Appendix D

PLANNING AID REPORT

LITTLE EGG INLET
SAND RESOURCE BORROW AREA INVESTIGATION

FOR THE

BARNEGAT INLET TO LITTLE EGG INLET (LONG BEACH ISLAND)
STORM DAMAGE REDUCTION PROJECT
OCEAN COUNTY, NEW JERSEY

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office
Galloway, New Jersey 08205

February 2016

16-CPA-0075

Lieutenant Colonel Michael A. Bliss, P.E.
District Commander, Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

FEB 0 1 2016

Dear Lieutenant Colonel Bliss:

The U.S. Fish and Wildlife Service (Service) provides this Planning Aid Report (PAR) to the U.S. Army Corps of Engineers, Philadelphia District Planning Division (Corps) for the evaluation of Little Egg Inlet (study area) as a source of sand material for the Barnegat Inlet to Little Egg Inlet beach re-nourishment project, Ocean County, New Jersey. The purpose of the study is to evaluate the suitability of the subject borrow area, and assess potential adverse impacts to Federal trust species and the Edwin B. Forsythe National Wildlife Refuge – Holgate Unit and Little Beach Island that may result from project implementation.

This PAR provides preliminary information on fish and wildlife resources in the study area. This PAR is provided pursuant to a Fiscal-Year 2016 interagency agreement and scope of work. Comments and recommendations provided in this PAR do not constitute the report of the Secretary of the Interior pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*).

The Service notes that the Corps cannot determine the feasibility of utilizing Little Egg Inlet as a borrow area for the Long Beach Island Storm Damage Reduction Project until compliance with the following Federal laws and statutes is completed:

- Pursuant to Section 7 consultation of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA), the Corps is required to provide a determination to the Service on whether the project as proposed may affect the federally listed (threatened) piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), and seabeach amaranth (*Amaranthus pumilus*).

- Pursuant to the Migratory Bird Treaty Act of 1918 (40 Stat. 755, as amended; 16 U.S.C. 703-712), the Corps has the responsibility to protect and conserve migratory birds and their nesting habitats. A list of migratory birds known to occur within or in the vicinity of the proposed project area is presented in Appendix 1.

- Pursuant to the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Administration Act) (16 U.S.C. 668dd - ee); the Wilderness Act of 1964 (16 U.S.C. 1131-1136); and specific Service Wilderness Area Authorities (Public Laws 90-532, 91-504, 92-364, 93-429, 93-550, 93-632, 94-557, 95-450, 96-487, 96-560, 97-211, 98-140, 101-628, 103-433, 104-167, and 104-333), the Corps is required to consult with the Edwin B. Forsythe National Wildlife Refuge on any potential adverse impacts to Holgate and Little Beach Island, which have been designated as National Wilderness Areas.

- Pursuant to Section 7 consultation of the ESA, the Corps is required to provide a determination to the National Marine Fisheries Service (NMFS) on whether the project as proposed may affect the federally listed (endangered) Kemp's ridley (*Lepidochelys kempi*), leatherback (*Dermochelys coriacea*) and green (*Chelonia mydas*) sea turtles; the federally listed (threatened) Northwest Atlantic Ocean distinct population segment of loggerhead (*Caretta caretta*) sea turtle; the federally listed (endangered) North Atlantic right (*Eubalaena glacialis*), fin (*Balaenoptera physalus*), and humpback whales (*Megaptera novaeangliae*); and the federally listed (endangered) Atlantic sturgeon (*Acipenser oxyrhynchus*).

- Pursuant to the Magnuson-Stevens Act (Public Law 94-265, as amended), the Corps is required to consult with the NMFS with respect to "any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat (EFH) identified under this Act." The NMFS has designated the Little Egg Inlet as EFH for the life stages of fish listed in Appendix 2 of this PAR.

The Service recommends that the Corps coordinate with the New Jersey Division of Fish and Wildlife for the protection of State-listed species such as the endangered least tern [*Sternula* (*Sterna*) *antillarum*] and black skimmer (*Rhyncops* niger); the threatened osprey (*Pandion haliaetus*), yellow-crowned night-heron (*Nyctanassa violacea*), and black-crowned night-heron (*Nycticorax nycticorax*); and the State species of special concern American oystercatcher, common tern (*Sterna hirundo*), gull-billed tern (*Gelochelidon nilotica*), Caspian tern (*Hydroprogne caspia*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), snowy egret (*Egretta thula*), and glossy ibis (*Plegadis falcinellus*).

Further, the Service recommends that the Corps coordinate with the New Jersey Bureau of Shellfisheries to minimize impacts to designated Shellfish Growing Areas approved for harvest.

Finally, pursuant to the National Environmental Policy Act (83 Stat.852;42 U.S.C. 4321 *et seq.*), the Corps should not complete a Finding of No Significant Impact until all of the aforementioned issues are resolved.

Any questions regarding this report should be submitted to Carlo Popolizio at (609) 382-5271. The Service would appreciate receiving any written comments on this report within 30 days.

Sincerely,

Eric Schrading
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FOR THE

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STORM DAMAGE REDUCTION PROJECT
OCEAN COUNTY, NEW JERSEY

Prepared for:

U.S. Army Corps of Engineers
Philadelphia District – Planning Division
Philadelphia, Pennsylvania 19107-3390

Prepared by:

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Ecological Services, Region 5
New Jersey Field Office
Galloway, New Jersey 08205

Preparer: Carlo Popolizio
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Project Leader: Eric Schrading

February 2016

EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (Service) provides this Planning Aid Report (PAR) to the U.S. Army Corps of Engineers, Philadelphia District Planning Division (Corps) for the evaluation of Little Egg Inlet (study area) as a source of sand material for the Barnegat Inlet to Little Egg Inlet (Long Beach Island), Storm Damage Reduction Project, Ocean County, New Jersey (LBI Project). The purpose of the study is to evaluate the suitability of the subject borrow area, and assess potential adverse impacts to Federal trust species and the Edwin B. Forsythe National Wildlife Refuge (Forsythe NWR).

The study area is a 2,130-acre fan-shaped portion of Little Egg Inlet, Ocean County, New Jersey. The study area is in the vicinity of the Forsythe NWR, approximately 0.25 mile south of the Holgate Unit and north of Little Beach Island. Holgate and Little Beach are designated and administered as National Wilderness Areas.

This PAR provides an ecological characterization and analysis of natural resources within the study area, with a focus on critical resources for Federal and State-listed threatened and endangered species that may be impacted by dredging in adjacent waters. The Service also provides species lists and recommendations for the protection of State-listed species, species of special concern, migratory birds, fish, and shellfish.

The federally listed species (threatened) under Service purview that occur in or in the vicinity of the study area are the piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), seabeach amaranth (*Amaranthus pumilus*), and northern long-eared bat (*Myotis septentrionalis*). Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) requires every Federal agency 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.

Several species of federally listed threatened or endangered species under the jurisdiction of the National Marine Fisheries Service (NMFS) are known to occur in the vicinity of the proposed study area. Pursuant to the ESA, the Corps is required to consult with the NMFS on potential adverse effects to the species under NMFS purview that may result from implementing project activities. The NMFS has designated the Little Egg Inlet as essential fish habitat (EFH) for the life stages of fish listed in this PAR. Pursuant to the Magnuson-Stevens Act (Public Law 94-265 as amended) the Corps is required to consult with the NMFS to prevent adverse impacts to EFH.

The Holgate and Little Beach Units of the Forsythe NWR are designated as wilderness areas pursuant to the Wilderness Act of 1964 (16 U.S.C. 1131-1136). In the PAR, the requirements of the Act and other Federal statutes and laws are described in detail.

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I. INTRODUCTION

The U.S. Fish and Wildlife Service (Service) provides this Planning Aid Report (PAR) to the U.S. Army Corps of Engineers, Philadelphia District Planning Division (Corps) for the evaluation of Little Egg Inlet (study area) as a source of sand material for the Barnegat Inlet to Little Egg Inlet (Long Beach Island), Storm Damage Reduction Project, Ocean County, New Jersey (LBI Project). The purpose of the study is to evaluate the suitability of the subject borrow area, and assess potential adverse impacts to Federal trust species and the Edwin B. Forsythe National Wildlife Refuge (Forsythe NWR) Holgate Unit and Little Beach Island that may result from project implementation.

In February 2001, the Corps selected the National Economic Development (NED) plan for the LBI project, which included a combination of dune and berm restoration, with periodic nourishment every seven years for a 50-year project life. The NED plan maximizes benefits to the Nation while meeting planning objectives. The NED objective is to increase the value of the Nation's output of goods and services and improve the national economic efficiency, consistent with protecting the Nation's environment pursuant to national environmental statutes, applicable executive orders and Federal planning requirements (Conlin pers. comm. 2015).

In compliance with the National Environmental Policy Act of 1969 (NEPA) (83 Stat. 852, as amended; 42 U.S.C. 4321 *et seq.*), the Corps is preparing a draft Environmental Assessment (EA) to investigate the Little Egg Inlet area as a sand borrow source for beach nourishment for the LBI Project. The Corps has worked with the New Jersey Department of Environmental Protection (NJDEP) and the New Jersey Geologic and Water Survey over the past 20 years to identify potential sand sources necessary for storm damage reduction projects along the New Jersey coast. These investigations have encompassed extensive areas both in state waters [<3 nautical miles (nm)] and federally regulated waters. Studies in Federal waters (>3 nm) have been coordinated with the U.S. Bureau of Ocean Energy Management (BOEM). The work has included geotechnical and geophysical investigations, bathymetric mapping and laboratory analyses (Conlin pers. comm. 2015).

Based on these cooperative efforts, the Corps believes that Little Egg Inlet (Figure 1) is an area that has potential as a sustainable borrow source for future beach nourishments at LBI due to the large quantity of highly compatible sand that accrues in the inlet environment. A hydrodynamic modeling study is being conducted to evaluate the use of the ebb shoal as a borrow area and potential impacts to adjacent shoreline. Bathymetric, geotechnical, benthic, and cultural assessments were applied to a Gencade model that was provided to the Service in draft format and further revised at the end of December 2015 (Frey, Grzegorzewski, and Johnson 2015).

