APPENDIX D

ESSENTIAL FISH HABITAT ASSESSMENT

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

Environmental Analysis Branch

May 1, 2019

Mr. Lou Chiarella
Assistant Regional Administrator for Habitat Conservation
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Mass. 01930-2276

Subject: Atlantic Coast of Long Island, Fire Island Inlet to Montauk Point (FIMP), New York Coastal Storm Risk Management Project.

Dear Mr. Chiarella:

The U.S. Army Corps of Engineers (USACE), New York District (District) is in receipt of National Marine Fisheries Service (NMFS) EFH Conservation Recommendations, dated April 11, 2019 submitting recommendations on the Final FIMP Project. Please find attached our responses to your Conservation Recommendations.

The District looks forward to working with your office throughout the Pre-Engineering and Design and Construction phases of this study and thanks you for your continued assistance and input to this process which helps to advance the execution of this regionally-significant project.

If you require any additional information, please feel free to contact Robert Smith Project Biologist at 917-790-8729.

Sincerely,

Peter Weppler
Chief, Environmental Section

Enclosure
Cc: NMFS - Karen Greene
NMFS – Ursula Howson

Response to Essential Fish Habitat (EFH) Conservation Recommendations Fire Island to Montauk Point (FIMP) Reformulation Study

General: The District would like to clarify that the FIMP Final Recommended Plan does not call for any inlet modification, only the dredging of the ebb shoal at the three inlets have been proposed. The maintenance dredging of the three Federal Inlets will be performed the District's Operations and Maintenance Dredging Program and is not part of the FIMP project. The only groin modification activities would be the partial removal of the two groins in Ocean Beach. Note that the groin modification activities within the Westhampton Reach has been removed from the project. As far as the Coastal Process Features (CPFs), there are twelve barrier island and two mainland CPFs. Only eight CPFs will have activities of having sediment being placed along the barrier island bayside shoreline.

Conservation Recommendations 1 – 4: Borrow Area Dredging:
A full evaluation of impacts within the borrow areas has been completed as part of the FIMP study and will continue to evaluate the borrow areas as well as any new borrow areas identified. The District has shared the most recent borrow area monitoring reports and will continue to provide additional data to NMFS as it is available. The District has been working for many years to consolidate information to support consultation for this project.

Conservation Recommendation 5 Inlet Dredging:
Per clarification above, inlet dredging will continue to be completed and coordinated under District's Operations and Maintenance Dredging Program. Continued in-District coordination between the FIMP project and the inlet dredgings will occur.

Conservation Recommendation 6:
The District concurs and will follow these best management practices.

Conservation Recommendations 7 - 9 CPFs:
The District concurs and will initiate individual consultations with NMFS as Plans and Specifications become available for each individual CPF. All work on the bayside of the barrier island will be pre-surveyed for SAV to ensure no beds are impacted as part of the construction of the CPFs. Prior to the construction of these CPFs, the District will consult with NMFS to ensure these beds are not impacted.

As previously discussed, additional coordination is warranted during the Preconstruction, Engineering and Design Phase of the project. Based upon this additional coordination and potential data analysis specific to refined design details, the District expects to continue to work with NMFS and include the appropriate references to existing and previous data collection as well as refine conservation recommendations as necessary

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

APR 1 1 2019

Peter Weppler, Chief
Environmental Analysis Branch
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0900

RE: Fire Island Inlet to Montauk Point Reformulation Study
EFH Assessment for Coastal Process Features

Dear Mr. Weppler:

We have reviewed the *Fire Island to Montauk Point (FIMP) Reformulation Study Essential Fish Habitat (EFH) Assessment Addendum for Coastal Process Features (CPF)*, dated January 2019 and received in our office on February 14, 2019. The FIMP project area extends from Fire Island Inlet east to Montauk Point in Long Island, New York. The project includes beach and dune restoration, salt marsh enhancement, inlet modifications, groin modifications, a breach response plan and other non-structural measures, as well as the continuation of authorized dredging in Fire Island, Moriches and Shinnecock Inlets and the ebb shoals outside of the inlets, with the placement of the dredged material in down drift areas. The project area includes the entire Atlantic coast of Suffolk County covering an ocean shoreline length of approximately 83 miles, and over 200 miles of additional shoreline within the estuary system.

