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

MAY 14 2014

Peter Weppler, Acting Chief
Coastal Ecosystem Section
Planning Division
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0900

ATTN: Robert Smith, Project Biologist
RE: Draft Environmental Assessment for the Fire Island Inlet to Moriches Inlet; Fire Island Stabilization Project – Hurricane Sandy Reevaluation Report

Dear Mr. Weppler:

We have reviewed the draft environmental assessment (DEA) and the essential fish habitat assessment (EFH) for the Fire Island Inlet to Moriches Inlet - Fire Island Stabilization Project. The proposed project area extends approximately 31 miles along the south shore of Long Island, NY from Fire Island Inlet to Moriches Inlet and includes the Towns of Babylon, Islip and Brookhaven, as well as the entire Fire Island National Seashore. The proposed stabilization plan includes dredging sand from two offshore borrow areas with placement along the shoreline for beach nourishment and the creation of dunes. The initial volume of sand to be removed from the borrow area 2C and the Western Westhampton Borrow Area is 6,992,145 cubic yards. This project is part of the larger Fire Island to Montauk Point Reformulation Study. Because of the extensive storm damage and increased vulnerability to future events following Hurricane Sandy, this project is proceeding separately from the larger study.

As you are aware, the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) require Federal agencies to consult with one another on projects such as this. Because this project affects EFH, 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. We offer the following comments for your consideration.

Essential Fish Habitat
The EFH assessment included in the DEA evaluates some of the potential impacts to EFH that may result from construction of the proposed project. The dredging of sand for beach nourishment has the potential to impact both the EFH of a particular species as well as the organisms themselves in a variety of ways. Dredging can damage fishery resources and their habitats through direct impingement of eggs and larvae, through the creation of undesirable suspended sediment levels in the water column, and through deposition of sediments on immobile eggs and early life stages. Such suspended sediment levels can also reduce dissolved oxygen, can mask pheromones used by migratory fishes, and can smother immobile benthic

organisms and newly-settled juvenile demersal fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). Sustained water column turbulence can reduce the feeding success of sight-feeding fish such as winter flounder, tautog, and summer flounder. According to Olla *et al.* (1974 and 1975 in Collette and Klein-MacPhee 2002), tautog are opportunistic sight feeders. Winter flounder are also sight feeders and are diurnally active in both inshore and offshore waters (Pearcy 1962 in Collette and Klein-MacPhee 2002).

Noise from the dredging activities may also result in adverse effects. Our concerns about noise effects comes from an increased awareness that high-intensity sounds have the potential to harm both terrestrial and aquatic vertebrates (Fletcher and Busnel 1978; Kryter 1984; Richardson et al. 1995; Popper 2003; Popper et al. 2004). Effects may include (a) non-life threatening damage to body tissues, (b) physiological effects including changes in stress hormones or hearing capabilities, or (c) changes in behavior (Popper et al. 2004).

Dredging can also remove the substrate used by federally managed species as spawning, refuge and forage habitat. Benthic organisms that are food sources for federally managed species may also be removed during the dredging. These impacts may be temporary in nature if the substrate conditions return to preconstruction condition and benthic community recovers with the same or similar organisms. The impacts may be permanent if the substrate is altered in a way that reduces its suitability as habitat, if the benthic community is altered in a way that reduces its suitability as forage habitat or if the dredging occurs so often that the area does not have time to recover.

Some of the adverse effects of the dredging will be temporary and others can be minimized using best management practices assessment such as not dredging deep holes and leaving similar substrate in place to allow for recruitment. According to the information in the EFH assessment, the sediment taken from the borrow area would be extracted to a depth no greater than 20 feet below the existing bottom to minimize impacts on existing coastal processes and to avoid anoxic conditions. In addition, the project will include monitoring and adaptive management of the project over 10 years, which is consistent with the period over which the physical changes in the beach configuration are expected to persist. The monitoring includes physical monitoring of the borrow area processes and biological monitoring of the borrow area.

Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305 (b) (4) (A) of the MSA, we recommend the following EFH conservation recommendations be incorporated into the project:

1. The intakes on the dredge plant should not be turned on until the dredge head is in the sediment and turned off before lifted to minimize larvae entrained in the dredge.

2. Dredging within the borrow areas should be designed and undertaken in a manner that maintains geomorphic characteristics of the borrow area and best management practices such as not dredging too deeply and leaving similar substrate in place to allow for the benthic community recovery should be employed.

3. Areas of high surf clam densities within the borrow area should be avoided.

4. Copies of the proposed monitoring and adaptive management plans should be provided to us for review and comment prior to implementation so that we can ensure that the proposed plans assess adequately the potential effects of the dredging on biological resources of the borrow area. The results of the monitoring, as well as post-dredging bathymetry should be provided to us following project construction.

Please note that Section 305 (b)(4)(B) of the MSA requires you to provide us with a detailed written response to these EFH conservation recommendations, including the measures adopted by you for avoiding, mitigating, or offsetting the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305 (b) (4) (B) of the MSA also indicates that you must explain its reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effect pursuant to 50 CFR 600.920 (k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CRF 600.920 (j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above EFH conservation recommendations.

Endangered Species Act

A number of federally listed threatened or endangered species under our jurisdiction are known to occur in the vicinity of the project area. Listed sea turtles are also found seasonally in the waters off of New York, typically between from May through November, with the highest concentration of sea turtles present from June to October. The species that are likely to be present include the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead (*Caretta caretta*) sea turtles, as well as endangered Kemp's ridley (*Lepidochelys kempi*), leatherback (*Dermochelys coriacea*) and green *(Chelonia mydas)* sea turtles. In addition, 5 DPSs of Atlantic sturgeon (*Acipenser oxyrhynchus oxyrinchus)* are known to occur within the nearshore, coastal waters of the Atlantic Ocean, primarily using these bodies of water throughout the year as a migratory pathway to and from spawning, overwintering, and/or foraging grounds throughout their range.[1]

The federally endangered North Atlantic right, humpback, and fin whales, are seasonally present in the waters off New York; however, these ESA listed species of whales are not expected to occur in the shallow, near shore waters of eastern Long Island, and thus, are not expected to occur in the project area.

Section 7 of the Endangered Species Act of 1973 (ESA), as amended requires federal agencies to consult with us to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or adversely modify or destroy designated critical habitat. You requested emergency ESA section 7 consultation (50 CFR § 402.05) with us on March 22, 2013, for shoreline

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[1] The 5 DPSs of Atlantic sturgeon are as follows: threatened, Gulf of Maine DPS; and the endangered New York Bight DPS; Chesapeake Bay, Carolina and South Atlantic DPSs.

restoration/rehabilitation activities in need along several shorelines of New York and New Jersey, including the Atlantic coast of Long Island. Via a letter dated April 2, 2013, we formalized the emergency ESA section 7 consultation process with you for these actions and began the emergency consultation process.[2] Pursuant to CFR § 402.05, emergency section 7 consultation shall be initiated by you as soon as practicable after either: (1) the emergency response is completed (preferably within 30 days) or (2), the emergency is under control. Neither of these triggers for the initiation of consultation have been met, and the emergency consultation remains open for this action. We look forward to continued coordination with your office on this and other emergency projects covered under the April 2, 2013, letter. Should you have any questions about the emergency ESA section 7 process, or ESA section consultation in general, please contact Danielle Palmer at (978) 282-8468 or by e-mail (Danielle.Palmer@noaa.gov).

We look forward to 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 Karen Greene at karen.greene@noaa.gov or (732) 872-3023.

Sincerely,

Louis A. Chiarella,
Assistant Regional Administrator
for Habitat Conservation

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[2] On March 6, 2014, the New York Corps requested that we append several additional emergency actions to be covered under our April 2, 2013, letter to the Corps (pers. communication, Jenine Gallo, New York District Corps of engineers, email dated March 6, 2014). All of these projects fall within the already-exempted ecological boundaries along both the New York and New Jersey Sandy-impacted shorelines identified by project name in the April 2013 letter, however they were not specifically identified by the Corps by name or specific congressional authorization at the time the 2013 letter was written either due to a lack of transparency about the application of the new law (P.L. 113-2 was only recently interpreted by USACE-HQ) and/or due to the identification and/or acceleration of certain reaches or segments of some projects ((pers. communication, Jenine Gallo, New York District Corps of engineers, email dated 3/6/2014). The Atlantic Coast of Long Island, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, project was included in this list provide to us on March 6, 2014.

Literature Cited

Auld, A.H. and J.R. Schubel. 1978. Effects of suspended sediments on fish eggs and larvae: a laboratory assessment. Estuar. Coast. Mar. Sci. 6:153-164.

Breitburg, D.L. 1988. Effects of turbidity on prey consumption by striped bass larvae. Trans. Amer. Fish. Soc. 117: 72-77.

Burton, W.H. 1993. Effects of bucket dredging on water quality in the Delaware River and the potential for effects on fisheries resources. Prepared for: Delaware Basin Fish and Wildlife Management Cooperative, by Versar Inc, Columbia MD.

Collette, B.B. and G. Klein-MacPhee. eds. 2002. Bigelow and Schroeder's fishes of the Gulf of Maine. Smithsonian Institution. Washington, D.C.

Fletcher, J. L. and R. G. Busnel. 1978. Effects of Noise on Wildlife. Academic Press, New York.

Kryter, K D. 1985. The Handbook of Hearing and the Effects of Noise (2nd ed.). Academic Press, Orlando, Florida.

Nelson, D.A. and J.L. Wheeler. 1997. The influence of dredging-induced turbidity and associated contaminants upon hatching success and larval survival of winter flounder, Pleuronectes americanus, a laboratory study. Final report, Grant CWF #321-R, to Connecticut Department Environmental Protection, by National Marine Fisheries Service, Milford CT.

Newcombe, C.P. and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosystems. N. Amer. J. Fish. Manag. 11:72-82.

Olla, B.L., A.J. Bejda, and A.D. Martin. 1974. Daily activity, movements, feeding and seasonal occurrence in tautog, Tautoga onitis. Fish. Bull. U.S. 72:27-35.

Olla, B.L., A.J. Bejda, and A.D. Martin. 1975. Activity, movements and feeding behavior of the cunner, *Tautogoloabrus adspersus*, and comparison of food habitats with young tautog, *Tautoga onitis*., off Long Island, New York. Fish. Bull. U.S. 73:895-900.

Popper, A.N. 2003. Effects of anthropogenic sound on fishes. Fisheries 28:24-31.

Popper, A N., J. Fewtrell, M E. Smith, and R.D. McCauley. 2004. Anthropogenic sound: Effects on the behavior and physiology of fishes.
MTS J. 37: 35-40.

Pearcy, W.C. 1962. Ecology of an estuarine population of winter flounder, *Pseudopleuronectes americanus* (Walbaum). Bull. Bingham Oceanogr. Coll. 18(1):1-78.

Richardson, W.J., C R. Greene Jr., C.I. Malme and D H. Thomson. 1995. Marine Mammals and Noise. Academic Press, New York.

FIRE ISLAND INLET TO MORICHES INLET
FIRE ISLAND STABILIZATION PROJECT

ESSENTIAL FISH HABITAT ASSESSMENT
ATTACHMENT B TO THE
FINAL ENVIRONMENTAL ASSESSMENT

U.S. Army Corps of Engineers
New York District

May 2014

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The Fire Island to Moriches Inlet (FIMI) Stabilization Project has been developed to reinforce the existing dune and berm system along the island. The selected design includes beachfill at Robert Moses State Park, Fire Island Lighthouse Tract, all of the communities outside of Federal Tracts, and Smith Point County Park. Beachfill is not included in any Major Federal Tracts, except Fire Island Lighthouse which was requested by the National Park Service to protect the Lighthouse. This report presents the Essential Fish Habitat (EFH) assessment for the FIMI Stabilization Project portion of the FIMP *Tentative Selected (TSP).* The FIMI study area is described in Section 2.1.2.

1.3 ESSENTIAL FISH HABITAT ASSESSMENT BACKGROUND

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MFCMA), an EFH assessment must be completed which identifies potential impacts to fishery resources and habitat that resulting from activities proposed for the Fire Island Stabilization Project. The MFCMA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires that regional fishery management councils and other federal agencies identify and protect important marine and anadromous fish habitat. Federal agencies that fund, permit, or carry out activities that may adversely impact EFH are required to consult with National Marine Fisheries Service (NMFS) regarding the potential effects of their actions on EFH. According to USDOC (1999a), the contents of an EFH assessment should include:

- A description of the proposed action;
- Analysis of the effects of the proposed action on EFH, the managed fish species, and major prey species;
- The Federal agency's views regarding the effects of the action on EFH; and,
- Proposed mitigation, if applicable.

This EFH assessment includes:

- A description of the proposed activity.
- A description of the existing project area environment.
- A listing of EFH-designated species for the project area.
- Information relating to the habitat suitability and relative abundance of EFH-designated species and life history stages in the project area.
- A summary of the diets of EFH species (i.e., prey species) in the project area.
- A summary of available survey data for benthic prey species in the vicinity of the project area.
- An analysis of the potential impacts of project activities on EFH-designated species and species of special interest in the project area.
- An analysis of the direct, indirect, and synergistic impacts as a result of the activities in the project area.

2.0 PROJECT DESCRIPTION

2.1 PROJECT STUDY AREA

2.1.1 Fire Island Inlet to Moriches Inlet Study Area

This report provides an EFH Assessment for stabilization of the portion of the Western Study Area Barrier Island Segment of the overall study area, specifically, Fire Island Inlet to Moriches Inlet (FIMI). The FIMI Stabilization Project area includes portions of the Towns of Babylon, Islip and Brookhaven, as well as 2 incorporated villages, and the entirety of Fire Island National Seashore (FIIS). A series of barrier islands characterize the western portion of the study area. The barrier island chain study area includes Fire Island which extends approximately 30 miles east from Fire Island Inlet to Moriches Inlet. Fire Island Inlet and Moriches Inlet are Federal navigation channels that connect the ocean and the bays. Beaches along the barrier island chain are generally characterized by a well-defined dune system with crest elevations ranging from 6 to 40 feet relative to the National Geodetic Vertical Datum (NGVD). Beach berm widths vary throughout the study area, ranging from approximately 0 feet to 150 feet, with average beach berm elevations of approximately six to ten feet NGVD.