The Corps is requesting that the Service provide an ecological characterization and analysis of natural resources within the study area, with a focus on critical resources for Federal and State-listed threatened and endangered species that may be impacted by dredging in adjacent waters.

The Service has not participated in Corps-led meetings or site visits. Also, the Service has not received copies of the Corps draft EA (in progress) specific to the proposed borrow area. The Service in this PAR:

Figure 1. The study area (map courtesy of the Corps' Philadelphia District).

- identifies concerns for federally listed endangered and threatened species;
- identifies concerns for potential impacts to designated wilderness areas of the Forsythe NWR that may result from project activities; and
- provides species lists and recommendations for the protection of State-listed species, species of special concern, migratory birds, fish, and shellfisheries.

II. AUTHORITY

The following comments and recommendations are provided as planning aid and do not constitute the report of the Secretary of the Interior pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*). Comments are also provided under the authority of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) and the Migratory Bird Treaty Act of 1918 (MBTA) (40 Stat. 755;16 U.S.C. 703-712), as amended, and are consistent with the intent of the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, Jan. 23, 1981). Comments are further provided pursuant to the National Wildlife Refuge System Administration Act of 1966, as

amended by the National Wildlife Refuge System Improvement Act of 1997 (Administration Act) (16 U.S.C. 668dd - ee); the Wilderness Act of 1964 (16 U.S.C. 1131-1136); and specific Service Wilderness Area Authorities (Public Laws 90-532, 91-504, 92-364, 93-429, 93-550, 93-632, 94-557, 95-450, 96-487, 96-560, 97-211, 98-140, 101-628, 103-433, 104-167, and 104-333). Additional comments are provided as technical assistance and do not preclude further comment pursuant to NEPA.

III. METHODS AND PROCEDURES

This report is based on information provided by the Corps; Forsythe NWR; review of Service files and library material, including electronic searches; coordination with the National Marine Fisheries Service (NMFS) and New Jersey Division of Fish and Wildlife (NJDFW); and additional information provided by the Corps.

IV. STUDY AREA AND DESCRIPTION OF THE PROPOSED ACTION

The study area is a 2,130-acre fan-shaped portion of Little Egg Inlet (Figure 1), Ocean County, New Jersey. The study area is in the vicinity of the Forsythe NWR, approximately 0.25 mile south of the Holgate Unit and north of Little Beach Island (Figure 2). Holgate and Little Beach Island are designated and administered as National Wilderness Areas.

Figure 2. Forsythe NWR lands in the vicinity of the study area (delineated in green).

The Units represent two of the few remaining undeveloped barrier beaches in New Jersey. The Holgate Unit is a 3.5-mile-long beach located at the southern end of Long Beach Island. The Unit is closed to all public access from April 1 to August 31 to ensure undisturbed nesting conditions for Federal and State-listed shorebirds. Little Beach Island is a 6-mile-long windswept spit of sand and trees and is one of only few uninhabited barrier islands on the East Coast. A permit is required to visit Little Beach Island due to its environmental sensitivity.

According to Kana *et al.* (1989), the inlet is unusual because of its large throat width between adjacent barrier beaches. It is locally referred to as two inlets: Beach Haven to the north, which flushes Little Egg Harbor lagoons, and Little Egg Inlet to the south, which flushes Great Bay. However, the two form one system over 3,000 meters (10,000 feet wide), and there appears to be essentially free exchange of waters between Great Bay and Little Egg Harbor. The Great Bay Boulevard Wildlife Management Area west/northwest of the Little Egg Inlet is also recognized as being probably the largest and one of the few untouched marshes in New Jersey (Figure 2).

According to the National Oceanic and Atmospheric Administration (2015), the study area has a temperate, continental climate, with relatively cooler summers and milder winters than elsewhere at the same latitude. Land and sea breezes often prevail. January is the coldest month and July the warmest. The average annual temperature in Atlantic City to the south is 53.7°F (12.1°C). The average January temperature is 31.7°F (-0.2°C) and the average July temperature is 75.3°F (24.1°C). Temperatures in excess of 100°F (37.8°C) have occurred in each month, June through August, and temperatures in excess of 90°F (32.2°C) have occurred in each month, April through October. Each month has recorded below freezing temperatures except June, July, and August and each month, December through February, has recorded temperatures below 0°F (-17.8°C). Precipitation, on the average, is moderate and well distributed throughout the year, with June the driest month and August the wettest, with an average annual precipitation of 41 inches (1041 mm). Thunderstorms are mostly a warm season phenomenon. The bulk of winter precipitation results from storms which move northeasterly along or close to the coast. Snowfall, at about 17 inches (432 mm) per year, is considerably less than elsewhere at the same latitude. Snow has fallen in each month, October through May. The greatest 24-hour snowfall was 16.6 inches (421.6 mm) recorded in February 1979. Ice storms are relatively infrequent.

The Final Feasibility Report and Integrated Environmental Impact Statement were completed by the Corps (1999) for the LBI reach of the New Jersey Atlantic Ocean coastline. In the LBI Project, the Corps proposed to place sand on various stretches of Long Beach Island in phases where the existing berm and dune profiles are below the minimum measurements of the design profile. The completed design plan will provide for a dune with a slope of 1V:5H (20%). This will produce a beach berm width of 125 feet from centerline of dune to the edge of the berm, with approximately 105 feet of dry beach from the seaward toe to mean high water (MHW). The dune elevation is 22 feet NAVD with a 30-foot wide crest and incorporates 347 acres of planted dune grasses and 540,000 linear feet of sand fencing. This plan was chosen because it provided the maximum net storm damage reduction benefits (Conlin pers. comm. 2015).

The 50-year plan selected by the Corps (1999) for restoring LBI called for the placement of approximately 7.4 million cubic yards (mcy) of sand along approximately 17 miles of coastline from Barnegat Inlet to Little Egg Inlet, including 4.95 mcy for the initial berm placement and

2.45 mcy for dune placement. The berm and dune restoration extends from Groin 4 (Seaview Drive, Loveladies) to the terminal groin (Groin 98) in Holgate, Long Beach Township. The Barnegat Light area (northern end of the study area) and the Holgate Unit of Forsythe NWR are not included. It is estimated in the Feasibility Report that approximately 1.9 mcy of sand would be needed for periodic nourishment every 7 years over the authorized 50-year period. Since 2006, the Corps has constructed 4.5 miles of the LBI shoreline within the municipalities of Surf City, Ship Bottom, Harvey Cedars, and the Brant Beach sections of Long Beach Township (U.S. Army Corps of Engineers 2014).

Initial construction of three sections of the Barnegat Inlet to Little Egg Inlet project has been completed using Borrow Area D1 (Figure 3). The Corps proposes to complete the currently proposed periodic nourishment in the spring of 2016. According to the Corps (2014), approximately 7.8 mcy are proposed to be placed on the remaining (unconstructed) sections of the project reach, obtaining approximately 0.8-1.0 mcy from Borrow Area D1 and 7.0 mcy from offshore Borrow Area D2 under the authority and agreement of BOEM. Although the design plan remains the same as described in both the 1999 Environmental Impact Statement and 2014 EA, quantity estimates have been updated for the completion of initial construction to 8.4 mcy (from 7.8 mcy) and 2-3 mcy (from 1.9 mcy) for periodic nourishment in future cycles (Conlin pers. comm. 2015).

Borrow Area D1 is a 683-acre area located approximately 2.5 miles off Harvey Cedars in New Jersey waters that has been used for past construction at LBI. According to the Corps (2014), there is an insufficient volume of sand remaining in D1 for continued project maintenance and/or full project construction. A 572-acre area directly east of Area D1, named D2, and a 542-acre area directly southeast of D2 named D3, have also been proposed (Figure 4). Subsequent to geotechnical, biological, and cultural investigations, Area D2 and D3 underwent further geotechnical evaluation and were subsequently combined as one 1,034-acre site referred to as Area D2. Borrow area D2 is outside New Jersey waters and is under BOEM jurisdiction. The Corps also proposes to use Little Egg Inlet as a borrow area and remove approximately 800,000 cubic yards of sand to allow for recovery of sand resource at Borrow Area D1. However, the Corps requested the Engineer Research and Development Center (ERDC) model removal of 1.0 mcy every 7 years as well as 1.2 mcy, 2.2 mcy, and 3 mcy at the beginning of the simulation (Frey, Grzegorzewski, and Johnson 2015). The Service review of this report is presented in Section VIII of this PAR.

V. FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The federally listed species (threatened) under Service purview that occurs in or in the vicinity of the study area are the piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), seabeach amaranth (*Amaranthus pumilus*), and northern long-eared bat (*Myotis septentrionalis*). Little Egg Inlet is the only unmodified inlet in New Jersey, as it has never been hardened with jetties, seawalls, revetments, terminal groins, or breakwaters. Also it has never been dredged or mined for sand used in beach re-nourishments. Little Egg inlet is also the only unmodified inlet between Montauk, New York, and Gargathy Inlet at the south end of Assawoman Island, Virginia (Rice 2014). The mining of inlet shoals for use as beach fill removes massive amounts of sand, which is not equivalent to the natural sediment bypassing that occurs at unmodified

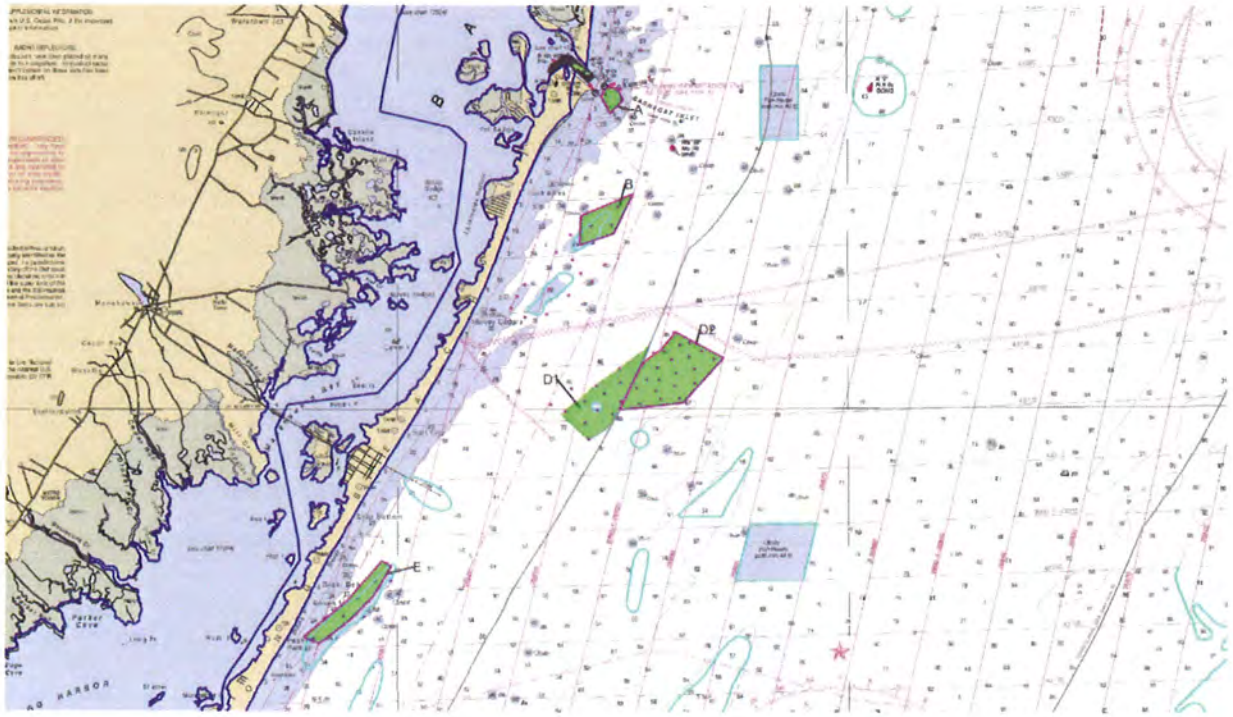

Figure 3. Borrow areas D1 and D2 (map courtesy of the Corps' Philadelphia District).

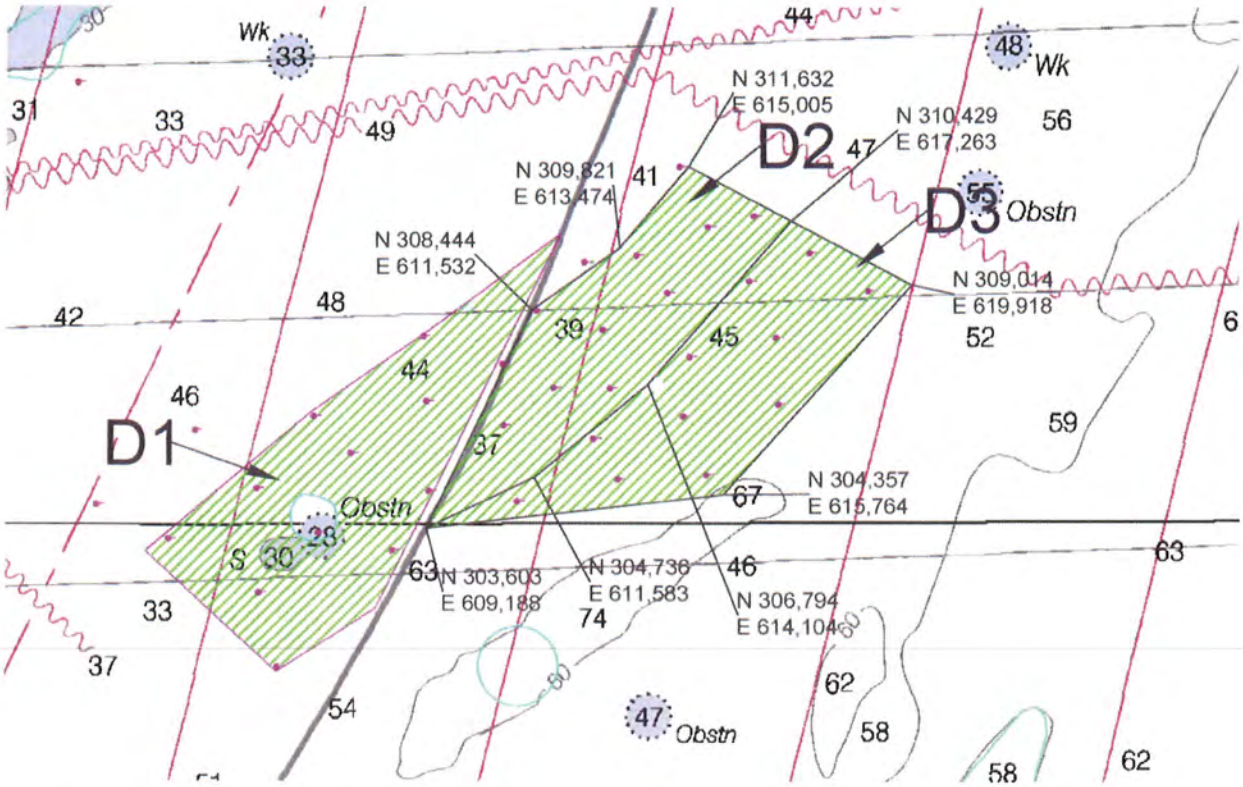

Figure 4. Detailed borrow areas D1-D3 (map courtesy of the Corps' Philadelphia District).

inlets. Dredging removes massive volumes of sand virtually instantaneously that is not equivalent to natural sand bypass that occurs gradually and continuously (Rice 2014).

Section 7(a)(2) of the ESA requires every federal agency 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. The Little Egg Inlet is not an approved borrow area in the Service's December 2005 Programmatic (Tier 1) Biological Opinion on the Effects of Federal Beach Nourishment, Re-nourishment, Stabilization, and Restoration Activities along the Atlantic Coast of New Jersey within the Corps, Philadelphia District on the Federally Listed (threatened) Piping Plover (*Charadrius melodus*) and Seabeach Amaranth (*Amaranthus pumilus*) (PBO). Section 7 consultation with the Service is required to ensure that the proposed project does not adversely affect federally listed species.

A. PIPING PLOVER

1. Habitat Use

There are known nesting occurrences of the piping plover located on Forsythe NWR both at Holgate and Little Beach Island adjacent to the proposed study area. These small, territorial shorebirds are present on the Forsythe NWR shore between March and the end of August. Piping plovers 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. Piping plover adults and chicks feed on marine invertebrates such as worms, fly larvae, beetles, and crustaceans. Feeding areas 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. According to Kisiel (2009), inlets play a crucial role in piping plovers' nesting site selection, as optimal habitat in New Jersey is mostly limited to the number of un-stabilized inlet areas which, in turn, affects the ability of piping plovers to recover in New Jersey.

Landscape-wide habitat loss from urban development, public beach use during nesting periods, off-road vehicle travel, shoreline stabilization, and dune modification along barrier islands and beaches has significantly reduced shorebird habitats along the Atlantic Coast. Pedestrian and off road vehicle travel negatively affect shorebird foraging during critical periods and may contribute to the lack of long distance migration success (Harrington and Drilling 1996). To eliminate these types of disturbances, Holgate Beach is closed to all public access April 1 to August 31 each year and Little Beach Island is closed to all public use year-round, requiring special access permission from the Refuge Manager.

The Piping Plover Recovery Plan established a region-wide goal of 1.5 chicks fledged per breeding pair (U.S. Fish and Wildlife Service 1996a). Analysis of trends in abundance and productivity from 1986-2009 indicates the breeding productivity within New Jersey was 1.18 chicks per pair (Hecht and Melvin 2009). The Forsythe NWR draft Habitat Management Plan (HMP) (U.S. Fish and Wildlife Service 2013) identified a fledge rate objective of 1.2 fledged

chicks per pair is a more realistic objective based on Hecht and Melvin's analysis. It is slightly higher than the New Jersey 23-year average of 1.18 chicks per pair. While consistent with average New Jersey productivity, the goal is still higher than the average actual productivity of 0.71 observed from 1993 to 2015 on Forsythe NWR (Table 1) by refuge biologists.

The Refuge-wide average piping plover fledge rate from 1993 to 2015 was below the current recovery objective, the New Jersey average, and the revised objective within the HMP.

TABLE 1. NUMBER OF PIPING PLOVER NESTING PAIRS AND PRODUCTIVITY ON E.B. FORSYTHE NATIONAL WILDLIFE REFUGE, 1993 TO 2015

Year	Nesting Pairs	Plover Chicks Fledged	Fledging Rate (Chicks/Pairs)
1993	18*	4*	0.22*
1994	31	9	0.29
1995	9*	8*	0.89*
1996	35	13	0.37
1997	22	6	0.27
1998	31	26	0.84
1999	33	39	1.18
2000	30	29	0.97
2001	36	29	0.81
2002	35	20	0.57
2003	34	32	0.94
2004	38	8	0.21
2005	32	8	0.25
2006	30	10	0.33
2007	39	16	0.41
2008	25	1	0.04
2009	17	24	1.41
2010	26	31	1.19
2011	24	27	1.13
2012	31	20	0.65
2013	37	21	0.57
2014	26	45	1.73
2015	38	52	1.37
Mean	29.43	20.78	0.71

* Holgate Beach only

In 2015, Forsythe NWR nearly reached the Federal recovery goal for piping plovers. Holgate fledged 1.54 chicks per pair (24 pairs), down from the extremely high result in 2014 (2.33 chicks per pair - 12 pairs), but this fledgling output was still a major driver for the high statewide productivity in 2015. The combined Forsythe NWR sites of Holgate and Little Beach produced 1.37 fledglings per pair (38 pairs). In 2015, breeding pairs in New Jersey continued a recent trend of becoming increasingly concentrated in just a few sites, with Sandy Hook National Recreation Area accounting for nearly half the population, and Forsythe NWR (Holgate and Little Beach) another 35 percent. Holgate, in particular, benefitted from tidal overwashing that occurred during Hurricane Sandy in 2012, which created large open expanses of sand that are ideal for nesting plovers.