You previously consulted with us on a portion of this project under the Fire Island Inlet to Moriches Inlet, Fire Island Stabilization Project – Hurricane Sandy Reevaluation Report. We provided conservation recommendations for that project in our letter dated May 14, 2014. We commented on the December 2015 EFH assessment for the current project in our letter dated May 3, 2016, as well as on the Draft General Reevaluation Report, Draft Environmental Impact Statement, and the July 2016 EFH assessment in our letter dated October 18, 2016. We also provided comments on your May 2017 document on CPFs in an email dated June 21, 2017, in which we requested a complete evaluation of impacts of the CPFs on EFH and NOAA trust resources. In this letter we offer comments on the CPF EFH assessment that you subsequently provided to us, as well as an updated compilation of conservation recommendations for the entire project.

The CPF component of the FIMP reformulation study proposes to restore natural coastal processes that have been impacted by past development on Long Island barrier islands including longshore transport, cross-island transport, dune growth and evolution, bay shoreline processes, and estuarine circulation and water quality. The CPF component consists of 12 barrier island and three mainland features, all located within Long Island backbay estuaries from Fire Island to Montauk Point. For 11 of the barrier island CPFs, sediment will be placed along the barrier island bayside shoreline over the duration of the project to reestablish coastal processes; this will be conducted in conjunction with other nearby FIMP beach fill operations undertaken on the barrier island shorefront. For one barrier island CPF (Smith Point County Park Marsh, on the east end of Fire Island), an anthropogenically impacted salt marsh will be enhanced to reestablish natural marsh surface and hydrology and to promote cross island transport. The three mainland features consist of three anthropogenically impacted mainland salt marshes, which will be enhanced with natural vegetation and hydrology to restore natural floodplain function.

The CPF component of the FIMP formulation study will impact approximately 688 acres of estuarine habitat, including the conversion of approximately 156 acres of open water/unconsolidated bottom subtidal habitat to sandy beach intertidal habitat and the conversion of 191 acres of sandy beach intertidal habitat to upland for beach restoration, as well as enhancement of 341 acres of low marsh/vegetated tidal wetlands for flood control, including restoration of natural tidal channels and filling of mosquito ditches. Other than the filling of mosquito ditches to restore the natural marsh platform, no other fill will occur in vegetated tidal wetlands. No fill will occur in submerged aquatic vegetation (SAV).

Magnuson Stevens Fisheries Management and Conservation Act (MSA)
The CPF EFH assessment adequately evaluates some of the potential impacts to EFH that could result from the implementation of the FIMP Final Selected Plan, including temporary and indirect impacts to EFH, EFH species and NOAA trust resources. However, because the project is still being developed, site-specific details on project activities and impacts are not available so we are unable to provide detailed conservation recommendations. Further, because this project will result in permanent loss of EFH (from intertidal habitat to upland beach habitat) and conversion of EFH (from subtidal to intertidal), we cannot concur that there are no or minimal adverse impacts to EFH and/or EFH species, as stated in the CPF EFH assessment. However, these impacts to EFH are offset by the increase in ecosystem function and stabilization of habitats within the dynamic estuarine system.

<u>Habitat Area of Particular Concern</u>
The CPF EFH assessment, notes that the project will not impact SAV. However, there are extensive mapped SAV beds in the CPF project area. As we have noted in previous correspondence, SAV has been designated as a habitat area of particular concern (HAPC) for summer flounder by the Mid-Atlantic Fishery Management Council (MAFMC). HAPCs are subsets of EFH based on one or more of the following considerations: 1) the importance of the ecological function, 2) extent to which the habitat is sensitive to human-induced degradation, 3) whether, and to what extent, development activities are stressing the habitat type, or 4) rarity of habitat type (50 CFR 600.815(a)(8)). To evaluate SAV in the CPF project area, we used the most recent maps available (2002 New York State Department of State (NYSDOS); 2004, National Park Service). Due to the highly dynamic nature of the estuary and continual hydrodynamic and geomorphological changes that occur there, we recognize that newer maps may provide a better assessment of SAV resources in the estuary. However, since the 2002 and 2004 maps are currently the most recent maps available, they should be used to evaluate presence of SAV and analyze project impacts, until newer maps become available. Even then, because of the ephemeral nature of SAV beds and the fact that they may move from year to year, older maps are still valuable when used in conjunction with new maps, to determine habitat suitability for SAV.