Public lands throughout the Barrier Island Segment provide areas where natural resources are protected to the greatest extent possible. The Nation Park Service (NPS) managed FIIS is located along the Atlantic Ocean on the Fire Island barrier island, Great South Bay, and Moriches Bay shoreline. The NPS seeks, as part of its Mission Statement for FIIS, to preserve natural processes and protect ecological resources. FIIS is approximately 26 miles long, including the 7-mile long Otis Pike Wilderness Area, and includes, at the eastern end, Suffolk County's Smith Point County Park. The property consists of open ocean, marine intertidal, marine beach, dunes and swale, maritime forest, and back bay habitats, as well as primarily seasonal communities.

Along the barrier islands storm damages to developed areas are due to wave attack, erosion of the beach and dune, and tidal flooding of infrastructure on the barrier island that occurs when the beach and dune elevations are exceeded due to hurricanes and nor'easters. There is a long history of building destruction during storms. But in addition to storms impacting infrastructure on the barrier island, the barrier island itself is also vulnerable to storms which can erode the beach and dune system and create breaches (new inlets) of the barrier island. When a breach occurs, it impacts both the barrier island and back bay system not only during the storm, but for an extended period after the storm. When a breach opens, it tends to be relatively small, but if not closed quickly, will grow rapidly over time. As these breaches grow they also may migrate (move along the island) and can destroy buildings and other infrastructure on the barrier island. Breaches also impact the hydraulic stability of the existing inlets, which can result in increased sediment deposition in the inlet channels, and compromised navigability of the inlet. Of greatest impact however, is the hydrodynamic impact on the back bay. When a breach occurs, it increases flooding in the backbay environment due to tides and storm activity, and this effect continues to increase as the breach grows.

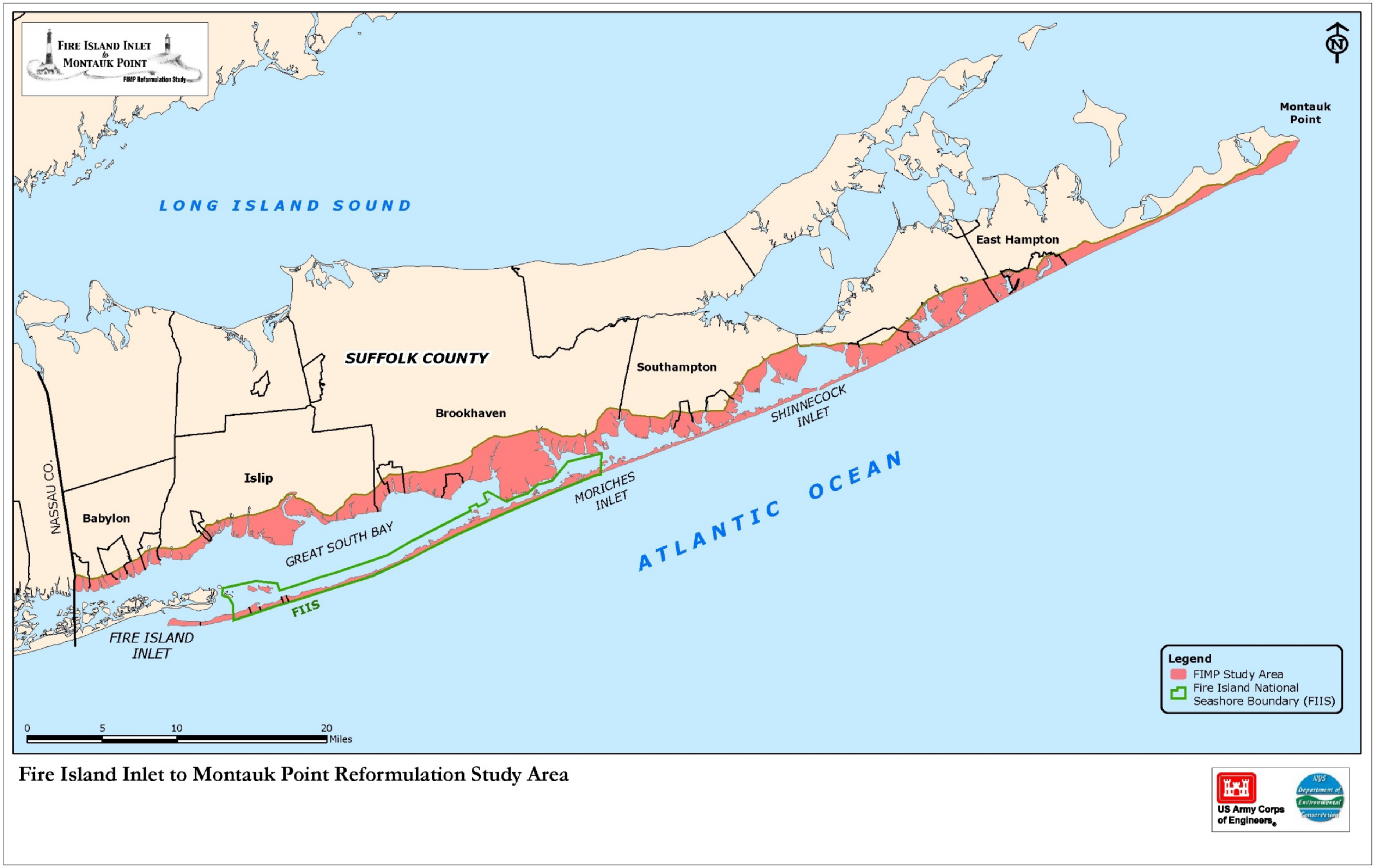

Figure 1 - FIMP Study Area

2.2 PROPOSED ACTION

The FIMI Stabilization Project consists of sand removal from three offshore borrow areas and sand placement along the Atlantic shoreline of the Fire Island barrier island for beach nourishment and creation and dune creation to provide coastal storm risk management. The purpose of this report is to assess the potential project impacts to EFH.

2.2.1 Problem Identification

Northeasters and hurricanes periodically impact the southern shores of Fire Island and the shoreline of the Great South Bay. These storms produce tides and waves that cause extensive flooding and erosion to the study area. Flooding in the Great South Bay is intensified when Fire Island is breached or overwashed. While long-term erosion and large storms have posed a significant threat to the project area for many years, a series of recent storms has created a potentially imminent hazard of widespread overtopping of the island. Previous investigations indicate that at several locations, overtopping may erode the barrier to the point where a breach or new inlet could be formed. Severe erosion of the protective dunes has left numerous barrier island structures exposed to even minor storms and detracts from the natural character of this national seashore. The lack of dry beach seaward of some dunes also impedes vehicular access by residents, Park Service, and emergency personnel. This creates a potential safety hazard by limiting options for emergency response and evacuation.

2.2.2 Project Authorization

The Fire Island Inlet to Montauk Point, New York, Combined Beach Erosion Control and Hurricane Protection Project was originally authorized by the River and Harbor Act of 14 July 1960, and subsequently modified in accordance with Section 103 of the River and Harbor Act of 12 October 1962, Section 31 of the Water Resources Development Act (WRDA) of 1974, and Sections 103, 502, and 934 of the WRDA of 1986 (P.L. 99-662). This report is being prepared in response to Public Law (PL) 113-2 of January 29, 2013, Disaster Relief Appropriations, in order to expedite implementation of the initial construction recommendations of The Fire Island Inlet to Montauk Point, NY Reformulation Study.

2.2.3 Proposed Action

Recent storm events, such as Hurricane Sandy and Hurricane Irene, have the left the dune and berm system along the south shore of Fire Island vulnerable, increasing the potential for overwash and breaching during future storm events. The proposed action has been developed to reinforce the existing dune and berm system along the island. The selected design includes beachfill at Robert Moses State Park, Fire Island Lighthouse Tract, all of the communities outside of Federal Tracts, and Smith Point County Park. Beachfill is not included in any Major Federal Tracts, except Fire Island Lighthouse which was requested by the National Park Service to protect the Lighthouse.

Design Section

The Berm Only, Small, and Medium design templates are used in the FIMI TSP. The proposed design foreshore slope (from +9.5 to +2 ft. NGVD) is roughly 12 on 1. Below MHW (roughly +2 ft. NGVD) the submerged morphological profile, representative of each specific reach, is translated and used as the design profile. Figure 3 shows typical design sections for a few reaches considered representative of the complete set of reaches where fill placement is considered.

- The Berm Only template is applicable to areas in which the existing condition dune elevation and width reduce the risk of breaching but have eroded beach berm conditions. The 90 ft. design berm provides protection to the existing dunes and ensure vehicular access during emergency response and evacuation. The Berm Only template is applied to Robert Moses State Park (GSB-1A) and Smith Point Count Park-TWA (MB-1A). At Smith Point County Park the design provides protection to the existing park facilities and TWA Memorial.

- The Small template is sufficient to reduce the risk of breaching but does not prevent a significant portion of the damages to oceanfront structures. Therefore, the Small template is applied to areas with limited oceanfront structures: Robert Moses State Park (GSB-1A), Fire Island Lighthouse Tract (GSB-1B), and the eastern section of Smith Point County Park (MB-1B, and MB-2A).

- The Medium template was identified as having the highest net benefits and provides for non-overtopping of an event with an approximate 50-year return period. The Medium template is applied to the areas with the greatest potential for damages to oceanfront structures: Kismet to Lonelyville (GSB-2A), Town Beach to Corneille Estates (GSB-2B), Ocean Beach to Seaview (GSB-2C), Ocean Bay Park to Point O' Woods (GSB-2D), Cherry Grove (GSB-3A), Fire Island Pines (GSB-3C), Water Island (GSB-3E), Davis Park (GSB-3G), and the western section of Smith Point County Park (MB-1A). The FIMI TSP does not include beachfill in any Major Federal Tracts except Fire Island Lighthouse Tract, which suffered significant beach and dune erosion during Hurricane Sandy. The Major Federal Tracts are: (Sailors Haven (GSB-2E), Carrington Tract (GSB-3B)), Talisman to Water Island (GSB-3D)), Water Island to Davis Park (GSB-3F), Watch Hill (GSB-3H), Bellport Beach (GSB-4A), and Old Inlet (GSB-4B) (Reference the HSLRR).

2.2.5 Description of Borrow Areas and Dredging Activities

The beachfill material required for initial construction will be obtained from three offshore borrow sites: 2C , 4C and 5B (It should be noted during Plans and Specifications phase of the project, additional sand was required and Borrow Area 5B was selected as it was already physically and biologically screened). Borrow area locations are shown on Figure 3. The borrow areas are located within a system of extensive shoreface-attached sand ridges positioned just offshore of Fire Island National Seashore. Large sediment volumes are associated with these sand ridges (nearly 18 billion cubic yards) that extend up to 82,000 ft offshore on the continental shelf. Potential sand resources within the borrow areas account for a small fraction of the sand ridge volume with which they are associated and an even smaller part of the total ridgefield sand volume (NPS. 2008).

Borrow area 2C is located approximately 2 miles offshore of Point O' Woods and contains an estimated 9,000,000 cy of compatible sediment. In order to limit potential impacts to shoreface ridges containing modern Holocene sediments only the northeastern half of the borrow area will be dredged and utilized for the FIMI project. Sediment Suitability analyses were performed in 1998 and the texture of the material was found to be compatible with the native Fire Island sand (USACE 2014).

Borrow Area 4C area is located approximately 1.5 miles offshore of Pikes Beach and contains an estimated 2,000,000 cy of compatible sediment. But after further investigation of the Sediment Suitability it was found that only 700,000 cys (which reflexes a 7' cut vs. a 20' cut) was found to be compatible with the native Fire Island sand.

Borrow Area 5B area is located approximately 6.5 miles offshore of Westhampton Beach and contains an estimated 9,500,000 cy of compatible sediment. Sediment Suitability analyses were performed in 1998 and the texture of the material was also found to be compatible with the native Fire Island sand.

Originally we thought we could use an average dredging cut depth of 20 feet in Borrow Area 4C, resulting in 2,180,000 CY of available sediment. Upon further review of core CB-40 we realized the acceptable dredging cut depth is 7 feet, resulting in 700,000 CY of available sediment. The sediment below 7 feet in Borrow Area 4C is not acceptable/compatible. Due to the lack of compatible sediment in Borrow Area 4C, we decided to utilize the next closest Borrow Area, 5B. The sand required for initial construction will be obtained from three offshore borrow sites: 2C, 4C, and 5B. Borrow area 2C contains an estimated 9 million cubic yards of compatible sediment. Borrow area 4C contains an estimated 700,000 cubic yards of compatible sediment. Borrow Area 5B contains an estimated 9.5 million cy of compatible sediment. The total initial project fill volume would be 6,992,145 cy which represents the volume of sand necessary to achieve the design fill, advance fill, overfill, and contingency profiles for 19 miles of beach.

Material for initial construction is proposed as follows: approximately 5,000,000 cy of sand to be removed from Borrow Area 2C and placed in the fill areas between Fire Island Inlet and Davis Park. Approximately 700,000 cy to be removed from Borrow Area 4C, and approximately 1,300,000 cy to be removed from Borrow Area 5B for fill areas between Smith Point County Park and Moriches Inlet.

Point	Easting	Northing
4C1	1,348,923	223,361
4C2	1,350,473	223,962
4C3	1,351,023	222,411
4C4	1,349,473	221,811

Point	Easting	Northing
5B1	1,371,140	231,984
5B2	1,381,680	236,212
5B3	1,382,350	234,057
5B4	1,371,970	229,922

Point	Easting	Northing
2C2	1,232,757	170,383
2C3	1,238,607	166,176
2C4	1,243,037	165,887
2C5	1,242,906	163,358
2C6	1,230,537	164,441
2C7	1,228,127	169,962
2C8	1,231,477	171,262

The dredging of the borrow areas could potentially and directly impact the benthic communities present in the areas. Although this community would be disturbed, such disturbance would be of a temporary nature and would occur in dynamic/high energy environments where species have adapted to these: conditions. Preconstruction surveys would ensure that impacts to highly diverse areas containing substantial surf clam populations are avoided or minimized. The portion of borrow areas actively dredged for all the Federal projects located along the south shore represent a very small percentage of the total available habitat. These areas also are spatially distributed so that dredging impacts are not concentrated in any one portion of the Study Area. In addition, the borrow areas are sloped in a manner to prevent anoxic conditions. Finally, the substrate in the borrow areas is similar in composition to pre- and post-construction conditions, allowing for the recolonization of these areas, which should occur within 12 to 18 months following dredging operations. Thus the cumulative effect of dredging on the ecology of the Study Area would not be significant.