2. Recommendations to Protect the Piping Plover

As the lead Federal Agency, the Corps must consult with the Service for the protection of the piping plover and its nesting habitat pursuant to Section 7 of the ESA. The Service has yet to receive the Corps' preliminary determination. Any activity that is projected to result in modification of beach, dune, intertidal, or nearshore habitats at Holgate or Little Beach can be expected to adversely affect the piping plover and therefore will require initiation of formal consultation. Little Egg Inlet was not an authorized borrow area at the time of the Service's December 2005 PBO. Thus, any adverse effects to piping plovers (including potential take in the form of harm from habitat modification) were not considered in the PBO and are not covered by the PBO's Incidental Take Statement.

B. SEABEACH AMARANTH

1. Habitat Use

An occurrence of the seabeach amaranth was documented at the Holgate Unit of the Forsythe NWR in 2015 within 1.5 miles of the proposed study area. Seabeach amaranth at Forsythe NWR never exceeded four plants for each year between 2000 and 2015. Numbers of seabeach amaranth in the action area are expected to increase in the next few years because Forsythe NWR is participating in a range-wide project to sow seeds of this species within NWRs from Massachusetts to South Carolina.

Seabeach amaranth is an annual plant endemic to Atlantic Coast beaches and barrier islands' (U.S. Fish and Wildlife Service 1996b), occurring historically from Nantucket, Massachusetts to Folly Beach, South Carolina. By 1987, the plant was extirpated from nearly three-fourths of its earlier range (Hancock and Hosier 2003). Although the species recolonized much of those former areas between 1990 and 2000, populations in the recolonized states dropped sharply after an initial surge. Numbers remain very low and local extirpations are occurring again. The seabeach amaranth recovery objective is to have 75 percent of the sites with suitable habitat within the historical range occupied for 10 consecutive years (U.S. Fish and Wildlife Service 1996b).

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 is found growing on a nearly pure sand substrate, occasionally with shell fragments mixed in.

Seabeach amaranth occupies elevations from 8 inches to 5 feet above mean high tide. The plant is intolerant of even occasional flooding during its growing season. Seabeach amaranth is dependent on a terrestrial, upper beach habitat that is not flooded during the growing season from May into the fall. Such habitat 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 of open, sandy beach habitats. Seabeach amaranth is often associated with beaches managed for the protection of beach nesting birds such as the piping plover and the State-listed (endangered) least tern (*Sterna antillarum*). Threats to seabeach amaranth include beach stabilization efforts (beach armoring, sand fences, sea walls, groins, jetties, and riprap); habitat loss; intensive recreational use; invasive species such as the Asiatic sand sedge (*Carex kobomugi*); and herbivory by webworms.

2. Recommendations to Protect Seabeach Amaranth

As with the piping plover, the Corps must consult with the Service for the protection of seabeach amaranth and its habitat pursuant to Section 7 of the ESA. The Service has yet to receive the Corps' preliminary determination. Any activity that is projected to result in modification of the beach area between the wrack line and dune within the Holgate Unit of Forsythe NWR can be expected to adversely affect seabeach amaranth and therefore will require initiation of formal consultation. Such modifications could be either direct or indirect (*e.g.*, through changes in natural coastal processes). Little Egg Inlet was not an authorized borrow area at the time of the Service's PBO. Thus, any adverse effects to seabeach amaranth were not considered in the PBO.

C. RED KNOT

1. Habitat Use

A final rule to list the red knot as threatened under the ESA was published on December 11, 2014, with an effective date of January 12, 2015. Small numbers of red knots may occur in New Jersey year-round, while large numbers of birds rely on Delaware Bay and Atlantic Coast stopover habitats during the spring (mid-May through early June) and fall (late-July through October) migration periods, respectively. These small shorebirds fly up to 9,300 miles from south to north every spring and reverse the trip every autumn, making the red knot one of the longest-distance migrating animals. Migrating birds break their spring migration into non-stop segments of 1,500 miles or more, ending at stopover sites called staging areas. Red knots converge in large flocks on stop-over and staging areas along the Delaware Bay and Atlantic Coast. Threats to the red knot include disturbance, reduced food availability at staging areas, and loss of stopover habitat. Available records indicate that red knots occur in the action area, including Holgate, Little Beach and nearby State lands. These records indicate red knots use the

action area annually during both spring and fall migration, with flocks sometimes numbering hundreds of birds.

For red knots, unimproved tidal inlets are a preferred nonbreeding habitat. Along the 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. From South Carolina to Florida, red knots are found in significantly higher numbers at inlets than at other coastal sites (U.S. Fish and Wildlife Service 2014).

2. Recommendations to Protect the Red Knot

As with the piping plover and seabeach amaranth, the Corps must consult with the Service for the protection of the red knot and its habitat pursuant to Section 7 of the ESA. The Service has yet to receive the Corps' preliminary determination. Any activity that is projected to result in modification of beach, dune, mudflat, intertidal, or nearshore habitats at Holgate, Little Beach, or nearby State lands can be expected to adversely affect the red knot and therefore will require initiation of formal consultation. Such modifications could be either direct or indirect, for example through changes in natural coastal processes. Little Egg Inlet was not an authorized borrow area and the red knot was not listed at the time of the Service's December 2005 PBO. Thus, any adverse effects to red knots (including potential take in the form of harm from habitat modification) were not considered in the PBO and are not covered by the Incidental Take Statement.

In addition, the Service is working on a proposed rule to designate critical habitat for the red knot. In a letter dated January 24, 2014, the Service requested input on how the Corps would be affected by future critical habitat designations for the *rufa* red knot. The Service is currently drafting a proposed critical habitat rule for this subspecies. The Corps' proposed borrow area within Little Egg Inlet overlaps with areas under consideration for proposed designation as critical habitat. The Service anticipates the proposed critical habitat rule will be published by mid-2016. The Service will coordinate with the Corps prior to the publication of this rule to update our economic analysis.

To avoid delays or interruption of a project that might still be ongoing when the final critical habitat rule is published, we recommend (but the ESA does not require) that the Corps request a conference opinion with the Service for a project likely to adversely affect critical habitat, even if it may not rise to adverse modification. The conference opinion may then be reconfirmed as a biological opinion if/when the rule is finalized. While consultation under Section 7 of the ESA is required when a proposed action "may affect" a listed species, a conference is required only if the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. The conference process is discretionary for all other effect determinations besides jeopardy/adverse modification. The Service encourages the Corps to request a conference opinion, although it remains to be determined whether the Corps' proposed project may result in adverse modification of critical habitat.

D. NORTHERN LONG-EARED BAT

1. Habitat Use

The proposed study area is located within the summer range of the northern long-eared bat. During the summer, northern long-eared bats typically roost singly or in colonies underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥3 inches dbh). The northern long-eared bat is opportunistic in selecting roosts, selecting varying roost tree species throughout its range. During the winter, northern long-eared bats predominately hibernate in caves and abandoned mine portals.

2. Recommendations to Protect the Northern Long-Eared Bat

No adverse effects to the northern long-eared bat are expected from project implementation. The study area does not provide any opportunities for bats to roost or hibernate.

E. FEDERALLY LISTED SPECIES UNDER PURVIEW OF THE NATIONAL MARINE FISHERIES SERVICE

Several species of federally listed threatened or endangered species under the jurisdiction of the National Marine Fisheries Service (NMFS) are known to occur in the vicinity of the proposed study area. Pursuant to the ESA, the Corps is required to consult with the NMFS on potential adverse effects to the following species (Greene pers. comm. 2015) that may result from implementing project activities.

1. Sea Turtles

Several species of federally listed threatened or endangered species under NMFS jurisdiction are known to occur in the vicinity of the proposed study area. Listed sea turtles are found seasonally in the waters off of New Jersey, typically between April and November. The species that are likely to be present within or in the vicinity of the proposed study area include the endangered Kemp's ridley (*Lepidochelys kempi*), leatherback (*Dermochelys coriacea*) and green (*Chelonia mydas*) sea turtles, as well as the threatened Northwest Atlantic Ocean distinct population segment of the loggerhead (*Caretta caretta*) sea turtle.

2. Cetaceans

The federally listed (endangered) North Atlantic right (*Eubalaena glacialis*), fin (*Balaenoptera physalus*), and humpback whales (*Megaptera novaeangliae*) may all use near-shore, coastal waters during migration, primarily between November 1 and April 30.

3. Atlantic Sturgeon

The federally listed (endangered) Atlantic sturgeon (*Acipenser oxyrhynchus*) occurs along the Atlantic Coast from Canada to Florida within near-shore, coastal waters. Rivers and estuaries, as well as open ocean waters are used by this species during the course of its life. In the early life

stage, Atlantic sturgeons remain within natal rivers or estuaries, while sub-adult and adult Atlantic sturgeons may occur in near-shore coastal areas from November 1 to April 30.

VI. STATE-LISTED THREATENED AND ENDANGERED SPECIES

The Service coordinated with the NJDFW Endangered and Nongame Species Program and obtained the following information (Davis pers. comm. 2016). State-listed species that may be adversely affected by the proposed use of Little Egg Inlet as a borrow area are the endangered least tern and black skimmer (*Rhyncops niger*). Also, the State species of special concern American oystercatcher (*Haematopus palliatus*) is known to occur in the vicinity of the proposed study area. The aforementioned species are shorebirds nesting on Holgate, Tucker's Island (State owned, directly west of Holgate), and Little Beach. The number of nesting pairs for least terns, black skimmers, and American oystercatchers are presented in Table 2.