According to the CPF EFH assessment, impacts of the CPFs on SAV were not evaluated because the 2002 and 2004 maps were considered too old. However, because those SAV maps are the best available information for the project area, we requested an evaluation of SAV resources using those maps to be included in an EFH assessment. In response to this, your office has proposed to coordinate with us to develop a multi-year SAV survey at all CPF sites, which your office will subsequently conduct. We recommend that you also use the new NYSDOS maps, tentatively scheduled for completion in 2019, in your design and planning for each CPF.

Additional consultation for site-specific impacts will be necessary for each CPF after project plans are developed. If SAV is found in or near any CPF as a result of the existing or new Corps and/or NYSDOS mapping efforts or site-specific surveys, a full analysis of temporary or permanent impacts to SAV should be provided to us as part of the site-specific EFH assessment, as well as an evaluation of the Corps' efforts to avoid and minimize impacts to SAV. Please note that tidal SAV (especially eelgrass, *Zostera marina*) is difficult to grow or transplant, so in-kind compensatory mitigation is difficult to undertake successfully. We will work with your office to ensure that direct impacts to SAV are avoided, and may recommend timing restrictions and/or best management practices for indirect impacts, and should the need arise, develop a compensatory mitigation plan to offset the loss of this valuable habitat.

Longfin Inshore Squid EFH in Borrow Areas

Longfin inshore squid spawn throughout the New York Bight; early life stages are found in coastal waters and throughout Jamaica Bay. Egg masses are demersal and are typically attached to low-relief structure (e.g. rocks, small boulders) on sandy or muddy substrate in water depths less than 50 feet. Recent research indicates that spawning may be concentrated in coastal waters off of Long Island (D. Stevenson, NMFS / Greater Atlantic Fisheries Office, pers. comm. 2018), which could result in increased vulnerability of longfin inshore squid EFH to offshore dredging operations. We are currently investigating the locations of highest egg mass concentration, seasonal occurrence, and egg mass residence time to better define EFH, in order to evaluate dredging impacts to this species in the project borrow areas. We will continue to coordinate with you as additional information becomes available to develop options for avoiding and minimizing impacts to longfin inshore squid early life stages.

Mid-Atlantic Fisheries Management Council Policy Statement

The Mid-Atlantic Fisheries Management Council (MAFMC) has developed a policy statement on beach nourishment activities (Appendix A) that may affect federally managed species under their purview including summer flounder, scup, black sea bass, monkfish and butterfish. This policy is intended to articulate the MAFMC's position on various development activities and facilitate the protection and restoration of fisheries habitat and ecosystem function. The policy should be incorporated into the final design of this project and its long-term management plan.

Essential Fish Habitat Conservation Recommendations

After ongoing discussions with your staff, we have determined that this letter will serve to combine and clarify previous conservation recommendations. As project plans are developed, we will modify these conservation recommendations as needed.

Pursuant to Section 305(b)(4)(A) of the MSA, we recommend the following EFH conservation recommendations to minimize adverse effect on EFH and federally managed species. These recommendations supersede those offered in previous comment letters related to this project, and include both modifications of recommendations from our previous letters and new recommendations.

1. *Borrow area dredging.* Dredging within borrow areas should be designed and undertaken in a manner that maintains geomorphic characteristics of the borrow area. Best management practices should be employed, such as minimizing dredging depth as practicable and leaving similar substrate in place to allow for benthic community recovery.

2. *Borrow area dredging.* Areas of high surf clam densities within borrow areas should be avoided.

3. *Borrow area dredging.* Copies of all 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 adequately assess the potential effects of dredging activities 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.

4. *Borrow area dredging.* Coordinate with our office to determine impacts of dredging in the borrow areas to longfin inshore squid EFH. If warranted, we will provide you with additional EFH conservation recommendations to address impacts to longfin inshore squid as information becomes available. We will work with you to incorporate longfin inshore squid EFH conservation recommendations into initial construction or subsequent maintenance dredging events.