Sediment taken from the borrow area would be extracted to a depth no greater than 20 feet below the existing bottom. The USACE is currently working with NYSDEC to establish a monitoring plan which would include monitoring for sturgeon. Anticipated first field effort is in spring 2014.

Fire Island National Seashore received emergency Hurricane Sandy funds from the Federal Highway Administration's Eastern Federal Lands Division to dredge approximately 60,000 cubic yards from the Seashore’s Watch Hill boat channel and marina. Currently, the plans are to undertake dredging during the channel's fall dredge window of 2014 (October 1 - December 15) which would coincide with the Stabilization Project’s proposed construction schedule. While the Watch Hill project's objective is to re-establish the channel for safe passage by all users of the channel, it also outlines the beneficial use of the dredged material by either stockpiling or placement in permitted areas (FIIS, 2013).

NPS is proposing that the 60,000 cubic yards be beneficially placed to create a feeder beach with a berm elevation not to exceed 9.5 ft. NGVD on the first 1500 feet of the eastern end of Davis Park. This action will augment the Stabilization Project’s need for sand within Davis Park. NPS is proposing that the pipeline from the channel to the placement site will be positioned on public land (Federally or locally permitted).

The proposed dredging activities associated with the project initial construction would be conducted in the three offshore borrow sites. In these locations the circulation, flushing rates, and dissolved oxygen levels are relatively high. The beach nourishment or dredge material (comprised primarily of clean, coarse-grained sand and gravel) would be hydraulically dredged and pumped to down drift beaches. The small percentage of fines in the borrow area sand consists almost entirely of clean, coarse-grained sand and gravel, and most of the fine material that would be suspended by the activities in the Atlantic Ocean water column would settle out in nearby Atlantic Ocean waters and would not adversely affect the designated habitat areas.

A hopper dredge with a capacity of 6500 cy is likely to be utilized for this project. The dredge slurry will be sucked into the hoppers, then the dredge boat will transport the slurry to a pump out located near shore. The pump out equipment will be is connected to a pipe that transports the dredge slurry to shore. Once on shore, the material will be handled with standard construction equipment to create the design beach and dune profile.

2.2.5 Proposed Project Schedule

The pre-construction and construction sequence and time schedule of the Emergency Project is dependent on the timeliness of this report's approval, the foregoing construction procedures, and the ability of local interests to implement items of local cooperation. These items of local cooperation are principally the furnishing of offshore borrow easements by the State of New York as well as required shoreline real estate easements, and structure acquisition and relocation.

Due to the anticipated delay in obtaining the necessary real estate requirements in the communities, the initial construction is expected to be split into three contracts:

Smith Point County Park

- Contract 1: Smith Point County Park (MB-1A, MB-1B, MB-2A): Contract 1: September 2014 to March 2015

Robert Moses Area

- Contract 2: Lonelyville to Robert Moses State Park (GSB-1A, GSB-1B, GSB-2A): November 2014 to March 2015

Communities

- Contract 3: Davis Park to Town Beach (GSB-2B, GSB-2C, GSB-2D, GSB-3A, GSB-3C, GSB-3E, GSB-3G): Contract 3: December 2014 to August 2015

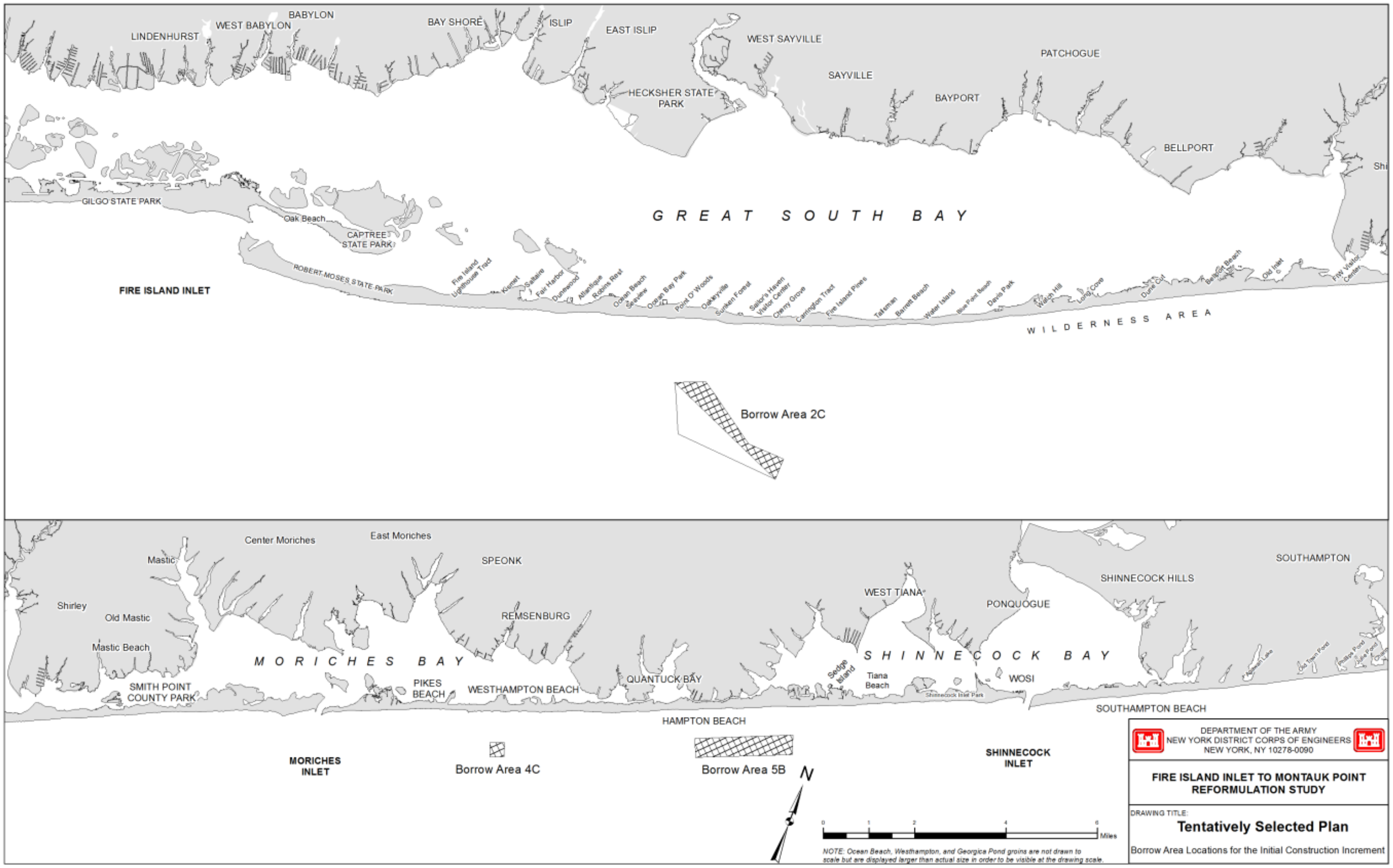

Figure 2: Borrow Area Locations

3.0 EXISTING ENVIRONMENT

3.1 MARINE OFFSHORE ECOSYSTEM

The three borrow areas are within the Marine Offshore Ecosystem. The Marine Offshore Ecosystem includes the Marine Offshore habitat, which consists of the deeper water areas of the Atlantic Ocean within the study area. With the exception of sea turtles and birds, all biota associated with the Marine Offshore habitat are exclusively aquatic. Aquatic biota that utilize the Marine Offshore habitat primarily include fish and benthic invertebrates, as well as marine mammals.

3.1.1 Physical Description

The Marine Offshore habitat is an oceanic area with water depths ranging from 10 to 30 m. The habitat is relatively homogeneous throughout the entire southern Long Island coastline from Rockaway Inlet, through FIIS and east to Montauk Point. The habitat includes pelagic and benthic zones which support different assemblages of organisms. The pelagic zone refers to the water column and organisms within it, whereas the benthic zone refers to the bottom or substrate and includes sediments and other material present on the ocean floor. The benthic zone substrate is primarily sand within the study area. Through geo-morphological analyses, sand suitable for beach nourishment has been identified within the three borrow areas.

3.1.2 Marine Invertebrates

Marine benthic invertebrates are bottom-dwelling species that can be grouped into two categories: infaunal (i.e., benthic invertebrates living within the substrate) and epifaunal (i.e., benthic invertebrates living on the surface of the substrate). Benthic invertebrates are found in the substrate of the borrow areas. Polychaetes (segmented worms with bristles) are an important component of the benthic infaunal community; epifaunal biota include amphipods, crabs, horseshoe crabs (*Limulus polyphemus*), echinoderms (e.g., sea stars, sand dollars), and bivalves (e.g., surf scallops [*Aequipecten sp.*], surf clams [*Spisula solidissima*]). Marine invertebrates provide an important food source for bottom feeding fish and also include species that are commercially and recreationally important. The benthic invertebrates of the Marine Offshore habitat include a variety of taxa common to generally clean, well-oxygenated, coarse sandy marine habitats.

3.1.3 Finfish

The Marine Offshore habitat supports a variety of pelagic and benthic finfish, some of which are recreationally or commercially important. The pelagic zone contains few truly resident fish populations; rather it is dominated primarily by a variety of migratory and highly mobile species including red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*), Atlantic butterfish (*Peprilus triacanthus*), bluefish (*Pomatomus saltatrix*), and striped bass (*Morone saxatilis*). Similarly, benthic fish species that occur in the Marine Offshore habitat are largely mobile and migratory; important benthic species include both summer flounder (*Paralichthys dentatus*) and winter flounder (*Pseudopleuronectes americanus*).

3.1.3 Marine Mammals

The pelagic zone also provides habitat for marine mammals. The harbor seal (*Phoca vitulina*), which is listed as a protected species by New York State is the only marine mammal expected to frequent the Marine Offshore habitat within the study area. Marine mammals such as the right whale (*Eubalaena glacialis*; Federally Endangered) and pygmy-sperm whale (*Kogia breviceps*) may also use this habitat from time to time. Gray seals (*Halichoerus grypus*) may also be found in this habitat.

3.1.4 Reptiles

Several species of sea turtles, including Kemps Ridley turtle (*Lepidochelys kempii*, State and Federally Endangered), green sea turtle (*Chelonia mydas*; State and Federally Endangered), and loggerhead sea turtle (*Caretta caretta*; State and Federally Threatened) may also pass through the Marine Offshore habitat from time to time.

4.0 EFH SPECIES OVERVIEWS

This section describes the habitat requirements of the EFH-designated species, non-EFH designated fish and shellfish species that are important recreationally and commercially, and rare and endangered species that potentially occur within the project area. Specifically, Section 4.1 provides individual species assessment of EFH-designated species.

4.1 EFH-DESIGNATED SPECIES

EFH-designated species and life history stages in the three borrow areas were identified based on the lists in the NOAA Guide to EFH Designations in the Northeastern United States (USDOC 1999a) for the 10-minute by 10-minute areas of latitude and longitude (10’ by 10’ square) where the borrow areas are located. EFH designations for coastal finfish and shellfish species in the 10’ by 10’ squares were based on information compiled by the New England Fisheries Management Council (NEFMC 1999). Designations for sharks and highly migratory finfish (e.g., tunas) were made by NMFS (USDOC 1999b).

The 10’ by 10’ square where Borrow Area 2C is located is described as: “Atlantic Ocean waters within the square within Great South Bay estuary south and north of Ocean Beach, NY on Fire Island.” This 10’ by 10’ square is defined by the following coordinates: North boundary: 40° 40.0’ N, East boundary: 73° 00.0’ W, South boundary: 40° 30.0’ N and West boundary: 73° 10.0’ W. A total of 20 bony finfish, 7 sharks, 2 skates, and 3 invertebrates are currently designated as EFH species in the 10’ by 10’ square where Borrow Area 2C is located. Each of the EFH-designated species and the corresponding designated life stages are presented in Table 1

The 10’ by 10’ square where the 4C Borrow Area and 5B is located is described as: “The waters within the square within the Atlantic Ocean and within Great South Bay estuary affecting the following: south of Tanner Neck, NY., East Moriches, NY, Center Moriches, NY, and within Moriches Bay and Moriches Bay Inlet, along with south of Eastport, NY, Speonk, NY, and Remsenberg, NY, from Apaucuck Point to Mastic Beach, NY, along with waters within eastern Narrow Bay.” This 10’ by 10’ square is defined by the following coordinates: North boundary: 40° 50.0’ N, East boundary: 72° 40.0’ W, South boundary: 40° 40.0’ N and West boundary: 72° 50.0’ W. A total of 21 bony finfish, 7 sharks, 2 skates, and 4 invertebrates are currently designated as EFH species in the 4C Borrow Area and 5B. Each of the EFH-designated species and the corresponding designated life stages are presented in Table 2.

Available information on life history and habitat requirements for each EFH-designated species within the two 10’ by 10’ squares where the borrow areas are located is summarized in this section, along with relevant survey information. Primary reference sources are cited once, at the beginning of each summary. For most species, the primary source was one of a series of EFH source documents that were initially prepared by the NMFS in 1999. Some species source documents were updated as new information became available and provide new information on life history, geographic distribution, and habitat requirements via recent literature, research, and fishery surveys. Several other primary sources are also identified. Designated life history stages for the bony fish, shark species, skate species and invertebrate species for the 10 minute x 10 minute "squares" of latitude and longitude that encompass the project area are identified at the beginning of each species assessment as well as in Table 1 and Table 2.

Conclusions regarding the likelihood of occurrence of each species and life history stage in the borrow areas are presented at the end of each species assessment. In reaching these conclusions, emphasis was given to the depth and water quality preferences of eggs, larvae, juveniles and adults, and their association with the sandy substrates that are found in the borrow areas. Information on depth and substrate preferences is important because the proposed dredge and nourishment areas are relatively shallow and predominantly consist of a sandy substrate. Another important factor is whether the bottom sediments (sand) in the project area provide suitable habitat for invertebrates that are preyed upon by bottom feeding EFH species. The majority of dredging activities are proposed for the fall, winter or spring when many of the EFH species would most likely not be present in the borrow areas. However, in order to meet the overall project schedule for implementation of the FIMI TFSP, dredging and on shore placement of sand cannot be completely avoided. The proposed project schedule is presented in Section 2.2.5.