TABLE 2. NUMBER OF LEAST TERN, BLACK SKIMMER, AND AMERICAN OYSTERCATCHER NESTING PAIRS ON HOLGATE, LITTLE BEACH AND TUCKER'S ISLAND, 2010 TO 2015

Site	Year	Least Tern	Black Skimmer	American Oystercatcher
Holgate				
	2015	161	0	12
	2014	164	76	10
	2013	76	0	13
	2012	*	0	10
	2011	36	0	9
	2010	36	0	10
Little Beach				
	2015	12	0	14
	2014	19	0	17
	2013	30	0	19
	2012	6	0	18
	2011	0	0	12
	2010	12	0	*
Tucker's Island				
	2015	0	30	2
	2014	0	12	2
	2013	0	165	2
	2012	0	0	4
	2011	0	0	2
	2010	0	0	2

*Missing data

In addition, open water foragers such as the least tern, black skimmer, the State-listed (threatened) osprey (*Pandion haliaetus*), and other State species of special concern such as the common tern (*Sterna hirundo*), gull-billed tern (*Gelochelidon nilotica*), and Caspian tern (*Hydroprogne caspia*) occur within the study area. Common terns and gull-billed terns are also terrestrial foragers. Caspian terns utilize the marsh islands behind Holgate as their primary nesting area in New Jersey.

The birds that forage on the edges of marsh which may be adversely impacted include the State-listed (threatened) yellow-crowned night-heron (*Nyctanassa violacea*) and black-crowned night-heron (*Nycticorax nycticorax*); and the State species of special concern little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), snowy egret (*Egretta thula*), and glossy ibis (*Plegadis falcinellus*). All of these species nest in the vicinity of the proposed study area.

VII. MIGRATORY AVIFAUNA, FISHERIES, SHELLFISHERIES, AND PROTECTED AREAS

The Mullica River - Great Bay estuary habitat complex encompasses the entire Mullica River - Great Bay estuary and tidal river from its headwater streams to its connection with the New York Bight through Little Egg Inlet. Included are all riverine and estuarine wetlands to the limit of tidal influence of the Mullica River and its tributaries, the open waters of Great Bay and adjacent salt marsh habitat from the mouth of the Mullica River to Little Egg Inlet, and the inlet itself. This nearly pristine estuary provides seasonal or year-round habitat for a variety of anadromous, estuarine, marine, and freshwater fish and shellfish, nesting and migratory waterbirds and raptors, migratory and wintering waterfowl, and rare brackish and freshwater tidal communities and plants (U.S. Fish and Wildlife Service 1997).

A. MIGRATORY AVIFAUNA

Federal agencies have a responsibility under various federal statutes and Executive Orders (EOs) to protect, conserve, and manage migratory birds. Migratory birds are a federal trust resource responsibility and are protected pursuant to the MBTA, as amended. In 2001, President Clinton signed the *Responsibilities of Federal Agencies to Protect Migratory Birds* (EO 13186). The EO is intended to further the conservation purposes of the migratory bird conventions, including the MBTA, ESA, the FWCA, NEPA, and other pertinent statutes. A list of migratory birds known to occur within or in the vicinity of the proposed study area is presented in Appendix 1.

B. FISHERIES

The Little Egg Inlet provides a critical link between the Atlantic Ocean and the spawning, nursery, and forage grounds of fish in the estuary and rivers. The NMFS has designated the Little Egg Inlet as EFH for the life stages of fish listed in Appendix 2. The Magnuson-Stevens Act (90 Stat. 331;16 U.S.C. 1801 *et seq.*) requires Federal agencies to consult with the NMFS with respect to "any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH identified under this Act." Adverse effect is defined as "any impact which reduces the quality and/or quantity of EFH." The rule 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."

Other fish species found within or in the vicinity of the proposed study area are spot (*Leiostomas xanthurus*), sandlance (*Ammodytes americanus*), bay anchovy (*Anchoa mitchilli*), silversides (*Menidia* spp.), gobies (*Gobiosoma* spp.), wrasses (*Labridae* spp.), northern pipefish (*Syngnathus fuscus*), Atlantic silverside (*Menidia menidia*), silver perch (*Bairdiella chrysoura*), alewife (*Alosa pseudoharengus*), striped killifish (*Fundulus majalis*), white perch (*Morone americana*), northern puffer (*Sphoeroides maculatus*), oyster toadfish (*Opsanus tau*), and striped anchovy (*Anchoa hepsetus*) (U.S. Fish and Wildlife Service 1997).

C. SHELLFISHERIES

Little Egg Inlet (including the study area), Great Bay, and Little Egg Harbor are designated as Shellfish Growing Areas approved for harvest (New Jersey Department of Environmental Protection 2015a). The following species occur in and in the vicinity of the proposed study area: bay scallop (*Argopecten irradians*), eastern oyster (*Crassostrea virginica*), hard clam or northern quahog (*Mercenaria mercenaria*), dwarf surf clam (*Mulinia lateralis*), softshell clam (*Mya arenaria*), and blue mussel (*Mytilus edulis*) (U.S. Fish and Wildlife Service 2004). The Service recommends that the Corps contact the New Jersey Bureau of Shellfisheries (Bureau) and incorporate all comments and recommendations of the Bureau into project planning:

New Jersey Division of Fish and Wildlife
Nacote Creek Research Station
P.O. Box 418
Port Republic, New Jersey 08241

It is a major responsibility of the Bureau to review coastal development projects and assess potential impacts on shellfisheries habitat and resources.

D. PROTECTED AREAS

1. Edwin B. Forsythe National Wildlife Refuge

The lands surrounding the proposed study area are administered as part of the Service's Forsythe NWR. The Refuge is managed as part of the National Wildlife Refuge System, whose mission is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." The Refuge spans almost 50 miles of the New Jersey coastal estuaries, from the Metedeconk River in Ocean County to Reeds Bay in Atlantic County. Over 47,000 acres of coastal beach/dune, salt marsh, freshwater wetlands, wetland forest, upland forest, pitch pine barrens, early successional habitats, and managed wetland impoundments comprise the Refuge.

The Refuge was created in 1984 by combining the former Brigantine National Wildlife Refuge (Brigantine NWR) and Barnegat National Wildlife Refuge. Brigantine NWR was established on January 24, 1939 by the Migratory Bird Conservation Commission, under the authority of the Migratory Bird Conservation Act (16 U.S.C. Section 715d). Congress designated 6,603 acres of the Brigantine NWR as the Brigantine Wilderness (Wilderness Area) on January 3, 1975 (P.L. 93-632) to be managed under the Wilderness Act of 1964. This designation has far-ranging impacts on the management of these portions of the Refuge. The Holgate Unit, Little Beach Island, and Mullica-Motts areas of unaltered beach and salt marsh comprise the Wilderness Area (Figure 5).

The Refuge was established for the following purposes:

- For lands acquired under the Migratory Bird Conservation Act (16 U.S.C. Sections 715-715r), as amended, "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds...." (16 U.S.C. Section 715d).

- "For...the development, advancement, management, conservation, and protection of fish and wildlife resources...." Fish and Wildlife Act of 1956 (16 U.S.C. Section 742f(a)(4)).

- "For...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations (regarding migratory birds)..." [Emergency Wetlands Resources Act of 1986 (16 U.S.C. Section 3901(b), 100 Stat. 3583) (EWRA)].

- "To secure for the American people of present and future generations the benefits of an enduring resource of wilderness." (Wilderness Act of 1964).

The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) states that in administering the System, the Service shall "... ensure that the biological integrity, diversity, and environmental health of the System are maintained..." The Service defines these terms as:

- *Biological Integrity:* Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.

- *Biological Diversity:* The variety of life and its processes, including the variety of living organisms, the genetic differences between them, and the communities and ecosystems in which they occur.

- *Environmental Health:* Composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.

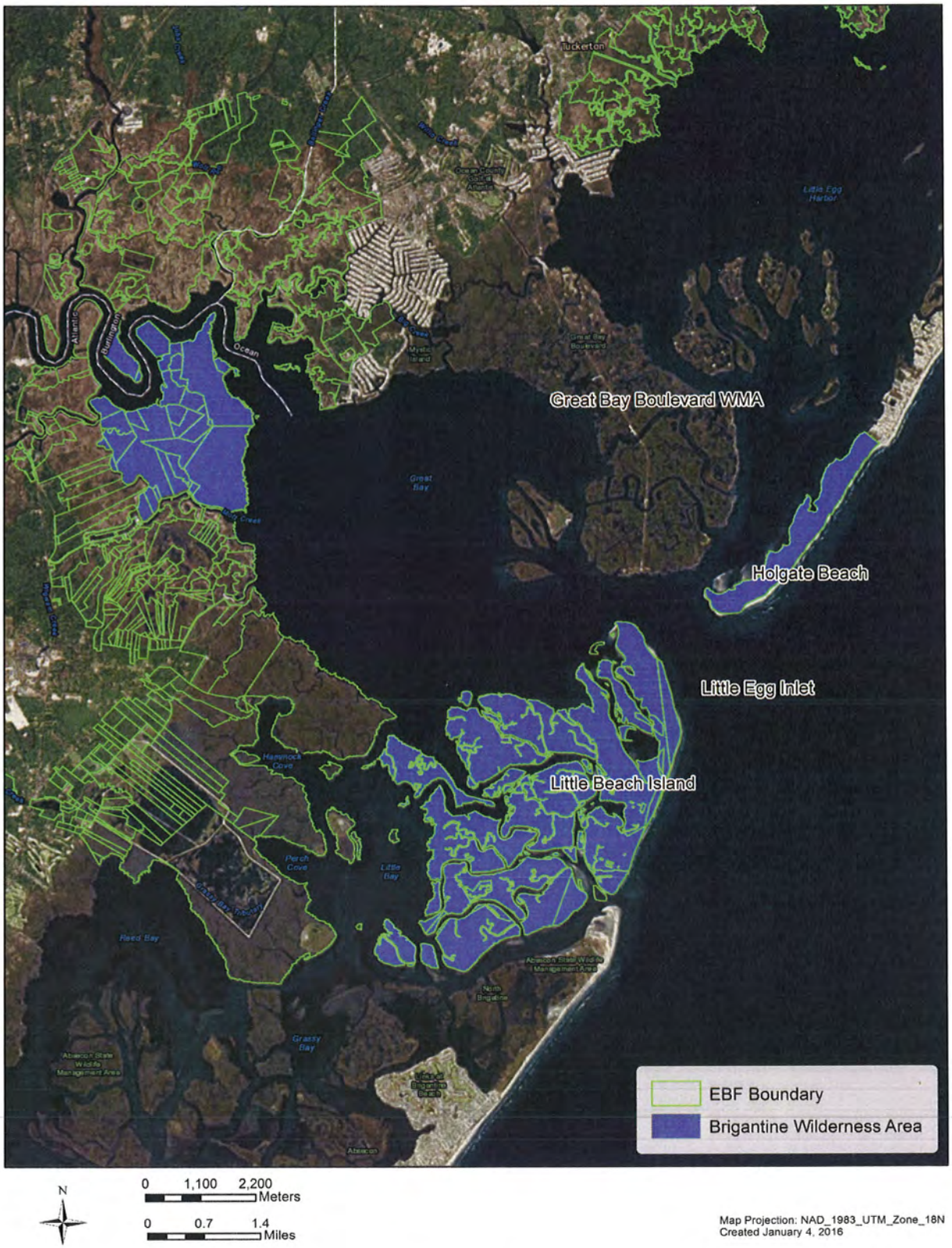

Figure 5. Wilderness areas of the Forsythe NWR.