5. *Inlet dredging.* Reinitiate consultation prior to each inlet dredging event. At that time, site characteristics and project activities will be further evaluated to determine whether conservation recommendations such as timing restrictions (e.g. for winter flounder and river herring ingress) will be necessary.

6. *All hydraulic dredging.* Intakes on the dredge plant should not be turned on until the dredge head is in the sediments, and should be turned off before lifted to minimize larval fish and invertebrate entrainment in the dredge.

7. *CPFs.* Avoid permanent impacts to SAV. Avoid and/or minimize temporary impacts to SAV.

8. *CPFs.* Reinitiate consultation prior to construction of CPFs. At that time, site characteristics and project activities will be further evaluated to determine whether conservation recommendations such as timing restrictions (e.g. for SAV, winter flounder, river herring, horseshoe crab, etc.) will be necessary.

9. *CPFs.* When consultation is reinitiated prior to construction, provide project plans for each salt marsh enhancement project. Provide areal extent of dredging and filling for

each CPF, including fill in vegetated wetlands (e.g. ditches), subtidal open water and intertidal sandy beach habitats. Provide areal extent of habitat conversion (e.g. subtidal open water habitat to intertidal sandy beach habitat) and habitat loss (e.g. intertidal sandy beach habitat to upland).

A detailed written response to these EFH conservation recommendations is required under the MSA. 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 your 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).

In addition, 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.

As CPF sites are advanced to the preconstruction engineering and design (PED) phase, conceptual profiles for each CPF site that more accurately depict existing and proposed gradients at each site will be developed. The design criteria and/or configuration of CPFs selected may also be refined. In addition to stakeholder and community outreach, the PED phase will include field studies, surveys and data collection inputs to inform a more detailed design of the CPFs. Additional consultation will be necessary for each CPF, so that site specific EFH conservation recommendations can be developed.

We look forward to our continued coordination with your office on this project as it moves forward. As stated above, because project plans have not yet been fully developed, the EFH assessment provided does not contain sufficient detail on each project activity. Therefore, individual consultations are needed prior to the initiation of each activity so that site specific conservation recommendations can be developed. We can work with your staff to complete a programmatic consultation to reduce the need for individual consultations. If you have any questions or need additional information, please do not hesitate to contact Ursula Howson at (732) 872-3116 (ursula.howson@noaa.gov) or Karen Greene at (732) 872-3023 (karen.greene@noaa.gov).

Sincerely,

Louis A. Chiarella,
Assistant Regional Administrator
for Habitat Conservation

cc: NYD Corps – C. Alcoba
PRD – D. Marrone, E. Carson-Supino
FWS – S. Sinkevich
EPA – Region II, D. Montella
NEFMC – T. Nies
MAFMC – C. Moore
ASMFC – L. Havel

Appendix 1

The Mid-Atlantic Fisheries Management Council (MAFMC) has developed a policy statement on beach nourishment activities that may affect federally managed species under their purview including summer flounder, scup, black sea bass, monkfish and butterfish. These policies are intended to articulate the MAFMC's position on various development activities and facilitate the protection and restoration of fisheries habitat and ecosystem function. The MAFMC's policies on beach nourishment are:

1. Avoid sand mining in areas containing sensitive fish habitats (e.g., spawning and feeding sites, hard bottom, cobble/gravel substrate, shellfish beds).
2. Avoid mining sand from sandy ridges, lumps, shoals, and rises that are named on maps. The naming of these is often the result of the area being an important fishing ground.
3. Existing sand borrow sites should be used to the extent possible. Mining sand from new areas introduces additional impacts.
4. Conduct beach nourishment during the winter and early spring, when productivity for benthic infauna is at a minimum.
5. Seasonal restrictions and spatial buffers on sand mining should be used to limit negative impacts during fish spawning, egg development, young-of-year development, and migration periods, and to avoid secondary impacts to sensitive habitat areas such as SAV.
6. Preserve, enhance, or create beach dune and native dune vegetation in order to provide natural beach habitat and reduce the need for nourishment.
7. Each beach nourishment activity should be treated as a new activity (i.e., subject to review and comment), including those identified under a programmatic environmental assessment or environmental impact statement.
8. Bathymetric and biological monitoring should be conducted before and after beach nourishment to assess recovery in beach borrow and nourishment areas.
9. The effect of noise from mining operations on the feeding, reproduction, and migratory behavior of marine mammals and finfish should be assessed.
10. The cost effectiveness and efficacy of investments in traditional beach nourishment projects should be evaluated and consider alternative investments such as non-structural responses and relocation of vulnerable infrastructure given projections of sea level rise and extreme weather events.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
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REPLY TO
ATTENTION OF
Environmental Analysis Branch