Table 1. EFH-Designated Species and Life History Stages in Borrow Area 2C

Species	**Life Stage**			
Bony Fish Species	**E**	**L**	**J**	**A**
Atlantic butterfish (*Peprilus triacanthus*)	X	X	X	X
Atlantic salmon (*Salmo salar*)				X
Atlantic sea herring (*Clupea harengus*)			X	X
Atlantic mackerel (*Scomber scombrus*)	X	X	X	X
Black sea bass (*Centropristis striata*)	n/a	X		X
Bluefin tuna (*Thunnus thynnus*)			X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Monkfish (*Lophius americanus*)	X	X		
Pollock (*Pollachius virens*)			X	
Red hake (*Urophycis chuss*)	X	X	X	
Scup (*Stenotomus chrysops*)	n/a	n/a	X	X
Skipjack tuna (*Katsuwonus pelamis*)				X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Summer flounder (*Paralichthys dentatus*)		X	X	X
Whiting (*Merluccius bilinearis*)	X	X	X	
Windowpane (*Scophthalmus aquosus*)	X	X	X	X
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Yellowtail flounder (*Limanda ferruginea*)	X			X
Skate Species	**E**	**L**	**J**	**A**
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Invertebrate Species	**E**	**L**	**J**	**A**
Atlantic surf clam (*Spisula solidissima*)	n/a	n/a	X	X
Long finned squid (*Loligo pealeii*)	n/a	n/a		
Ocean quahog (*Arctica islandica*)	n/a	n/a		X
Shark Species		**EJ**	**LJ**	**A**
Blue shark (*Prionace glauca*)		X	X	X
Dusky shark (*Carcharhinus obscurus*)		X	X	
Sand tiger shark (*Carcharias taurus*)		X		

Species	**Life Stage**			
Sandbar shark (*Carcharhinus plumbeus*)		X	X	X
Shortfin mako shark (*Isurus oxyrinchus*)		X	X	X
Tiger shark (*Galeocerdo cuvieri*)		X	X	
White shark (*Carcharodon carcharias*)			X	

Source: USDOC 1999a.
Key: E = eggs, L = larvae, J = juveniles, A = adults
For sharks: EJ = early juvenile, LJ = late juvenile, A = adults
"n/a" for scup and black sea bass indicates that there is insufficient data for the egg and larvae life stages, and no EFH designation has been made as of yet, and, "n/a" for long finned squid, short finned squid, surf clam, and ocean quahog which are referred to as pre-recruits and recruits corresponds with juveniles and adults in the table

Table 2. EFH-Designated Species and Life History Stages in the 4C Borrow Area and 5B

Species	**Life Stage**			
Bony Fish Species	**E**	**L**	**J**	**A**
Atlantic butterfish (*Peprilus triacanthus*)	X	X	X	X
Atlantic salmon (*Salmo salar*)				X
Atlantic sea herring (*Clupea harengus*)		X	X	
Atlantic mackerel (*Scomber scombrus*)	X	X	X	X
Black sea bass (*Centropristis striata*)	n/a			X
Bluefin tuna (*Thunnus thynnus*)			X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
Haddock (*Melanogrammus aeglefinus*)		X		
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Monkfish (*Lophius americanus*)	X	X		
Red hake (*Urophycis chuss*)	X	X	X	
Scup (*Stenotomus chrysops*)	n/a	n/a	X	X
Skipjack tuna (*Katsuwonus pelamis*)				X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Summer flounder (*Paralichthys dentatus*)	X	X	X	X
Whiting (*Merluccius bilinearis*)	X	X	X	
Windowpane (*Scophthalmus aquosus*)	X	X	X	X
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Witch flounder (*Glyptocephalus cynoglossus*)	X			
Yellowtail flounder (*Limanda ferruginea*)	X	X		
Skate Species	**E**	**L**	**J**	**A**
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Invertebrate Species	**E**	**L**	**J**	**A**
Atlantic surf clam (*Spisula solidissima*)	n/a	n/a		
Long finned squid (*Loligo pealeii*)	n/a	n/a		
Ocean quahog (*Arctica islandica*)	n/a	n/a		
Short finned squid (*Illex illecebrosus*)	n/a	n/a		
Shark Species		**EJ**	**LJ**	**A**
Blue shark (*Prionace glauca*)		X		X
Dusky shark (*Carcharhinus obscurus*)		X	X	
Sand tiger shark (*Carcharias taurus*)		X		

Species	Life Stage			
Sandbar shark (*Carcharhinus plumbeus*)		X	X	X
Shortfin mako shark (*Isurus oxyrinchus*)		X	X	
Tiger shark (*Galeocerdo cuvieri*)		X	X	
White shark (*Carcharodon carcharias*)			X	

Source: USDOC 1999a.
Key: E = eggs, L = larvae, J = juveniles, A = adults
For sharks: EJ = early juvenile, LJ = late juvenile, A = adults
"n/a" for scup and black sea bass indicates that there is insufficient data for the egg and larvae life stages, and no EFH designation has been made as of yet, and, "n/a" for long finned squid, short finned squid, surf clam, and ocean quahog which are referred to as pre-recruits and recruits corresponds with juveniles and adults in the table

Table 2. EFH-Designated Species and Life History Stages in Borrow Area 5b

Species	Life Stage			
Bony Fish Species	**E**	**L**	**J**	**A**
Atlantic butterfish (*Peprilus triacanthus*)	X	X	X	X
Atlantic salmon (*Salmo salar*)				X
Atlantic sea herring (*Clupea harengus*)		X	X	
Atlantic mackerel (*Scomber scombrus*)	X	X	X	X
Black sea bass (*Centropristis striata*)	n/a			X
Bluefin tuna (*Thunnus thynnus*)			X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
Haddock (*Melanogrammus aeglefinus*)		X		
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Monkfish (*Lophius americanus*)	X	X		
Red hake (*Urophycis chuss*)	X	X	X	
Scup (*Stenotomus chrysops*)	n/a	n/a	X	X
Skipjack tuna (*Katsuwonus pelamis*)				X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Summer flounder (*Paralichthys dentatus*)	X	X	X	X
Whiting (*Merluccius bilinearis*)	X	X	X	
Windowpane (*Scophthalmus aquosus*)	X	X	X	X
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Witch flounder (*Glyptocephalus cynoglossus*)	X			
Yellowtail flounder (*Limanda ferruginea*)	X	X		
Skate Species	**E**	**L**	**J**	**A**
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Invertebrate Species	**E**	**L**	**J**	**A**
Atlantic surf clam (*Spisula solidissima*)	n/a	n/a		
Long finned squid (*Loligo pealeii*)	n/a	n/a		
Ocean quahog (*Arctica islandica*)	n/a	n/a		
Short finned squid (*Illex illecebrosus*)	n/a	n/a		
Shark Species		**EJ**	**LJ**	**A**
Blue shark (*Prionace glauca*)		X		X
Dusky shark (*Carcharhinus obscurus*)		X	X	

Species	Life Stage			
Sand tiger shark (*Carcharias taurus*)		X		
Sandbar shark (*Carcharhinus plumbeus*)		X	X	X
Shortfin mako shark (*Isurus oxyrinchus*)		X	X	
Tiger shark (*Galeocerdo cuvieri*)		X	X	
White shark (*Carcharodon carcharias*)			X	

Source: USDOC 1999a.
Key: E = eggs, L = larvae, J = juveniles, A = adults
For sharks: EJ = early juvenile, LJ = late juvenile, A = adults
"n/a" for scup and black sea bass indicates that there is insufficient data for the egg and larvae life stages, and no EFH designation has been made as of yet, and, "n/a" for long finned squid, short finned squid, surf clam, and ocean quahog which are referred to as pre-recruits and recruits corresponds with juveniles and adults in the table

4.1.1. Bony Fishes

Atlantic butterfish (*Peprilus triacanthus*)
Borrow Area 2C: All Stages
4C Borrow Area and 5b: All Stages

Primary Source: EFH Source Document by Cross et al. (1999)

All life stages are listed for Atlantic butterfish in the 10' by 10' squares for both borrow areas. Butterfish are relatively small, fast-growing, short-lived, pelagic fish that form loose schools, often near the surface. Juveniles and adults are common in inshore areas, including the surf zone, as well as in sheltered bays and estuaries in the Mid-Atlantic Bight (MAB) during the summer and fall. Juveniles and adults are eurythermal and euryhaline, and are frequently found over sand, mud, and mixed substrates. Smaller juveniles often aggregate under floating objects and often live in the shelter of large jellyfish. Juvenile and adult butterfish in the MAB are typically found at depths ranging from 3 to 23 meters with water temperatures ranging from 8 to 26°C, salinities ranging from 19 to 32 ppt, and DO ranging from 3 to 10 mg/l. Butterfish eggs are buoyant and the larvae are nektonic.

Project Area: Juvenile and adult butterfish are common inhabitants of the water column in shallow water over sandy substrates in the MAB in the summer and fall and are therefore likely to occupy the project area during those seasons. However, butterfish are pelagic and even juveniles are highly mobile. In addition the dredging activities would be conducted in the late fall, winter and spring when Atlantic butterfish would less likely to be present. Therefore, no more than minimal impact to butterfish EFH is expected to occur as a result of the dredging activities associated with the proposed Project.

Atlantic salmon (*Salmo salar*)
Borrow Area 2C: Adult
Western 4C Borrow Area and 5B: Adult

Primary Source: Page and Burr (1991)

Adult Atlantic salmon are listed in the 10' by 10' squares for both borrow areas. This species can be found in the temperate and arctic zones of the Atlantic Ocean in northern hemisphere. In the western Atlantic, they are distributed in coastal drainages from northern Quebec, Canada, to Connecticut, USA. In the eastern Atlantic, they are found in drainages from the Baltic States to Portugal. Accounts of landlocked stocks have been documented in Russia, Finland, Sweden, Norway, and North America. Atlantic salmon typically inhabit cooler waters (< 25°) with strong to moderate flow. Young remain in freshwater for 1 to 6 years, migrate to the ocean, and reside there for 1 to 4 years before returning to the river of their origin to spawn. After spawning, they return to sea. A diurnal species, juveniles feed mainly on aquatic insects, mollusks, crustaceans and fish, and adults at sea feed mainly on squid, shrimp, and fish. Adults approaching the reproductive stage do not feed once they enter the freshwater environment.

Project Area: These life stages of Atlantic salmon prefer colder waters (< 25°) and are generally observed in pelagic areas from Long Island Sound to the Gulf of Maine, which is outside the proposed dredging/nourishment areas. Therefore, little to no impact on Atlantic salmon or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Atlantic sea herring (*Clupea harengus*)
Borrow Area 2C: Juvenile, Adult
4C Borrow Area and 5B: Larvae, Juvenile

Primary Source: EFH Source Document by Stevenson and Scott (2005) –

Adult and juvenile Atlantic sea herring are listed in the 10’ by 10’ square for Borrow Area 2C and larvae and juveniles are listed for the 4C Borrow Area. The Atlantic herring is a small, pelagic, schooling, plankton-feeding species that inhabits both sides of the North Atlantic Ocean. Adult Atlantic sea herring migrate south into southern New England and mid-Atlantic shelf waters in the winter after spawning in the Gulf of Maine, on Georges Bank, and Nantucket Shoals. Juvenile and adult herring are abundant in coastal and mid-shelf waters from southern New England to Cape Hatteras in the winter and spring. In the spring, adults return north, but juveniles do not undertake coastal migrations. Larval herring are limited almost exclusively to Georges Bank and the Gulf of Maine waters. Larvae typically metamorphose the following spring into young-of-year (YOY) juveniles.

Project Area: Atlantic herring are pelagic species. During these life stages, Atlantic herring prefer higher salinities (26–32 ppt) and juveniles and adults (including spawning adults) are typically found at depths (15–130 meters) considerably deeper than the project depth. Therefore, no more than minimal impact on Atlantic sea herring or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Atlantic Mackerel (*Scomber scombrus*)
Borrow Area 2C: All Stages
4C Borrow Area and 5B: All Stages

Primary Source: EFH Source Document by Studholme, et. al. (1999)

All life stages of Atlantic mackerel are listed in the 10’ by 10’ squares for both borrow areas. Atlantic mackerel are a fast swimming, pelagic schooling species that are distributed over the western Atlantic ocean in primarily open water. All life stages of this species are pelagic. EFH for this species is mostly pelagic waters over the Continental Shelf with salinities of greater than 25 ppt. However, Atlantic mackerel may be found in estuarine seawater zones. Juveniles may be found at varying levels of abundance in bays and estuarine areas from New Jersey north to Canada, and juveniles and adults are common in saline waters of the Hudson-Raritan estuary in the spring and fall. Atlantic mackerel are intolerant of temperatures below 5-6^{o}C or above 15-16^{o}C and undergo substantial seasonal migrations in response to changes in seawater temperature. In the fall Atlantic mackerel migrate to deeper offshore waters and return to inshore waters in the spring. Atlantic mackerel are opportunistic feeders that either select individual prey organisms or feed by filtering planktonic prey organisms when they are abundant. Juveniles eat mostly small crustaceans such as copepods, amphipods, mysid shrimp, and decapod larvae. They also feed on small pelagic mollusks (*Spiratella* and *Clione*) when available. Adults feed on the same food as juveniles but on a wider assortment of organisms and larger prey items. For example, euphausid, pandalid, and crangonid shrimp are common prey; chaetognaths, larvaceans, pelagic polychaetes and larvae of many marine species have been identified in Atlantic mackerel stomachs. Larger prey such as squid and a variety of fishes (silver hake, sand lance, herring, hakes, and sculpins) are not uncommon, especially for large Atlantic mackerel.