The Integrity Policy directs refuges to assess their importance across landscape scales and to "forge solutions to problems arising outside refuge boundaries" (Meretsky *et al.* 2006). Some of these regional land use problems include habitat fragmentation and lack of connectivity; high levels of contaminants; and incompatible development or recreational activities.

The Holgate and Little Beach Units of Forsythe NWR are designated as National Wilderness Areas pursuant to the Wilderness Act of 1964, which mandates that designated areas be managed to preserve their wilderness character. The Act defines wilderness as an area with the following characteristics:

- "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain,"

- "of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions," that "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" and

- has "outstanding opportunities for solitude or a primitive and unconfined type of recreation...".

National Wilderness Areas are established to keep them substantially free from the effects of modern civilization. Wilderness is managed to be wild, natural, and undeveloped and to provide opportunities for solitude or primitive recreation. Naturalness encompasses not only the natural diversity of plants and animals, but also soils, natural night skies, natural soundscapes, air resources, hydrology, and other ecological processes. Impacts to wilderness characteristics were evaluated by the Service (U.S. Fish and Wildlife Service 2011). The Holgate and Little Beach units of the Brigantine Wilderness are two of the very few remaining undeveloped barrier beaches in New Jersey. The islands contain wetlands that have been designated by the Convention on Wetlands (RAMSAR) as Wetlands of International Importance. The RAMSAR is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The rare and unique nature of the two units and the internationally recognized significance of the wetlands, highlight the national ecological importance of the Brigantine Wilderness Area. Such a unique habitat is of increasing scarcity.

In addition to the Brigantine Wilderness Area receiving the highest level of federal conservation protection, the air shed surrounding the Brigantine Wilderness Area is further protected by the Clean Air Act of 1970, as amended (42 U.S.C. 7401 *et seq.*). The Clean Air Act designated all wilderness areas over 5,000 acres in existence on August 7, 1977, as mandatory Class I air quality areas and established limits for the additional amounts of air pollution that can be allowed in Class I areas. The Service has an "affirmative responsibility" to protect the Air Quality-Related Values (AQRVs) of Class I lands. The AQRVs include visibility, wildlife, vegetation, soil, water, and geological and cultural resources. The Act grants special protection to visibility in Class I areas and establishes a national goal of remedying any existing and preventing any future, human-caused visibility impairment in mandatory Class I areas. In

consultation with the U.S. Environmental Protection Agency, and other Federal, State, or local agencies, the Corps must determine if air pollutant emissions from a proposed action will adversely affect AQRVs in wilderness and, if so, address any adverse impacts.

2. Other Protected Areas

Other protected areas within the Great Bay-Little Egg Inlet system include the following:

- *Great Bay Boulevard Wildlife Management Area:* A 4-mile long peninsula composed of approximately 5,346 acres of salt marsh and narrow sandy beaches, separating Great Bay and Little Egg Harbor at the mouth of the Mullica River, and extending to the Little Egg Inlet. Owned by the New Jersey Division of Fish and Wildlife.

- *Mystic Island Preserve:* 164 acres owned by the New Jersey Natural Lands Trust. Currently proposed to be the site of a restoration project by Little Egg Harbor Township and Tuckerton Borough with funds provided by the National Fish and Wildlife Foundation through the Hurricane Sandy Coastal Resiliency Competitive Grants Program for the purpose of protecting and preserving fragile tidal wetlands through the creation of a natural living shoreline (New Jersey Department of Environmental Protection 2015b).

- *Playhouse Drive and The Sanctuary:* Owned by the NJDEP Green Acres Program. Located immediately west of Great Bay Boulevard Wildlife Management Area.

- *Coastal Barrier Resource System/Otherwise Protected Areas:* NJ-07P [Otherwise Protected Area (OPA)] includes the proposed study area and Great Bay. The only Federal spending limitation within OPAs is the prohibition on Federal flood insurance.

- *Priority Wetlands:* designated by the Service pursuant to the EWRA. It includes the proposed study area and Great Bay. The purpose of the EWRA is to promote wetlands conservation through cooperative efforts with private interests and local, State, and Federal governments for the management and protection of wetlands. In addition to the functions and values provided to the public (*e.g.*, flood control, water quality maintenance, and recreational and educational opportunities), the Service considers these wetlands to be of exceptional value to wildlife.

VIII. REVIEW OF THE MODEL SIMULATIONS BY ENGINEER RESEARCH AND DEVELOPMENT CENTER

The Service has some reservations about conclusions as well as some assumptions suggested in the ERDC report. For one, it seems clear that, for piping plover and seabeach amaranth habitat, red knot-proposed critical habitat, and wilderness areas, the No Action may be the preferred alternative or that the amount removed be significantly reduced (*e.g.*, 350,000 cubic yards).

The ERDC estimates of net sediment transport are 50,000-5,000,000 cubic yards of sand based on two sources, but the modelling consistently uses 100,000 and 250,000 cubic yards. The

Service suggests that the model be re-run using 50,000 cubic yards as the most conservative estimate.

Using 50,000 cubic yards for transport in the model, if 1 mcy are removed from the proposed project areas every seven years, only 350,000 cubic yards would return to the inlet for a net loss or deficit of 650,000 cubic yards. The Service notes that a conservative risk-adverse approach would conclude that this may result in additional erosion of Forsythe NWR beaches.

On page 40 of the ERDC report, the time period used for the model was 2002-2007. This seems to be a period of significant Corps beach nourishment along Long Beach Island, so there was a tremendous amount of sand being placed updrift of Holgate and Little Beach Island during this time, which may not adequately represent current study area conditions.

On page 49 of the ERDC report, it is stated that "without a source term and initially dredging 1.2 mcy, the shoreline recedes about 10 feet/year more than the No Action case. Therefore 10 years after dredging 1.2 mcy, slight erosion compared to the No Action case is predicted...." If a risk-adverse approach (50,000 cubic yards in sediment transport) is used, this level of erosion may even be higher.

On page 50 of the ERDC report, all graphs show No Action vs dredging with and without sources, but no "No Action" with a source. The only comparison available from the ERDC graphs is the No Action and the Dredging with No Source, which all indicate (at least for Little Beach Island) that dredging will either cause more erosion or less accretion. This case scenario may be considered an adverse effect on the piping plover and seabeach amaranth, as well as the proposed critical habitat for the red knot and wilderness areas.

On page 51 of the ERDC report, it is stated that "south of the inlet, all cases experience slightly more erosion than the No Action case directly adjacent to the inlet, but further from the inlet, the shoreline position of the alternatives becomes more landward". Little Beach Island is south of the inlet and provides prime nesting habitat for the piping plover adjacent to the inlet. As such, ERDC report appears to conclude that more erosion will occur on piping plover nesting habitat, proposed critical habitat for the red knot, and wilderness areas than under the No Action alternative.

On page 63 of the ERDC report, it is stated that "after dredging, if the inlet captures most of the sediment removed during the dredging, the adjacent shorelines will erode. While the shorelines adjacent to Little Egg Inlet may erode slightly [note: this is not quantified] initially, once the sand from the Long Beach Island project moves to the south, the shorelines should no longer experience adverse effects." As identified above, (see the third paragraph of this section regarding assumptions) this appears to indicate there will be adverse effects on piping plover nesting habitat, proposed critical habitat for the red knot, and wilderness areas until the inlet refills, which may not occur for many years.

IX. PRELIMINARY IDENTIFICATION OF IMPACTS AND SUMMARY OF REQUIREMENTS OR RECOMMENDATIONS

The Service requires or otherwise recommends that the Corps address the following potential adverse impacts of the proposed study for inclusion in the draft feasibility report.

A. FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

Section 7 consultation with the Service pursuant to the ESA is required to ensure that the proposed project does not adversely affect federally listed species. The following is a summary of requirements to protect federally listed threatened and endangered species:

1) Provide the Corps' determination to the Service for the federally listed (threatened) piping plover, red knot, seabeach amaranth, and northern long-eared bat. Little Egg Inlet is not an authorized borrow area according to the Service's December 2005 PBO.

2) Request a conference opinion with the Service on proposed project activities likely to adversely modify critical habitat for the red knot. The Service is considering delineation of the study area and adjacent lands as critical habitat for the red knot by mid-2016.

3) Provide the Corps' determination to the NMFS for the federally listed (endangered) Kemp's ridley turtle, leatherback turtle, green sea turtle, North Atlantic right whale, fin whale, humpback whale, and Atlantic sturgeon; and the federally listed (threatened) Northwest Atlantic Ocean distinct population segment of the loggerhead sea turtle.

B. STATE-LISTED THREATENED AND ENDANGERED SPECIES

Section 2 (a) of the FWCA requires the Corps to consult with the Director of the NJDFW for the conservation of wildlife resources in New Jersey by preventing loss of and damage to such resources as well as providing for the development and improvement thereof in connection with such water-resource development (*i.e.*, borrowing sand).

