, and refining existing models to better evaluate water flow velocities, volumes, duration, and inundation.

Typical criteria for successful wetland mitigation projects in New Jersey include:

1. Compensation Area: That the goals of the wetland mitigation project including acreage and the required wetland transition area, as stated in the approved wetland mitigation proposal and the permit has been satisfied. At the end of year-5, the USACE must submit a field wetland delineation of the wetland mitigation project based on the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (FICWD, 1989) which shows the exact acreage of the wetland mitigation areas.
2. Vegetation: The site has an 85 percent survival or 85 percent area coverage of the mitigation plantings or target hydrophytes which are species native to the area and similar to ones identified on the mitigation planting plan. All plant species in the mitigation area are healthy and thriving and all trees are at least five feet in height.
3. Invasive Species: The site is less than 10 percent occupied by invasive or noxious species such as but not limited to *Phalaris arundinacea* (reed canary grass), *Phragmites australis* (common reed grass), *Pueraria montana* (kudzu), *Typha latifolia* (broad-leaved cattail), *Typha angustifolia* (narrow-leaved cattail), *Lythrum salicaria* (purple loosestrife), *Ailanthus altissima* (tree-of-heaven), *Berberis thunbergii* (Japanese barberry), *Berberis vulgaris* (common barberry), *Elaeagnus angustifolia* (Russian olive), *Elaeagnus umbellata* (autumn olive), *Ligustrum obtusifolium* (Japanese privet), *Ligustrum vulgare* (common privet) and *Rosa multiflora* (Multiflora rose).
4. Hydrology: The proposed hydrologic regime as specified in the mitigation proposal, which proves the mitigation site is a wetland, has been satisfied.The documentation shall include when appropriate monitoring well data, stream gauge data, photographs, and field observation notes collected throughout the monitoring period.