Project Area: In the fall Atlantic mackerel migrate to deeper offshore waters and would most likely not be present when in the dredging activities are to be conducted. All life stages of the Atlantic mackerel are pelagic and no more than minimal impact on Atlantic mackerel EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Black sea bass (*Centropristis striata*)
Borrow Area 2C: Larvae, Adult
4C Borrow Area and 5B: Adult

Primary Source: EFH Source Document by Drohan et al. (2007)

Adult black sea bass are usually strongly associated with structured, sheltering habitats such as reefs and ship wrecks on the continental shelf. Their distribution changes seasonally as fish migrate from coastal areas to the outer continental shelf while water temperatures decline in the fall and from the outer shelf to inshore areas as water temperatures rise in the spring. Adult sea bass are very structure oriented, especially during their summer coastal residency. Adults only enter larger estuaries and are most abundant along the outer Atlantic coast. Larger fish tend to be found in deeper water than smaller fish. Adults on the Atlantic coast occupy waters greater than 65 ft MLW in the fall and 260 to 460 ft MLW in the winter and spring. Spawning occurs on the continental shelf, beginning in the spring off Cape Hatteras and progressing into the fall in the MAB and off southern New England. When larvae reach 10 to 16 mm total length (TL), they tend to settle and become demersal on structured inshore habitat such as sponge beds. In the MAB, recently settled juveniles move into coastal estuarine nursery areas between July and September. The estuarine nursery habitat of YOY black sea bass is relatively shallow, hard bottom with some kind of natural or man-made structure including amphipod tubes, eelgrass, sponges, and shellfish beds with salinities above 8 ppt. Black sea bass do not tolerate cold inshore winter conditions. Following an overwintering period presumably spent on the continental shelf, older juveniles return to inshore estuaries in late spring and early summer. They are uncommon in open, unvegetated, sandy intertidal flats or beaches.

Project Area: Due to the absence of three-dimensional structures in the borrow areas adult black sea bass are unlikely to occupy the borrow areas in significant numbers. Black sea bass migrate to deeper waters on the outer continental shelf in the fall and return in the spring and would likely to not be present during the time of the dredging activities. Therefore, no more than minimal impact on black sea bass or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Bluefin tuna (*Thunnus thynnus*)
Borrow Area 2C: Juvenile, Adult
4C Borrow Area and 5B: Adult

Source: Colette and Nauen (1983)

Adult and juvenile bluefin tuna are listed in the 10’ by 10’ square for Borrow Area 2C and adults are listed for the 4C Borrow Area. Juvenile bluefin tuna are a migratory pelagic species. In the western North Atlantic, bluefin tuna migrate seasonally from spring spawning grounds in the Gulf of Mexico to summer feeding grounds off the northeast U.S. coast. Bluefin tuna often occur over the continental shelf and in embayments, particularly during the summer months when they feed actively on herring, mackerel, and squids. Juveniles and adults are typically found in inshore and pelagic surface waters warmer than 12°C from the Florida to Maine.

Project Area: The dredging activities are proposed during the fall, winter and spring seasons when juvenile and adult bluefin tuna would not be present in the borrow areas. Therefore, little to no impact on bluefin tuna or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Bluefish (*Pomatomus saltatrix*)
Borrow Area 2C: Juvenile, Adult
4C Borrow Area and 5B: Juvenile, Adult

Source: EFH Source Document by Shepherd and Packer (2006)

Juvenile and adult life stages are listed for bluefish are listed in the 10’ by 10’ squares for both borrow areas. Bluefish are a pelagic species that travel in schools of like-sized individuals and undertake seasonal migrations, moving into the MAB during spring and south or farther offshore during fall. Within the MAB they occur in large bays and estuaries as well as across the entire continental shelf. Bluefish spawn offshore in open ocean waters. Juvenile bluefish are found in estuaries, bays, and coastal ocean waters in the MAB and South Atlantic Bight in many habitats. Typically they are found near shorelines, including the surf zone, during the day and in open waters at night. Like adults, they are active swimmers and feed on small forage fishes, which are commonly found in nearshore habitats. They remain inshore in water temperatures up to 30°C and return to the continental shelf in the fall when water temperatures reach approximately 15°C. Juvenile bluefish are associated mostly with sand, but are also found over silt and clay bottom substrates. They usually occur at salinities of 23 to 33 ppt, but can tolerate salinities as low as 3 ppt. Adults are generally oceanic but are found near shore as well as offshore. Adults usually prefer warm water (at least 14 to 16°C) and full salinity. Juveniles and adults are present in the fall and prefer depths greater than 35 ft MLW. Eggs and larvae are present in the MAB during the summer and are more commonly found at depths greater than 100 ft MLW.

Project Area: Juvenile and adult bluefish are pelagic species and are expected to occupy the water column of the project area between the spring, summer and fall. Bluefish eggs and larvae would are not expected to occur in the project area. The dredging activities are proposed during the fall, winter and spring seasons when juvenile and adult bluefish would less likely to be present in the borrow areas. Therefore, no more than minimal impact to bluefish or EFH within the project area is expected to occur as a result of the dredging activities associated with the proposed Project.

Cobia (*Rachycentron canadum*)
Borrow Area 2C: All stages
4C Borrow Area and 5B: All stages

Primary Sources: Richards (1967), National Audubon Society (1983)

All life stages for cobia are listed in the 10’ by 10’ squares for both borrow areas. Cobia is a southern species that overwinters near the Florida Keys and migrates in the spring and summer to the mid-Atlantic states to spawn. Adults are rarely found as far north as Massachusetts. EFH for this species is the South Atlantic and mid-Atlantic Bights. Cobia prefer coastal waters to the edge of the Continental Shelf and along the edge of the Gulf Stream around sandy shoals, offshore bars, high profile rock bottoms, barrier island ocean-side waters and coastal inlets. EFH for cobia has also been designated within high salinity bays, estuaries and seagrass habitat. Cobia are found in water temperatures that are greater than 20°C.

Project Area: Cobia are pelagic, warm water species and would only be found in the project area during the summer. This species is mobile, not demersal and, therefore, adults and juveniles would not subject to potential entrainment. The project area is the northern temperature limit for this species, therefore an occasional adult cobia may occur in the borrow areas during the summer, but other life history stages of this species are not likely to be found at the project area. The dredging activities are proposed during the fall, winter and spring seasons when the water temperatures are too cold for cobia to be present. Therefore, little to no impact to cobia or EFH is expected as a result of the proposed dredging activities associated with proposed Project.

King and Spanish mackerel (*Scomberomorus cavalla* and *S. maculatus*)
Borrow Area 2C: All stages
4C Borrow Area and 5B: All stages

Primary Sources: Godcharles and Murphy (1986), Collette and Nauen (1983)

All life stages are listed for the King and Spanish mackerels are listed in the 10' by 10' squares for both borrow areas. King and Spanish mackerels are highly migratory, epipelagic, neritic fish that migrate north from Florida as far as the Gulf of Maine in the summer and fall. King mackerel spawn in coastal waters of the Gulf of Mexico and off the South Atlantic coast. Thus, only a few adults of this species would be expected to inhabit MAB coastal waters. In contrast, Spanish mackerel spawn as far north as Sandy Hook and Long Island in late August to late September. King and Spanish mackerel are found in water temperatures that are greater than 20°C.

Project Area: Due to the migratory and epipelagic nature of the Spanish and king mackerels and their regional distribution pattern, it is unlikely that adult Spanish and king mackerels will pass through the project area, and occurrences of early life stages of these species would be rare in the project area. The dredging activities are proposed during the fall, winter and spring seasons when the water temperatures are too cold for king and Spanish mackerel to be present. Therefore, little to no impact to king and Spanish mackerel or EFH is expected as a result of the proposed dredging activities associated with proposed Project.

Monkfish (*Lophius americanus*)
Borrow Area 2C: Eggs, Larvae
4C Borrow Area and 5B: Eggs, Larvae

Primary Source: EFH Source Document by Steimle et al. (1999a)

The egg and larvae life stages of the monkfish (also known as goosefish) are listed in the 10' by 10' squares for both borrow areas. Monkfish are solitary fish that make seasonal onshore–offshore migrations in response to water temperature and can be found over a variety of substrates. Monkfish egg and larval life stages were noted to occur in the two 10' by 10' minute squares where the borrow areas are located. Spawning locations are not well known but are thought to be on inshore shoals and in offshore SNE, MAB, and Gulf of Maine shelf waters. Monkfish eggs are contained in long mucus veils that float at or near the surface between March and September and are found in waters ranging from 15 to 1000 m deep. They are rarely collected in surveys but have been reported in open coastal bays and sounds (*e.g.*, Long Island Sound) in low numbers. Monkfish larvae are a common component of the ichthyoplankton community in the MAB and southern New England (SNE) areas. Larvae have been collected in offshore waters in the MAB during March and April and are most often observed in water depths between 25 and 1000 m. Larvae have been found off southern New Jersey, south of Long Island, in the MAB at depths of 30 to 300 ft MLW, and off SNE.

Project Area: Based on their range of habitat utilization, and that these life stages are not typically found in waters of depths < 15 meter. The dredging activities are proposed during the fall, winter and spring seasons when the likelihood of monkfish eggs and larvae occurring in the borrow areas is minimal. Therefore, no more than minimal impact on monkfish or EFH is anticipated as a result of the proposed dredging activities associated with proposed Project.

Pollock (*Pollachius virens*)
Borrow Area 2C: Juvenile
4C Borrow Area and 5B: not present

Primary Source: EFH Source Document by Cargnelli et al. (1999b)

Juvenile pollock are listed in the 10' by 10' square for Borrow Area 2C. EFH for this species includes the waters from the Gulf of Maine south to New Jersey. This demersal species prefers colder (<18°C) pelagic waters and are observed from surface depths to 365 meters. Individuals normally spend their first two years in nearshore coastal waters and then migrate out to deeper waters. Juvenile pollock are found over a variety of bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks. Juveniles feed primarily on crustaceans with nematodes, fish and annelids also making up a portion of their diet.

Project Area: Juvenile pollock will likely occupy Borrow Area 2C when water temperatures are less than 18°C. The dredging activities are proposed during the fall, winter and spring seasons when juvenile pollock are likely to be present. This species is heavily fished commercially and has demonstrated ongoing resilience therefore, no more than minimal impact on pollock or EFH is anticipated to occur within the proposed project area.

Red hake (*Urophycis chuss*)
Borrow Area 2C: Eggs, Larvae, Juvenile
4C Borrow Area and 5B: Eggs, Larvae, Juvenile

Primary Source: EFH Source Document by Steimle et al. (1999b)

Red hake eggs, larvae and juveniles are listed in the 10' by 10' squares for both borrow areas. Red hake occur in continental waters from the Gulf of St. Lawrence to the mid-Atlantic States. Red hake spawn offshore in the MAB in the summer, primarily in southern New England. The distribution of eggs is unknown because they cannot be distinguished from other hakes. However, EFH for eggs is defined as surface temperatures less than 10°C and salinity less than 25 ppt. Hake eggs are buoyant and are common in the upper water column of the MAB from May to November with peaks in June and July. Red hake larvae are a dominant species in the ichthyoplankton in the middle to outer continental shelf of the MAB during the summer at temperatures of 8 to 23°C and depths between 10 and 200 m. After larvae metamorphose into juveniles they are pelagic for about two months before settling to the bottom. Demersal settlement generally occurs between September and December with peaks in October to November. Juveniles are found in bottom environments and are commonly associated with scallops, surf clam shells, and seabed depressions where they seek shelter. Red hake juveniles are typically found in water temperatures below 16° C, depths less than 100 meters and a salinity range from 31 to 33‰. Adults prefer depths from 100 to 425 ft and temperatures between 2 to 22°C. Adults are typically associated with sand-mud bottom in holes and depressions. Both juveniles and adults make seasonal migrations in response to changes in water temperatures.

Project Area: Although red hake eggs (including eggs of other hake species) are found in the project area from May to November they are buoyant and would therefore not be present on the bottom where the dredging activities would take place. Red hake larvae are pelagic and would also not be present on the bottom where the dredging activities would take place. Juvenile red hake would be present in the bottom habitats during the time of year when the dredging activities are proposed and could therefore be impacted by the dredging activities.

Scup (*Stenotomus chrysops*)
Borrow Area 2C: Juvenile, Adults
4C Borrow Area and 5B: Juvenile, Adults

Source: EFH Source Document by Steimle et al. (1999c)

The juvenile and adult life stages for scup are listed in the 10’ by 10’ squares for both borrow areas. Scup spawn along the inner continental shelf from Delaware Bay to SNE between May and August, mainly in bays and sounds in and near SNE. YOY juveniles are commonly found from the intertidal zone to depths of about 30 m in portions of bays and estuaries where salinities are above 15 ppt. Juvenile scup appear to use a variety of coastal intertidal and subtidal sedimentary habitats during their seasonal inshore residency, including sand, mud, mussel beds, and eelgrass beds. Adult scup are common residents in the MAB from spring to fall and are generally found in schools on a variety of habitats, from open sandy bottom to structured habitats such as mussel beds, reefs or rough bottom. Larger adults are found in deeper waters while smaller sized adults are typically found in bays and estuaries. Adults move inshore during early May and June between Long Island and Delaware Bay. As inshore water temperatures decline to < 8 to 9°C adult and juvenile scup leave inshore waters and move to warmer waters on the outer continental shelf south of the Hudson Canyon off New Jersey and along the coast from south of Long Island to North Carolina in depths ranging from 75- 185 m. Both juvenile and adults are demersal but have also been observed at the water surface.

Project Area: Adult and juvenile scup would be found in the borrow areas during the warmer seasons but migrate offshore to deeper waters when the water temperature falls. The dredging activities are proposed during the fall, winter and spring seasons when juvenile and adult scup are less likely to be present. Therefore, no more than minimal impact on scup or EFH is anticipated as a result of the proposed project.

Skipjack tuna (*Katsuwonus pelamis*)
Borrow Area 2C: Adults
4C Borrow Area and 5B: Adults

Source: Colette and Nauen (1983)

Adult skipjack tuna are listed in the 10’ by 10’ squares for both borrow areas. Skipjack tuna are a highly migratory, circumglobal pelagic fish that inhabit tropical and warm-temperate waters and are generally limited by the 15°C isotherm. Skipjack tuna are often found in mixed schools with bluefin tuna of the same size. Like bluefin tuna, skipjack tuna often occur over the continental shelf and in embayments, particularly during the summer months when they feed actively on herring, mackerel, and squid. In the MAB, adults typically occur in pelagic waters where water temperatures range from 20 to 31°C.

Project Area: Skipjack tuna are highly migratory and pelagic, and may be present in the project area during the warmer summer months when the water temperature is above 20°C. The dredging activities are proposed during the fall, winter and spring seasons when adult skipjack tuna are not likely to be present. Therefore no impact on skipjack tuna or EFH is anticipated as a result of the proposed project.