Incorporate protective measures in project planning for the State-listed (endangered) least tern, black skimmer; the State-listed (threatened) osprey yellow-crowned night-heron, and black-crowned night-heron; and the State species of special concern American oystercatcher, common tern, gull-billed tern, Caspian tern, little blue heron tricolored heron, snowy egret, and glossy ibis. All of these species forage and/or nest within or in the vicinity of the proposed study area.

C. MIGRATORY AVIFAUNA

Migratory birds are a Federal trust resource responsibility and are protected pursuant to the MBTA, FWCA, and EO 13186. Incorporate protective measures in the draft Feasibility Study for the migratory birds known to occur within or in the vicinity of the proposed study area, as presented in Appendix 1.

D. FISHERIES

The NMFS has designated the Little Egg Inlet as EFH. The Magnuson-Stevens Act requires the Corps to consult with the NMFS with respect to "any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH identified under this Act."

1) Consult with the NMFS for the life stages of EFH fish species listed in Appendix 2.

2) Incorporate the requirements and recommendations of the NMFS in the draft Feasibility Study.

3) Incorporate protective measures in project planning for other fish species listed in Section VII B of the PAR.

E. SHELLFISHERIES

Little Egg Inlet, Great Bay, and Little Egg Harbor are designated as Shellfish Growing Areas approved for harvest for bay scallop, eastern oyster hard clam or northern quahog dwarf surf clam, softshell clam, and blue mussel. Incorporate in project planning the recommendations of the New Jersey Bureau of Shellfisheries to minimize or mitigate for the loss of shellfish.

F. EDWIN B. FORSYTHE NATIONAL WILDLIFE REFUGE

The lands surrounding the proposed study area are administered as part of the Service's Forsythe NWR under the mission "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans . . . " and "... ensure that the biological integrity, diversity, and environmental health of the System are maintained." Moreover, the Holgate and Little Beach Units of Forsythe NWR are designated as Wilderness Areas, which mandates that the Units be managed to preserve their wilderness character.

1) Incorporate the requirements or recommendations of the Forsythe NWR in the draft Feasibility Report.

2) Evaluate the effects of proposed project activities on wilderness areas, as being untrammeled, natural, undeveloped, and providing opportunities for solitude or primitive and unconfined recreation as their primary qualities and characteristics. The proposed action would not directly occur on wilderness areas so it is unlikely the untrammeled or undeveloped qualities would be negatively impacted. However, impacts on solitude and naturalness (which include natural soundscapes) should be evaluated.

3) Determine if air pollutant emissions from the proposed action will adversely affect AQRV in wilderness and, if so, address any adverse impacts.

4) Minimize the intrusion of artificial light and unnatural sounds in wilderness areas and take action to prevent or minimize artificial light and unnatural sounds that adversely affect wilderness resources or values or visitors' enjoyment of them.

5) Limit dredging operations to day light hours.

6) Avoid exceeding a pre-determined decibel threshold to be approved by Forsythe NWR for dredging equipment, barges, boats, equipment and tools.

7) Minimize the disturbance to all Trust Species that utilize the wilderness area and take action to prevent or minimize disturbance to Trust Species that utilize the inlet (*i.e.* feeding) between Holgate and Little Beach.

8) Dredge only outside of the breeding season.

9) Minimize the effects of erosion and the alteration of the size of Holgate and Little Beach Island.

10) Conduct monitoring to measure change in shoreline resulting from project implementation.

11) Create a set point in which dredge operations must be discontinued if the boundaries of Holgate and Little Beach become altered at a greater extent than other coastal areas.

G. REVIEW OF THE MODEL SIMULATIONS BY THE ENGINEER RESEARCH AND DEVELOPMENT CENTER

The Service requests that the Corps address the following issues related to piping plover and seabeach amaranth habitat, red knot-proposed critical habitat, and wilderness areas, as it appears that the No Action may be the preferred alternative or that the amount of sand removed be significantly reduced.

1) Rerun the ERDC model using 50,000 cubic yards of transport as the most conservative estimate.

2) Respond to the Service's assessment the using 50,000 cubic yards for transport and removing 1 mcy every seven years, only 350,000 cubic yards would return to the inlet for a net loss or deficit of 650,000 cubic yards, resulting in additional erosion of Forsythe NWR beaches.

3) Respond to the Service's assessment for the case scenario of initially dredging 1.2 mcy, causing the shoreline to recedes about 10 feet/year more than the No Action case. Even with 50,000 cubic yards in sediment transport, the shorelines would erode more with dredging than without.

4) Respond to the Service's assessment that dredging the Little Egg Inlet will either cause more erosion or less accretion of the shoreline.

5) Quantify "Little Egg Inlet may erode slightly" on page 63 of the ERDC report.

H. RECOMMENDATIONS RELATED TO THE LONG BEACH ISLAND BEACHFILL PROJECT

Pursuant to Section 7(a)(1) of the ESA, all Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species. The Service recommends that, in selected suitable areas some of the dune slopes be kept at 13%, the dune elevation at 3.61 feet NAVD, and vegetative cover less than 10% (backshore) and 13% (primary dune) for piping plover habitat, in accordance with the recommendations and conclusions found in Maslo *et al.* (2011). We also wish to remind the Corps that each community on Long Beach Island that receives a beach fill is required to develop a Beach Management Plan (BMP). All protected areas designated in the BMPs should follow the recommendations and conclusions found in Maslo *et al.* (2011).

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B. PERSONAL COMMUNICATIONS

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APPENDIX 1

MIGRATORY BIRDS OCCURRING WITHIN AND/OR IN THE VICINITY OF THE STUDY AREA

SCIENTIFIC NAME	COMMON NAME	STATUS
Actitis macularius	Spotted sandpiper	NJ Species of Concern
Ammodramus maritimus	Seaside sparrow	
Ammodramus nelson	Sharp-tailed sparrow	
Anas acuta	Northern pintail	
Anas Americana	American wigeon	
Anas clypeata	Northern shoveler	
Anas crecca	Green-winged teal	
Anas platytrhyncos	Mallard	
Anas rubripes	American black duck	
Anas strepera	Gadwall	
Ardea alba	Great egret	
Ardea Herodias	Great blue heron	NJ Species of Concern
Asio flammeus	Short-eared owl	NJ Endangered
Aythya marila	Greater scaup	
Aythya valisineria	Canvasback	
Bubulcus ibis	Cattle egret	NJ Threatened
Bucephala albeola	Bufflehead	
Buteo platypterus	Broad-winged hawk	NJ Species of Concern
Branta bernicla	Brant	
Branta Canadensis	Canada goose	
Butorides virescens	Green heron	
Calidris alba	Sanderling	NJ Species of Concern
Calidris canutus rufa	Red knot	Federal Threatened
Casmeridius albus	Great egret	
Charadrius melodus	Piping plover	Federal Threatened
Charadrius vociferous	Killdeer	
Circus cyaneus	Northern harrier	NJ Endangered
Cistothorus palustris	Marsh wren	
Clangula hyemalis	Long-tailed duck	
Colaptes auratus	Northern flicker	
Corvus brachyrhynchos	American crow	
Corvus ossifragus	Fish crow	
Dendroica petechial	Yellow warbler	
Dimetella carolinensis	Gray catbird	
Egretta caerulea	Little blue heron	NJ Species of Concern
Egretta thula	Snowy egret	NJ Species of Concern
Egretta tricolor	Tricolored heron	NJ Species of Concern
Eremophila alpestris	Horned lark	NJ Threatened
Falco columbarius	Merlin	
Falco peregrinus	Peregrine falcon	NJ Endangered
Geothypis trichas	Common yellowthroat	
Haematopus palliates	American oystercatcher	NJ Species of Concern
Hydroprogne caspia	Caspian tern	NJ Species of Concern

Hirundo rustica	Barn swallow	
Larus argentatus	Herring gull	
Larus marinus	Great black-backed gull	
Laterallus jamaicensis	Black rail	
Leucophaeus atricilla	Laughing gull	
Melanitta nigra	Black scoter	
Melanitta perspicillata	Surf scoter	
Melospiza melodia	Song sparrow	
Melospiza georgiana	Swamp sparrow	
Mergus serrator	Red-breasted merganser	
Mimus polyglottos	Northern mockingbird	
Molothrus ater	Brown-headed cowbird	
Nyctanassa violacea	Yellow-crowned night-heron	NJ Threatened
Nycticorax nycticorax	Black-crowned night-heron	NJ Threatened
Pandion haliaetus	Osprey	NJ Threatened
Pelecanus occidentalis	Brown pelican	
Phalacrocorax auritus	Double-crested cormorant	
Plegadis falcinellus	Glossy ibis	NJ Species of Concern
Porzana carolina	Sora	
Quiscalus major	Boat-tailed grackle	
Quiscalus quiscula	Common grackle	
Rallus crepitans	Clapper rail	
Rallus limicola	Virginia rail	
Rallus longirostris	Clapper rail	
Rynchops niger	Black skimmer	NJ Endangered
Sterna hirundo	Common tern	NJ Species of Concern
Sterna forsteri	Forster's tern	
Sterna nilotica (Gelochelidion nilotica)	Gull-billed tern	NJ Species of Concern
Sternula antillarum	Least tern	NJ Endangered
Tachycineta bicolor	Tree swallow	
Tringa semipalmata	Willet	
Turdus migratorius	American robin	
Tyto alba	Common barn owl	
Zenaida macroura	Mourning dove	

Sources: Niles *et al.* 2001, U.S. Fish and Wildlife Service 1997.

APPENDIX 2

ESSENTIAL FISH HABITAT SPECIES OCCURRING WITHIN AND/OR IN THE VICINITY OF THE STUDY AREA

SCIENTIFIC NAME	COMMON NAME	STATUS
Carcharhinus obscurus	Dusky shark	NOAA Species of Concern
Carcharhinus plumbeus	Sandbar shark	Habitat Area of Particular Concern – Little Egg Inlet
Centropristis striata	Black sea bass	
Clupea harengus	Atlantic sea herring	
Gadus morhua	Atlantic cod	
Galeocerdo cuvieri	Tiger shark	
Leucoraja erinacea	Little skate	
Leucorqja ocellata	Winter skate	
Lophius americanus	Monkfish	
Mustelus canis	Smooth dogfish	
Odontaspis taurus	Sand tiger shark	NOAA Species of Concern
Paralichthys dentatus	Summer flounder	
Peprilus triacanthus	Atlantic butterfish	
Pomatomus saltatrix	Bluefish	
Pseudopleuronectes americanus	Winter flounder	
Rachycentron canadum	Cobia	
Raja eglanteria	Clearnose skate	
Scomberomorus cavalla	King mackarel	
Scomberomorus maculatus	Spanish mackarel	
Scophthalmus aquosus	Windowpane flounder	
Sfenotomus chrysops	Scup	
Sphyrna lewini	Scalloped hammerhead shark	
Thunnus thynnus	Bluefin tuna	
Urophycis chuss	Red hake	

Reference: Greene pers. comm. 2015.

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Resources Branch

FEB 16 2016

Mr. Eric Schrading, Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office
Galloway, New Jersey 08205

Dear Mr. Schrading:

The U.S. Army Corps of Engineers, Philadelphia District is in receipt of your Planning Aid Report (PAR) for the *Little Egg Inlet Sand Resource Borrow Area Investigation for the Barnegat Inlet to Little Egg Inlet (Long Beach Island) Storm Damage Reduction Project, Ocean County, New Jersey*, dated 1 February 2016. The Philadelphia District appreciates your assessment of fish and wildlife resources in the study area as well as your comments and recommendations for minimizing and avoiding adverse impacts to Trust Species. The information has been incorporated into the draft Environmental Assessment (EA).

This letter provides responses, as requested, to statements in the PAR in the order that they are presented in the report in an effort to provide further clarification for those issues of concern. The draft EA provides supplemental information that compliments the information provided herein. Pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), the National Environmental Policy Act (83 Stat. 852:42 U.S.C. 4321 *et seq.*), Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S,C, 1531 *et seq.*), the Migratory Bird Treaty Act of 1918 (40 Stat. 755, as amended; 16 U.S.C. 703-712), the Magnuson-Stevens Act (Public Law 94-265, as amended), the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-ee); and the Wilderness Act of 1964 (16 U.S.C. 1131-1136) and all Service Wilderness Area Authorities (Public Laws 90-532, 91-504, 92-364, 93-429, 93-550, 93-632, 94-557, 95-450, 96-487, 96-560, 97-211, 98-140, 101-628, 103-433, 104-167, and 104-333), the Philadelphia District looks forward to receiving your EA review comments. The Philadelphia District seeks, through our collaborative work efforts, to minimize any potential adverse impacts to migratory birds, threatened and endangered species, marine mammals, sea turtles, fish and shellfish.

If you should have any further questions, please contact Ms. Barbara Conlin of our Environmental Resources Branch at 215-656-6557 or Barbara.E.Conlin@USACE.army.mil.

Sincerely,

Peter R. Blum

Peter R. Blum
Chief, Planning Division

Enclosure

RESPONSES TO PLANNING AID REPORT COMMENTS

Comment: Pg. 19 of PAR, para. 1: "*The Service suggests that the model be re-run using 50,000 cubic yards as the most conservative estimate.*"

Response: The Philadelphia District and the Engineer Research and Development Center selected 100,000 cy/year and 250,000 cy/year as realistic representatives of average quantities to model as sand source terms for the study area. These quantities were chosen after review of the historic sediment budge analysis that had been completed for the study area. Use of a value of 50,000 cy as the input term would be an outlier on the low side and not an appropriate value to use to model the sediment transport patterns of the inlet over the life of the federal project. As with shoreline erosion, the amount of longshore sediment transport that occurs annually can vary greatly based on storm frequency and severity conditions. A sediment budget for the period 1986 -2003 calculated a longshore transport to the south of 360,000 cy/year to the southwest and 95,000 cy/year to the north, resulting in a net southerly transport of 265,000 cy/year over 17 year period (USACE, 2006). Greenhorne & O'Mara, Inc. (1975) estimated gross sediment transport rates from 1838 through 1975 to be as low as 500,000 cy/year to almost 2 million cy/year, with a net southward transport ranging between 50,000 to 400,000 cy/year. Caldwell (1966) estimates the net littoral drift in this area to be approximately 500,000 cubic yards per year to the south. All of these estimates of net southerly longshore transport were calculated during years prior to any beach nourishment operations at Long Beach Island (beginning in 2006/2007). It is expected that with the initial construction adding almost 3 million cubic yards of sand within a few miles of the inlet and the future periodic nourishment along the shoreline of LBI for the project life (until 2055), the net longshore sediment transport to the south into the Little Egg Inlet study area will increase.

Comment: Pg. 19 of PAR, para. 3: "*On page 40 of the ERDC report, the time period used for the model was 2002-2007. This seems to be a period of significant Corps beach nourishment along Long Beach Island, so there was a tremendous amount of sand being placed updrift of Holgate and Little Beach Island during this time, which may not adequately represent current study area conditions.*"

Response: See above response. The PAR is referencing the screen page numbers within Adobe Acrobat and not the page numbers cited in the ERDC modeling report. Page 30 (Section 3.2.5) of the ERDC report references the 2002-2007 time period to represent typical conditions to compare calculated shoreline change to the calibrated data available. There were no Corps beach fill activities that occurred during that time period that would affect the transport in the vicinity of Little Egg Inlet. As noted above, the Corps began beach nourishment operations on Long Beach Island in 2006/2007. Approximately 886,000 cy of sand was placed on 8,100 linear feet

of beach between North 25th Street in Surf City to South 5th Street in the northern five blocks of Ship Bottom, more than 10 miles north of the Forsythe refuge at Holgate). It is unlikely that any of that material could move that distance south within a year and have any effect on the sediment budget within the Little Egg Inlet area. No sand has been placed, to date, in the southern end of the LBI project area.

Comment: Pg. 19 of PAR, para. 4: "*On page 49 of the ERDC report, it is stated that "without a source term and initially dredging 1.2 mcy, the shoreline recedes about 10 feet/year more than the No Action case. Therefore 10 years after dredging 1.2 mcy, slight erosion compared to the No Action case is predicted...*"

Response: The case of no sand transport into the Little Egg Inlet study area is not a realistic scenario for any average time period and was run in the model for analysis purposes. The study area is more likely to experience more sand transport into it than what was modeled as the average conditions. This is evidenced by the fact that the Holgate spit has been growing in length through longshore transport processes (*i.e.* a source term) for decades before beachfill placement operations began on Long Beach Island. Page 36-37 of the ERDC report notes that the previous beach placements on southern LBI are not incorporated within the model. It assumes the same berm height and depth of closure as with the model domain, and transport rates and shoreline position are driven by waves. In order to have a better understanding of the effects of dredging and the movement of sand from the beach nourishment site, shoreline change per year for each alternative scenario modeled was shown after 10 years and after 33 years. So in addition to the No Action = No dredging (Little Egg Inlet borrow area) and no LBI placement, two other variations of the No Action case (no dredging) were also simulated. Construction of the beachfill on LBI has already began along the southern beaches and sand will move towards Little Egg Inlet. Hence, why future shoreline change with beachfill (represented by the source term) and without dredging (Little Egg Inlet borrow area) were applied across the domain to represent the net movement of sand to the southwest.

Comment: Page 19 of PAR, para.6: "*On page 50 of the ERDC report, all graphs show No Action vs. dredging with and without sources, but no No Action with a source.*"

Response: See the above response. Figures 21 and 22 show three "No Action" scenarios. A No Action with no dredging and no placement is shown in red and a No Action (no dredging) but with source terms of 100,000 cy/year and 250,000 cy/year shown in blue and green, respectively. The ERDC report goes on to state in the following paragraph: "As expected, after 33 years of a continuous source of sand, shoreline position of all alternatives is seaward of the No Action case" (*i.e.* less erosion than the No Action is predicted). A No Action scenario with no source term is a modeled condition for comparison and not occurring at the site with a net sediment transport to the south.

Comment: Page 19 of PAR, last para.: "*On page 63 of the ERDC report, it is stated that "after dredging, if the inlet captures most of the sediment removed during the dredging, the adjacent*

shorelines will erode. While the shorelines adjacent to the Little Egg Inlet may erode slightly [note: this is not quantified] initially, once the sand from the Long Beach Island project moves to the south, the shorelines should no longer experience adverse effects." As identified above, (see the third paragraph of this section regarding assumptions) this appears to indicate there will be adverse effects on piping plover nesting habitat, proposed critical habitat for the red knot, and wilderness areas until the inlet refills, which may not occur for many years."

Response: The model shows that inlet shoal evolution factors into adjacent shoreline effects. Multiple scenarios were modeled to assess changes in shoreline, including some that entailed behavioral differences in the source term (*e.g.* continuous; over just 1.9 miles; or delays until after 5 years, *etc.*). It is important to note that other than the shoal volumes, the inlet in the model remains the same throughout the entire simulation. This means that the inlet cannot technically migrate, widen, or narrow in the model. Because Little Egg Inlet is unstructured (*i.e.* no jetties), it is free to migrate. Holgate spit growth is not incorporated in the model, although it is already known that it is elongating. Although there are limitations within the model, the results show that as long as the historically documented net sand transport to the southwest continues to move into the Little Egg Inlet area from Long Beach Island, the shorelines should experience no adverse effects from dredging the proposed Little Egg Inlet borrow area. It is highly likely that after completion of the current initial construction of the Federal beachfill at LBI and the subsequent future periodic nourishments that the sand transport to the Holgate/Little Egg Inlet region will increase. This would likely improve the available habitat for beach nesting and foraging shorebirds, as well as reduce the risk of wilderness areas being breached and eroded during severe coastal storms like the coastal storms Joaquin and Jonas recently demonstrated.