Summer flounder (*Paralichthys dentatus*)
Borrow Area 2C: Larvae, Juvenile, Adults
4C Borrow Area and 5B: All stages

Primary Source: EFH Source Document by Packer et al. (1999)

Larvae, juvenile and adult summer flounder are listed in the 10' by 10' square for Borrow Area 2C and all life stages are listed for the 10' by 10' square for the 4C Borrow Area. Summer flounder exhibit strong inshore–offshore movements with adult and juveniles normally inhabiting shallow coastal and estuarine waters during the warmer months of the year and moving offshore during the fall and winter. Summer founder eggs are planktonic and buoyant. Summer flounder eggs were collected in the highest numbers from fall to early winter. Planktonic larvae and post-larvae derived from offshore fall and winter spawning migrate inshore, entering coastal and estuarine nursery areas to complete transformation. Juveniles are distributed inshore and occupy many estuaries during spring, summer, and fall. Some juveniles remain inshore for an entire year before migrating offshore, while others move offshore in the fall and return the following spring. Juvenile summer flounder utilize several different estuarine habitats such as marsh creeks, seagrass beds, mud flats, and open bay areas. As long as other conditions are favorable, substrate preferences and prey availability are the most important factors affecting distribution. Some studies indicate that juveniles prefer mixed or sandy substrates, others show that mud and vegetated habitats are used. Adults are reported to prefer sandy habitats, but can be found in a variety of habitats with both mud and sand substrates. Habitat areas of particular concern (HAPC) for summer flounder include, "All native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH is HAPC. If native species of SAV are eliminated then exotic species should be protected because of functional value, however, all efforts should be made to restore native species."

Project Area: Given their association with sandy substrates and the fact that they feed on a variety of bottom-dwelling invertebrates and fish species that occupy the project area, juvenile and adult summer flounder are expected to occupy the project area during the late spring, summer and fall. Early stage juveniles may be present year round. Older juveniles and adults are wary and very capable of high degrees of mobility and would likely avoid the dredge by swimming away. Small juveniles tend to seek protection in structure or by "hiding in plain sight" via cryptic coloration. Juveniles in the path of the dredge might be impacted. Because the project area does not offer SAV or other types of cover large numbers of early stage juveniles are not expected. Therefore, no more than minimal impact on summer flounder or EFH is anticipated as a result of the proposed dredging activities associated with proposed Project.

Whiting (*Merluccius bilinearis*)
Borrow Area 2C: Eggs, Larvae, Juvenile
4C Borrow Area and 5B: Eggs, Larvae, Juvenile

Primary Source: EFH Source Document by Lock and Packer (2004)

Egg, larval and juvenile life stages for whiting are listed for the 10' by 10' squares for both borrow areas. Whiting, or silver hake, spawn on the outer continental shelf where eggs and larvae are primarily found in surface waters. Primary spawning grounds apparently occur between Cape Cod and Montauk Point, New York, on the southeastern slope of Georges Bank, and in Massachusetts Bay. Significant egg production occurs during May to October, with a peak in August. Whiting eggs are pelagic and hatch in about two days. Juveniles are common during spring and summer in relatively shallow waters in SNE and south of Long Island. Coastal waters off New Jersey, Long Island, and Rhode Island are centers of abundance in the fall. During spring and summer, whiting move into nearshore waters in the Gulf of Maine, to the northern edge of Georges Bank, and northward in the Middle Atlantic Bight. Juvenile and adult whiting migrate to deeper waters of the continental shelf as water temperatures decline in the autumn and return to shallow waters in spring and summer to spawn. The pattern for juveniles is similar to adults in general distribution and movements, except that the centers of juvenile abundance occur in shallower waters. Generally, the following conditions exist where most whiting juveniles are found: water temperatures below 21° C, depths between 20 and 270 meters and salinities greater than 20‰. Juveniles as well as adults utilize bottom habitats of all substrate types.

Project Area: Eggs and larvae are typically dispersed in deeper water, and therefore are not likely to occur in the project area in significant numbers. Based on their range of habitat utilization, juvenile whiting can be expected to occupy the bottom habitats in project area in the spring and summer. The dredging activities are proposed during the fall, winter and spring seasons when juvenile whiting would be less likely to be present in the project area. Therefore, no more than minimal impact on whiting or EFH is anticipated as a result of the dredging activities associated with proposed Project.

Windowpane flounder (*Scophthalmus aquosus*)
Borrow Area 2C: All stages
4C Borrow Area and 5B: All stages

Primary Source: EFH Source Document by Chang et al. (1999)

All life stages for windowpane flounder are listed in the 10' by 10' squares for both borrow areas. Windowpane flounder are a shallow water mid- and inner-shelf species found primarily between Georges Bank and Cape Hatteras on bottom habitats with a substrate of mud or fine grained sand. Spawning occurs on inner shelf waters, including many coastal bays and sounds, and on Georges Bank. Windowpane flounder eggs and larvae are often observed in the MAB from February to November with peaks in May and October. Windowpane eggs are buoyant and are found in surface waters. Larvae are initially planktonic then settle to the bottom. Juveniles and adults are similarly distributed. They are found in most bays and estuaries south of Cape Cod throughout the year at depths less than 100 meters, bottom temperatures (3 to 12°C in the spring and 9 to 12°C in the fall), and salinities (5.5 to 36 ppt). Juveniles that settle in shallow inshore waters move to deeper offshore waters as they grow. Adults occur primarily on sand substrates off SNE and MAB. Juveniles and adults are common in the MAB throughout the year. YOY and older juveniles are common within 100 ft of shore.

Project Area: Juvenile and adult windowpane are commonly found on shallow, sandy substrates and are expected to occupy the project area throughout the year. Since this species spawns in inner shelf and nearshore waters, eggs and larvae are expected be found in the project area at all time of the year except during the winter. Smaller, YOY juveniles prefer shallow water, and therefore are less likely to occupy the project area than adults and older juveniles. No more than minimal impact to windowpane or EFH within the project area is expected to occur as a result of the dredging activities associated with the proposed Project.

Winter flounder (Pseudopleuronectes americanus)
Borrow Area 2C: All stages
4C Borrow Area and 5B: All stages

Primary Source: EFH Source Document by Pereira et al. (1999)

All life stages for winter flounder are listed in the 10' by 10' squares for both borrow areas. Winter flounder are a small-mouthed, right-eyed flounder that is a valuable commercial and recreational species. They are found in the northwest Atlantic coast from Labrador to Georgia. Winter flounder spawning occurs from late winter through early spring, peaking south of Cape Cod in February and March. The eggs of the winter flounder are typically found at depths of less than five meters in bottom habitats in a broad range of salinity (10–30 ppt), with seasonal abundance from January to May. Eggs are adhesive and demersal and are deposited on a variety of substrates, but sand is the most common; they have been found attached to vegetation and on mud and gravel. The larvae of the winter flounder are typically found at depths of less than six meters in pelagic and bottom waters in a broad range of salinity (10–30 ppt), with seasonal abundance from March to July. Larvae are negatively buoyant and nondispersive; they sink when they stop swimming. Thus, recently settled YOY juveniles are found close to spawning grounds and in high concentrations in depositional areas with low current speeds. YOY juveniles migrate very little in the first summer, move to deeper water in the fall, and remain in deeper cooler water for much of the following year. Habitat utilization by YOY is not consistent across habitat types and is highly variable among systems and from year to year. Several field and lab studies suggest a "preference" for muddy/fine sediment substrates where they are most likely to have been deposited by currents. Adult winter flounder prefer temperatures of 12 to 15° C; DO concentrations greater than 2.9 mg/l, and salinities above 22 ppt, although they have been shown to survive at salinities as low as 15 ppt. Mature adults are found in very shallow waters during the spawning season.

Project Area: The sandy habitat of the borrow areas may provide suitable spawning habitat for this species. In addition, winter flounder would also spawn on the neighboring shoal areas. Due to their range of habitat utilization, juveniles may also be found in the borrow areas throughout the year. Adults are expected to occupy the borrow areas during the fall, winter, and spring, and migrate offshore during the summer. Winter flounder would be expected to be present on the bottom habitats while dredging activities are proposed to take place. Adults and larger juveniles may be able to avoid the hydraulic dredge by swimming away. However, if present, eggs and larvae would most likely be entrained by the hydraulic dredge.

Yellowtail flounder (*Limanda ferruginea*)
Borrow Area 2C: Eggs, Adults
4C Borrow Area and 5B: Eggs, Larvae

Primary Source: EFH Source Document by Johnson et al. (1999)

Eggs and adult yellowtail flounder are listed in the 10' by 10' square for Borrow Area 2C and eggs and larvae are listed for the 10' by 10' square for the 4C Borrow Area. The yellowtail flounder is a small-mouthed, thin bodied fish that inhabits waters along the Atlantic coast of North America from the Gulf of St. Lawrence, Labrador, and Newfoundland to the Chesapeake Bay. Yellowtail flounder occupy continental shelf bottom environment on the Atlantic coast between depths typically being from 20 to 50 meters. Adults prefer sand or sand–mud sediments. Spawning takes place from March through August, but occurs during March to May in the MAB. Generally, the following conditions exist where yellowtail eggs are found: sea surface temperatures below 15° C, water depths from 30 to 90 meters and a salinity range from 32.4 to 33.5 ppt. Yellowtail flounder eggs are most often observed during the months from mid-March to July, with peaks in April to June in southern New England. Eggs are buoyant, spherical and are pelagic. Larvae are initially pelagic then become benthic.

Project Area: Based on their range of habitat utilization, yellowtail flounder eggs and larvae and adults could occur in the project areas. Yellowtail flounder would be expected to be present on the bottom habitats while dredging activities are proposed to take place. Adults and larger juveniles may be able to avoid the hydraulic dredge by swimming away. However, if present, eggs and larvae would most likely be entrained by the hydraulic dredge.

4.1.2 Cartilaginous Fishes

Little skate (*Leucoraja erinacea*)
Borrow Area 2C: Juvenile, Adult
4C Borrow Area and 5B: Juvenile, Adult

Primary Source: EFH Source Document by Packer et al. (2003a)

Juvenile and adult little skate life stages are listed in the 10' by 10' squares for both borrow areas. Little skate occurs from Nova Scotia to Cape Hatteras and is one of the dominant members of the demersal fish community of the northwest Atlantic. Little skate are generally found on sandy or gravelly bottoms, but also occur on mud. The species generally makes no extensive migrations, though when it occurs in inshore areas they may move between inshore and offshore areas with seasonal temperature changes. This species is known to remain buried in depressions during the day and are more active at night. Overall depth preference of this species is 1 to 130 meters ft with a water temperature range between 2 to 15°C. Bottom trawls conducted by NMFS from the Gulf of Maine to Cape Hatteras from 1963 to 2002 resulted in juveniles most commonly found between 8 and 16°C and salinities at 32 to 33 ppt. Results from these trawls indicated that adults were most commonly found between 4 and 16°C in the spring and 9 and 14°C in the fall, and salinities at 32 to 33 ppt. This species has been observed to leave some estuaries for deeper water during warmer months. Eggs are generally deposited in sandy bottoms, usually at depths less than 100 meters.

Project Area: Based on the habitat utilization of this species, juvenile and adult little skate are expected to occur throughout the project area. Adults and larger juveniles will most likely be able to avoid the hydraulic dredge by swimming away. Given the abundance of little skate that resides off shore impact to little skate and EFH is expected to be no more than minimal to moderate.

Winter skate (*Leucoraja ocellata*)
Borrow Area 2C: Juvenile, Adult
4C Borrow Area: Juvenile, Adult

Primary Source: EFH Source Document by Packer et al. (2003b)

Juvenile and adult winter skate life stages are listed in the 10' by 10' squares for both borrow areas. Similar to the little skate, winter skate are generally found on sandy or gravelly bottoms, but also occur in mud. This species remains buried in depressions during the day and are most active at night. This species has been captured in a wide range of depths and over a water temperature range of -1.2 to 19°C. During the winter months, captures off the coast of the mid-Atlantic typically occur when water temperatures range from 10 to 12°C. Winter skate are found in saline waters, with adults in water with salinities greater than 30 ppt and juveniles found in slightly less saline waters, generally around 25 to 30 ppt. Females with developed egg cases are found in summer and fall, though reproduction may possibly occur throughout the year. Eggs are deposited in sandy or muddy flats.

Project Area: Based on the habitat utilization of this species, juvenile and adult winter skate are expected to occur throughout the project area. Adults and larger juveniles will most likely be able to avoid the hydraulic dredge by swimming away. Given the abundance of winter skate that resides off shore impact to winter skate and EFH is expected to be no more than minimal to moderate.

Blue shark (*Prionace glauca*)

Borrow Area 2C: Early Juvenile, Late Juvenile, Adult

4C Borrow Area and 5B: Early Juvenile, Adult

Source: USDOC (1999b) and Compagno (1984)

Early juvenile, late juvenile and adult life stages for the blue shark are listed in the 10' by 10' squares for both borrow areas. Blue shark is an oceanic–epipelagic, fringe–littoral, cosmopolitan species, occurring throughout the tropical, subtropical, and temperate open waters. Atlantic blue sharks are highly migratory with a regular clockwise trans-Atlantic migration route following the warm Gulf Stream waters. The general range of blue shark is from Argentina to Newfoundland in the western Atlantic. The temperature preference of blue shark is between 7 to 18°C.

Project Area: EFH is designated within the project grid for blue shark early juveniles, late juveniles, and adults. Blue sharks are a pelagic, highly mobile species and will most likely be able to avoid the hydraulic dredge. Therefore, little to no impact to blue shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Dusky Shark (*Carcharhinus obscurus*)

Borrow Area 2C: Early Juvenile, Late Juvenile

4C Borrow Area: Early Juvenile, Late Juvenile

Source: USDOC (1999b) and Compagno (1984)

Early juvenile and late juvenile life stages for the dusky shark are listed in the 10' by 10' squares for both borrow areas. The dusky shark is a large, highly migratory species that is common in warm and temperate continental waters throughout the world. Although nursery areas are in coastal waters, dusky sharks do not prefer areas with reduced salinities and tend to avoid estuaries. Dusky sharks are viviparous. Females move inshore to drop their young and then return to deeper water.

Project Area: Although migratory and pelagic, dusky sharks spawn in nearshore waters, and therefore juveniles may occur in the project area. Juvenile dusky sharks are a mobile species and will most likely be able to avoid the hydraulic dredge. No more than minimal impact to dusky shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Sand tiger shark (*Carcharias taurus*)

Borrow Area 2C: Early Juvenile

4C Borrow Area and 5B: Early Juvenile

Source: Compagno (1984) and USDOC (1999b)

The early juvenile life stage for the sand tiger shark is listed in the 10' by 10' squares for both borrow areas. Sand tiger sharks are commonly found in coastal embayments and nearshore waters from the surf zone to the outer continental shelves from the surface to a minimum of 600 ft. This species exhibits a preference for near-bottom habitats but often occurs in midwater or surface zones. Sand tiger sharks typically feed on bony fishes, small sharks, rays, squids, crabs, and lobsters. EFH for early juveniles (≤125 cm) is shallow coastal waters to 25 meters deep from Barnegat Inlet, NJ south to Cape Canaveral, FL.

Project Area: Early juvenile sand tiger sharks can be present in the near-bottom habitats as well as other parts of the water column in the location of the three borrow areas. Early juvenile sand tiger sharks are a mobile species and will most likely be able to avoid the hydraulic dredge. No more than minimal impact to sand tiger shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Sandbar shark (*Carcharinus plumbeus*)
Borrow Area 2C: Early Juvenile, Late Juvenile, Adult
4C Borrow Area and 5B: Early Juvenile, Late Juvenile, Adult

Source: Compagno (1984) and USDOC (1999b)

Early juvenile, late juvenile and adult life stages for the sandbar shark are listed in the 10' by 10' squares for both borrow areas. The sandbar shark is an abundant, coastal–pelagic shark of temperate and tropical waters that occurs inshore and offshore. It is found on continental and insular shelves and is common at bay mouths, in harbors, inside shallow muddy or sandy bays, and at river mouths, but tends to avoid sandy beaches and the surf zone. Sandbar sharks migrate north and south along the Atlantic coast, reaching as far north as Massachusetts in the summer. Sandbar sharks bear live young in shallow Atlantic coastal waters between Great Bay, New Jersey, and Cape Canaveral, Florida. The young inhabit shallow coastal nursery grounds during the summer and move offshore into deeper, warmer water in winter. Late juveniles and adults occupy coastal waters as far north as southern New England and Long Island.

Project Area: Habitat preference and distribution of this species make it possible that adults and juveniles may occur at the project site. Sandbar sharks are a mobile species and will most likely be able to avoid the hydraulic dredge. No more than minimal impact to sandbar shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Shortfin mako shark (*Isurus oxyrichus*)
Borrow Area 2C: Early Juvenile, Late Juvenile, Adult
4C Borrow Area and 5B: Early Juvenile, Late Juvenile

Sources: Compagno (1984) and USDOC (1999b)

Early juvenile, late juvenile and adult life stages for the shortfin mako shark are listed in the 10' by 10' square for Borrow Area 2C and early juvenile and late juvenile life stages are listed in the 10' by 10' square for the Western Westhampton Borrow Area and 5b. Shortfin mako shark is a common, extremely active, offshore littoral and epipelagic species found in tropical and warm temperate waters that is seldom found in waters below 16°C. In the extreme northern and southern parts of its range, this species migrates with warm water masses in the summer. Very little is known about the life history of this species, but nursery areas are believed to be located in deep tropical waters.

Project Area: Habitat preference and distribution of this species make it possible that adults and juveniles may occur at the project site. Shortfin mako sharks are a mobile species and will most likely be able to avoid the hydraulic dredge. No more than minimal impact to shortfin mako shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Tiger shark (*Galeocerdo cuvieri*)
Borrow Area 2C: Early Juvenile, Late Juvenile
4C Borrow Area and 5B: Early Juvenile, Late Juvenile

Sources: Compagno (1984) and USDOC (1999b)

Early juvenile and late juvenile life stages for the tiger shark are listed in the 10’ by 10’ squares for both borrow areas. Tiger sharks typically inhibit tropical and sub-tropical waters on or adjacent to the continental and insular shelves and makes seasonal migrations into warm temperate waters. This species occupies different marine habitats, but seems to prefer turbid waters. The nurseries for this species appear to be in offshore areas, but have not been described.

Project Area: Habitat preference and distribution of this species make it possible that juvenile tiger shark may occur at the project site. Tiger sharks are a mobile species and will most likely be able to avoid the hydraulic dredge. No more than minimal impact to tiger shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

White shark (*Carcharodon carcharias*)
Borrow Area 2C: Late Juvenile
4C Borrow Area and 5B: Late Juvenile

Sources: Compagno (1984) and USDOC (1999b)

The late juvenile life stage for the white shark is listed in the 10’ by 10’ squares for both borrow areas. EFH for these large, apex predators includes pelagic northern New Jersey and Long Island waters of depths between 25 and 100 meters. The white shark is a cosmopolitan, non-schooling species that is primarily a coastal and offshore inhabitant of continental and insular shelves. This species is often found close inshore to the surf line but may also occur off oceanic islands. White sharks typically feed on bony fishes, other sharks, rays, seals, dolphins and porpoises, sea birds, carrion, cephalopods, crabs and whales.

Project Area: Habitat preference and distribution of this species make it possible that late juvenile white shark may occur at the project site. White sharks are a highly mobile species and will most likely be able to avoid the hydraulic dredge. Therefore, no impact to white shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

4.1.3 Invertebrate Species

Atlantic surf clam (*Spisula solidissima*)
Borrow Area 2C: Juvenile, Adult
4C Borrow Area and 5B: Juvenile, Adult

Primary Source: EFH Source Document by Cargnelli et al. (1999b)

Juvenile and adult life stages for the Atlantic surf clam are listed in the 10’ by 10’ squares for both borrow areas. Surf clams are the largest bivalve in the mid-Atlantic Bight and are found from the Gulf of Maine to Cape Hatteras, North Carolina. Water currents are responsible the distribution and settlement of juvenile clams. Surf clams generally occur from the beach zone to a depth of about 200 feet, but beyond about 125 feet abundance is low. Surf clams are mostly oceanic and their distribution is limited by salinity. They prefer turbulent waters at the edge of the breaker zone but can be found in some estuarine areas. Juvenile clams prefer medium- to fine-grained sands that contain low levels of organics. Adults prefer medium- to coarse-grained sand and gravel and bury themselves just below the sediment surface. Surf clams are filter feeders and feed on plankton during all life stages. They have two temperature-dependent spawning periods; the first occurs in mid-July and continues through early August, and the second begins in mid-October and lasts through early November, and these periods are believed to be synchronous across an entire bed.

Project Area: Juvenile and adult surf clams occur in the project area. Where present in the borrow areas during dredging most will be lost. The "seeding" mechanisms of the surf clam are at work continuously and will establish populations regularly and will be reestablished after the dredging activities are completed. Therefore, no more than minimal impact to Atlantic surf clam or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Longfin inshore squid (*Loligo pealeii*)
Borrow Area 2C: Pre-recruits and Recruits
4C Borrow Area and 5B: Pre-recruits and Recruits

Primary Source: EFH Source Document by Jacobson (2005)

Pre-recruit and recruit life stages for the longfin squid are listed in the 10' by 10' squares for both borrow areas. Pre-recruits and recruits are stock assessment terms used by the Northeast Fisheries Science Center (NEFSC) and correspond roughly to the life history stages juveniles and adults, respectively. Longfin squid pre-recruits are less than or equal to 8 cm and recruits are greater than 8 cm. Longfin inshore squid are a pelagic schooling species that can be found in continental shelf and slope waters from Newfoundland to the Gulf of Venezuela. Juveniles inhabit the upper 10 m of the water column over water 50 to 150 meters deep on continental shelf. Juveniles are typically found in coastal inshore waters in spring/fall while migrating to offshore waters in winter. Juveniles have a temperature preference of 10 to 26°C and salinities of 31.5 to 34.0 ppt. Adult longfin inshore squid inhabit the continental shelf and upper continental shelf slope to depths of 400 m. Adults are typically found over mud or sandy mud bottoms, and have been found at surface temperatures ranging from 9 to 21°C and bottom temperatures ranging from 8 to 16°C.

Project Area: Based on their range of habitat utilization longfin squid may be expected to seasonally occur in the project area. This species is mobile and it is unlikely that it will be subjected to potential entrainment in the dredge or burial during dredging operations. Given the spatial distribution pattern and habits of this species little to no impact on longfin squid or EFH is anticipated to result from the proposed Project.

Shortfin squid (*Illex illecebrosus*)
Borrow Area 2C: no
4C Borrow Area and 5B: Pre-recruits and Recruits

Primary Source: EFH Document by Hendrickson and Holmes (2004)

Pre-recruit and recruit life stages for the shortfin squid are listed in the 10' by 10' squares for the Western Westhampton Borrow Area and 5b but were not listed in the 10' by 10' square for Borrow Area 2C. Generally, pre-recruit and recruit shortfin squid are collected from shore to 200 meters and temperatures between 2°C and 23°C. Like many squid species shortfin squid live for less than one year, has a high natural mortality rate, and exhibits a protracted spawning season whereby overlapping "microcohorts" enter the population throughout the year and exhibit variable growth rates. During spring, squid migrate onto the continental shelf between Newfoundland and Cape Hatteras. During late autumn, squid migrate off the continental shelf, presumably to a winter spawning site.

Project Area: Based on their range of habitat utilization shortfin squid may be expected to seasonally occur in the Western Westhampton Borrow Area and 5b. This species is mobile and it is unlikely that it will be subjected to potential entrainment in the dredge or burial during dredging operations. Given the spatial distribution pattern and habits of this species little to no impact on shortfin squid or EFH is anticipated to result from the proposed Project.

Ocean quahog (*Arctica islandica*)
Borrow Areas 2c: Juvenile, Adult
4C Borrow Area and 5B: Juvenile, Adult

Primary Source: EFH Source Document by Cargnelli et al. (1999c)

Juvenile and adult life stages for the ocean quahog are listed in the 10' by 10' squares for both borrow areas. Ocean quahogs are extremely slow-growing and long-lived marine bivalves. Distribution in the western Atlantic ranges in depths from 10 meters to about 250 meters. Ocean quahogs are rarely found where bottom water temperatures exceed 16°C, and occur progressively further offshore between Cape Cod and Cape Hatteras. Adults are usually found in dense beds in medium- to fine-grained sand, sandy–mud, and silty sand. Spawning is protracted, lasting from spring to fall. It has been reported to last from September to November, and sometimes until January, off New Jersey.

Project Area: Juvenile and adult ocean quahogs are likely to occur in the project area. Where present in the borrow areas during dredging most will be lost. The "seeding" mechanisms of the ocean quahog are at work continuously and will establish populations regularly and will be reestablished after the dredging activities are completed. Therefore, no more than minimal impact to ocean quahog or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

5.0 IMPACTS

This section identifies the potential direct and indirect impacts of the proposed sand dredging and placement on the relevant life history stages of EFH-designated species and their habitats. Significant impacts are not anticipated for the majority of species and life history stages. Table 3 identifies potential direct and indirect impacts for each EFH-designated species. There will be temporary impacts to the habitat and associated prey species for the duration of the construction phase of the Project. However, since the project area is a small portion of this type of habitat in the region, the overall impact on the effected species will be minimal relative to the region.

5.1 HABITAT IMPACTS

The proposed dredging activities at the three offshore borrow areas are described in Section 2.3.1. The Marine Offshore ecosystem where the borrow areas are located is described in Section 3.1. The proposed dredging activities associated with the project initial construction would be conducted in the three offshore borrow sites. In these locations the circulation, flushing rates, and dissolved oxygen levels are relatively high. The beach nourishment or dredge material (comprised primarily of clean, coarse-grained sand and gravel) would be hydraulically dredged and pumped to down drift beaches on the Atlantic coast of the Fire Island barrier island. The borrow area sand consists almost entirely of clean, coarse-grained sand and gravel with a small percentage of fines. Most of the fine material that would be suspended by the activities in the Atlantic Ocean water column would settle out in nearby Atlantic Ocean waters and would not adversely affect the designated habitat areas. Sediment taken from the borrow areas would be extracted to a depth no greater than 20 feet below the existing bottom, in order to minimize impacts on existing coastal processes and avoid anoxic conditions. The existing benthic invertebrate community would be removed as a result of the dredging. However, once the dredging is complete the ocean bottom would be colonized with invertebrates from the nearby benthic habitats.

5.2 DIRECT IMPACTS

The following subsections provide a general impact assessment for EFH-designated species (Table 3). For all species, the impacts during dredging would be temporary and non-significant for the following reasons:

- Turbidity plumes generated at the dredged site are not expected to be significant given that the type of dredge proposed is designed to minimize turbidity. Additionally, the sediment being mined is coarse-grained sand, which contains only trace amounts of fine-grained material. Also, the project site is under the direct influence of the inlet currents which are very powerful throughout most of each tidal cycle. These currents will quickly disperse any turbidity generated by the project operation. There are not expected to be any long lasting impacts to the water quality in or adjacent to the project area. Additionally, bottom sediments are predominantly sand without any significant amount of organic matter, therefore no significant release of nutrients or contaminants or lowering of oxygen concentrations (biological oxygen demand) is expected.

- Entrainment of demersal species may occur, however, hydraulic dredging equipment generally digs below the bottom substrate, gives noticeable warning of their approach (e.g., vibrations, etc.), and covers relatively small widths of the bottom at a time.

- Due to the dominance of sand in the borrow areas, sedimentation and turbidity resulting from the proposed Project are expected to settle quickly out of the water column or be dispersed by currents at the project area, and therefore would have a minimal impact on fish and invertebrate species (gill damage/suffocation or inhibition of sight feeding predators)

- The relatively small change in depth and the small size of the project foot print with a regional area with abundant similar resources result in minimal impacts to EFH-designated species. Direct impacts to EFH habitat is also expected to be minimal, especially since the bottom habitat is a dynamic area known to change by both small and large increments.

Table 3. Potential Impacts for EFH-Designated Species and Life History Stages in the Project Site

EFH-Designated Species	Life Stage	Potential Impacts
Bony Fish Species		
Atlantic butterfish	E/L	Not likely to occur in the project area. No significant impact
	J/A	Pelagic, zooplankton-feeding species. No significant impact.
Atlantic salmon	A	Not likely to occur in the project area. No significant impact
Atlantic sea herring	J/A	Pelagic, zooplankton-feeding species. No significant impact.
Black sea bass	L/A	Loss of benthic infaunal prey organisms would have minimal impact because fish feed primarily on more mobile benthic epifaunal species and small fish.

EFH-Designated Species	Life Stage	Potential Impacts
Bluefin tuna	J/A	Not likely to occur in the project area. No significant impact
Bluefish	L	Probably rare in the project area. No significant impact.
	J	Temporary displacement of fish and their prey (forage fish). No significant impact.
	A	Temporary displacement of fish and their prey (forage fish). No significant impact.
Cobia	E/L/J/A	Transient pelagic species. Not likely to occur in the project area. No significant impact.
King and Spanish mackerel	E/L/J/A	Transient pelagic species. Not likely to occur in the project area. No significant impact.
Monkfish	E/L	Not likely to occur in the project area. No significant impact.
Pollack	J	Not likely to occur in the project area. No significant impact.
Red hake	E	Not expected to occur in great densities but may be adversely impacted by dredging/placement activities. No significant impact.
	L/J	Not likely to occur in the project area. No significant impact.
Scup	E/L	Not likely to occur in the project area. No significant impact.
	J/A	Loss of benthic infaunal prey organisms would have minimal impact because fish also feed on pelagic prey organisms.
Skipjack tuna	A	Probably rare in the project area. No significant impact.
Summer flounder	E/L	Not likely to occur in the project area. No significant impact.
	J/A	Loss of benthic infaunal prey organisms would have minimal impact because fish also feed on pelagic prey organisms and larger, more mobile benthic epifauna (e.g., crabs).
Windowpane	E/L	May be adversely impacted by dredging/placement activities.
	J	Smaller YOY juveniles vulnerable to mortality from dredge. No significant impact from loss of benthic infaunal species because primary prey are more mobile epifaunal species.
	A	No significant impact from loss of benthic infaunal species because primary prey are more mobile epifaunal species.
Winter flounder	E	Dredge would cause mortality of demersal eggs during January-April spawning season.
	L	Dredge would cause mortality of recently-hatched larvae near the bottom, but have no significant impact on larvae in surface waters.
	J	Loss of benthic infaunal prey organisms would cause larger juveniles to relocate to nearby, unaffected areas; smaller YOY juveniles are less able to relocate and vulnerable to mortality from dredge.
	A	Loss of benthic infaunal prey organisms would cause adults to relocate to nearby, unaffected areas to feed; dredging during spawning season would cause females to move to nearby, unaffected areas to spawn, but should have no significant impact on egg production.
Whiting	E/L/J	
Witch flounder	L	Not likely to occur in the project area. No significant impact.
Yellowtail flounder	E/L	Probably rare in the project area. No significant impact.

EFH-Designated Species	Life Stage	Potential Impacts
Cartilaginous Fish Species		
Little skate	J/A	Dredging would not affect most prey species and adults would move out of affected area; no significant impact.
Winter skate	J/A	Dredging would not affect most prey species and adults would move out of affected area; no significant impact.
Blue shark	EJ/LJ/A	Not likely to occur in the project area. No significant impact.
Common thresher shark	EJ/LJ/A	Not likely to occur in the project area. No significant impact.
Dusky shark	EJ/LJ	Dredging activities would not affect most prey species.
Sand tiger shark	EJ	Not likely to occur in the project area. No significant impact.
Sandbar shark	EJ	Probably rare in the project area. No significant impact.
	LJ/A	Dredging would not affect most prey species and adults would move out of affected area; no significant impact.
Shortfin mako shark	EJ/LJ	Not likely to occur in the project area. No significant impact.
Tiger shark	EJ/LJ	Not likely to occur in the project area. No significant impact.
White shark	LJ	Not likely to occur in the project area. No significant impact.
Invertebrate Species		
Atlantic surf clam	A	May occur at sand placement site but would suffer minimal impact from sand placement activities.
Longfin inshore squid	J/A	No significant impact from loss of benthic infaunal species because primary prey are fish and mobile epifaunal species.
Shortfin squid	J/A	No significant impact from loss of benthic infaunal species because primary prey are fish and mobile epifaunal species.
Ocean quahog	L/J/A	Not likely to occur in the project area. No significant impact.

Key: E = eggs, L = larvae, J = juveniles, A = adults, EJ = early juveniles, LJ = late juveniles

5.3 INDIRECT IMPACTS

The most significant impact of sand dredging on EFH in the project area would be the indirect trophic effects caused by the removal of benthic infaunal prey organisms, and some epifaunal prey organisms, for bottom-feeding EFH-designated species. Any benthic organism that lives in the sand (infauna) and the smaller, less motile organisms that live on the bottom (epifauna) and are not capable of avoiding the suction effect of the dredge, would become entrained. Most of these organisms would be invertebrates, but burrowing fish would also be drawn into the dredge.

The negative effects of prey removal would be temporary, lasting only as long as it takes for benthic invertebrates to re-colonize the bottom once the project is complete. Studies conducted on offshore sand borrow areas off the outer New Jersey coast indicate that benthic communities were re-established within 8 to 9 months (USACE 1999a). Re-colonization of the infaunal species will be stimulated by neighboring adult populations that inhabit similar environments adjacent to the project area. However, because the project area is under the direct influence of inlet currents carrying eggs, larvae and instar forms of many invertebrate species the project area may recover much faster than these other areas. Nevertheless, some parts the project area will remain in a semi-disturbed state throughout the lifespan of the project. This represents a loss of some prey resources to some bottom feeding EFH-designated species. The degree to which sand extraction from the project area impacts benthic prey resources depends a great deal on how large of an area is selected for removal. Because bottom-feeding fish and crustaceans consume epifaunal organisms living on the bottom and infaunal organisms in the top several inches of the sediment, removal of surficial sediments over a large area would have a much greater impact on EFH than removal of the same volume of sand dredging a smaller area to a relatively greater depth. The project area represents a very small percentage of foraging grounds within the bay thus the overall indirect impact of the sand mining to EFH species will be minimal.

The temporary loss of benthic prey resources caused by dredging would not have any serious adverse effects on EFH for any species that feeds primarily on more motile epifaunal organisms (e.g., crabs, mysids, sand shrimp) or fish, since these organisms would re-occupy the dredged area almost immediately after sand was removed. For this reason, most of the EFH species in the project area would probably continue to feed there even after the dredge passed through.

The activities in the project area may have short-term benefits to some EFH-designated. Brinkhuis (1980) conducted a literature assessment on the biological effects of sand and gravel mining in the Lower Bay of New York Harbor and found that during dredging, and immediately after an area has been dredged, fish are attracted to the area to feed on infaunal organisms that are dislodged from the bottom. Due to the composition of the benthic infaunal organisms, bottom feeding fish species would be the primary benefactors as a result of the disturbance and certain opportunistic species such as striped bass would also benefit. Types of species attracted to the Project activity would be limited to highly mobile juveniles and adults, which presumably would be capable of avoiding entrainment.

Species that feed primarily on benthic infaunal organisms are most likely to be affected during the entire life of the Project. However, both benthic and pelagic foragers would likely expand their forage parameters until a sufficient prey patch is located, which in this case would mean re-locating to adjacent unaffected areas of similar habitat. Additionally, mobile foragers could resume feeding in the same location as soon as the dredge activities cease.

6.0 CONCLUSION

This assessment concludes that the overall potential adverse impacts to EFH-designated species and EFH in the project area will be minimal. Most EFH-designated species feed on more motile epifaunal organisms or on small forage fish and would not be seriously affected. For any bottom-feeding EFH species, the impact of dredging on local forage habitat area would be temporary, lasting only until the dredged area is re-colonized by new benthic organisms. There is also available data showing that disturbance to the sediments due to dredging can be short term benefit to many species of various life stages due to redistribution of prey items and detritus. The majority of dredging operations are expected to occur during the time period when most species are not active in the project area. For these reasons, it is concluded that the dredging of the three offshore borrow areas and subsequent placement of dredged material on beaches will not cause adverse effects to EFH-designated species or EFH.

7.0 REFERENCES

Brinkhuis, B.H. 1980. Biological effects of sand and gravel mining in the Lower Bay of New York Harbor: an assessment from the literature. Marine Science Research Center, State University of New York at Stony Brook, Special Report 34, Reference No. 80-1. 138 pp.

Cargnelli, L.M., S.J. Griesbach, D.B. Packer, P.L. Berrien, D.L. Johnson, and W.W. Morse. 1999a. Essential fish habitat source document: pollack, *Pollachius virens*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-131. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 38 pp.

Cargnelli, L.M., S.J. Griesbach, D.B. Packer, and E. Weissberger. 1999b. Essential fish habitat source document: Atlantic surf clam, *Spisula solidissima*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-142. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 22 pp.

Cargnelli, L.M., S.J. Griesbach, D.B. Packer, and E. Weissberger. 1999c. Essential fish habitat source document: ocean quahog, *Arctica islandica*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-148. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 11 pp.

Chang S., P.L. Berrien, D.L. Johnson, and W.W. Morse. 1999. Essential fish habitat source document: windowpane, *Scophthalmus aquosus*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-137. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA: 32 pp.

Collette, B.B. and C.E. Nauen. 1983. FAO species catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date. FAO Fish. Synopsis, (125) Vol. 2:137 p.

Compagno, L.J.V. 1984. FAO species catalogue. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. FAO Fisheries Synopsis No. 125, Vol. 4, Part 1 (Hexanchiformes to Lamniformes) and Part 2 (Carchariniformes). United Nations Fisheries and Agriculture Organization, Rome, Italy. 655 pp.

Cross, J.N., C.A. Zetlin, P.L. Berrien, D.L. Johnson, and C. McBride. 1999. Essential Fish Habitat Source Document: Butterfish, *Peprilus triacanthus*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-145. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA: 42 pp.

Drohan AF, Manderson JP, Packer DB. 2007. Essential fish habitat source document: Black sea bass, *Centropristis striata*, life history and habitat characteristics, 2nd edition. NOAA Tech Memo NMFS NE 200; 68 p.

Godcharles, M.F. and M.D. Murphy. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Florida) – king mackerel and Spanish mackerel. U.S. Fish and Wildlife Service, Biological Report 82(11.58). U.S. Army Corps of Engineers, TR EL-82-4, Waterways Experiment Station, Vicksburg, MS. 18 pp.

Hendrickson, L.C. and Holmes, E.M. 2004. Essential fish habitat source document (2nd edition): northern shortfin squid, *Illex illecebrosus*, life history and habitat characteristics. NOAA Technical Memorandum MNFS-NE-191. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 46 pp.

Jacobson, L.D. 2005. Essential fish habitat source document (2nd edition): longfin inshore squid, *Loligo pealei*, life history and habitat characteristics. NOAA Technical Memorandum MNFS-NE-193. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 52 pp.

Johnson, D.L., W.W. Morse, P.L. Berrien, and J.J. Vitaliano. 1999. Essential fish habitat source document: yellowtail flounder, *Limanda ferruginea*, life history and habitat characteristics. NOAA Technical Memorandum MNFS-NE-140. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 29 pp.

Lock MC, Packer PB. 2004. Essential fish habitat source document: Silver hake, Merluccius bilinearis, life history and habitat characteristiscs, 2nd edition. NOAA Tech Memo NMFS NE 186; 68 p.

Luca, M.C., S.J. Griesbach, D.B. Packer, P.L. Berrien, W.W. Morse, and D.L. Johnson. 1999. Essential fish habitat source document: witch flounder, *Glyptocephalus cynoglossus*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-139. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 29 pp.

Packer, D.B., S.J. Griesbach, P.L. Berrien, C.A. Zetlin, D.L. Johnson, and W.W. Morse. 1999. Essential fish habitat source document: summer flounder, *Paralichthys dentatus*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-151. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 88 pp.

Packer, D.B., C.A. Zetlin, and J.J. Vitaliano. 2003a. Essential fish habitat source document: little skate, *Leucoraja erinacea*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-175. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 76 pp.

Packer, D.B., C.A. Zetlin, and J.J. Vitaliano. 2003b. Essential fish habitat source document: winter skate, *Leucoraja ocellata*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-179. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 68 pp.

Pereira, J.J., R. Goldberg, J.J. Ziskowski, P.L. Berrien, W.W. Morse, and D.L. Johnson. 1999. Essential fish habitat source document: winter flounder, *Pseudopleuronectes americanus*, life listory and habitat characteristics. NOAA Technical Memorandum NMFS-NE-138. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 39 pp.

Richards, C.E. 1967. Age, growth and fecundity of the cobia, *Rachycentron canadum*, from the Chesapeake Bay and adjacent Mid-Atlantic waters. Trans. Amer. Fish. Soc. 96:343-350.

Shepherd GR, Packer DB. 2005. Essential fish habitat source document: Bluefish, *Pomatomus saltatrix*, life history and habitat characteristics (2nd Edition). NOAA Tech Memo NMFS NE 198; 89 p.

Steimle, F.W., W.W. Morse, and D.L. Johnson. 1999a. Essential fish habitat source document: goosefish, *Lophius americanus*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-127. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 31 pp.

Steimle, F.W., W.W. Morse, P.L. Berrien, and D.L. Johnson. 1999b. Essential fish habitat source document: red hake, *Urophycis chuss*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-133. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 34 pp.

Steimle, F.W., C.A. Zetlin, P.L. Berrien, D.L. Johnson, and S. Chang. 1999c. Essential fish habitat source document: scup, *Stenotomus chrysops*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-149. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. 39 pp.

Stevenson DK, Scott ML. 2005. Essential fish habitat source document: Atlantic herring, *Clupea harengus*, life history and habitat characteristics (2nd edition). NOAA Tech Memo NMFS NE 192; 84 p.

USACE (2001). "The New York District's Biological Monitoring Program for the Atlantic Coast of New Jersey, Asbury Park to Manasquan Section Beach Erosion Control Project. Final Report". U.S. Army Engineer District, New York and U.S. Army Engineer Research and Development Center, Waterways Experiment Station.

United States Department of Commerce (USDOC). 1999a. Guide to essential fish habitat designations in the Northeastern United States. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Regional Office, Gloucester, MA. Internet accessible at: www.nero.nmfs.gov/ro/doc.

United States Department of Commerce (USDOC). 1999b. Final Fishery Management Plan for Atlantic Tunas, Swordfish and Sharks. Vol. II, Chapter 6: Highly Migratory Species (HMS) Essential Fish Habitat (EFH) Provisions. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Silver Spring, MD. 302 pp.