February 14, 2019

Ms. Louis A. Chiarella
NOAA/NMFS/Habitat Conservation Division
55 Great Republic Drive
Gloucester, MA 01930-2276

Subject: : Atlantic Coast of Long Island, Fire Island Inlet to Montauk Point (FIMP), New York Coastal Storm Risk Management Project, National Oceanic and Atmosphere Administration (NOAA), Supplemental Essential Fish Habitat (EFH) Assessment.

Dear Ms. Chiarella:

The U.S. Army Corps of Engineers, New York District (District) is pleased to provide the final project description for the FIMP General Reevaluation Report (GRR) and Environmental Impact Statement (EIS) (Enclosure 1), the final Monitoring and Adaptive Management Plan (MAMP) (Enclosure 2) and District Final Response to the NOAA comments (Enclosure 3) on the July 2016 Draft GRR and EIS received via letters dated October 18, 2016. Also provided is the 2019 supplemental EFH assessment (Enclosure 4) focused on the Coastal Process Features (CPFs) prepared in response to NOAA's EFH consultation letter on the Draft EFH Assessment received via letter May 3, 2016 and follow up email requests for additional information. The District's original July 2016 EFH Assessment (Appendix D of the Draft EIS) is also provided for reference (Enclosure 5).

The District, New York State Department of Environmental Conservation (NYSDEC) and their local partners and resource agencies have participated in extensive coordination to finalize the documents provided in these encloses, in particular the details of CPFs which are designed to achieve no net loss of sediment into the back bay system as part of the mutually acceptable plan as well as for compliance with Section 7 of the Endangered Species Act by creating early successional habitat for piping plovers (*Charadrius melodus*).

The following updates have been made to the project based on the extensive sponsor, local partner, resource agency and public coordination since the release of the July 2016 Draft GRR and EIS:

1. Updated sand quantities in tables and text
2. Additional language regarding "no net loss" of sediment (how to achieve the goal of approximately 4.2 million cubic yards of sand)CY
3. Additional section on proactive breach response triggers (ex: Southampton transitioned from Proactive to Reactive for Real Estate purposes)
4. Updated discussion of Downtown Montauk related to beach nourishment

5. Additional language describing that vacant land will be acquired as part of mainland nonstructural plan
6. Updated description of current list of CPFs, including renumbering sites and the removal of sites that do not have landowner support and are no longer included (Cupsogue, Sunken Forest, Point of Woods, Carrington, Regan Property)
7. Incorporated an updated CPF table with quantities to achieve the approximate 4.2 MCY. The quantity in the table alone will not achieve the 4.2 MCY quantity and therefore Adaptive Management will be utilized to reach the overall total
8. Included a description of mainland CPF's.

The District has carefully considered and responded to all NOAA comments (Enclosure 3) and has incorporated the comments where appropriate in the GRR and EIS. These documents will be available mid-February for each agency to back check and then finalize their respective environmental coordination requirements.

After reviewing the May 3, 2016 consultation letter and the October 18, 2016 NOAA comment letter, the District notes that many of NOAA requests for additional information (including the proposed mitigation measures [CPFs] and avoiding the SAV beds) are provided in the final project description (Enclosure 1). The District also agrees with and has adopted many of NOAA's suggested measures (such as avoided high density surf clam beds and BMP for dredging the borrow areas).

Some of NOAA's request for additional information in the May 3, 2016 consultation letters are not addressed in either the Final Project Description (Enclosure 1) or response to NOAA comments (Enclosure 3) and instead is listed below:

- NOAA request for areal extent of all sand placement below the high tide line
    - Figures 1 and 2 and Table 1 from the Final Recommended Plan (Enclosure 1)
    - CPF profile designs, each showing mean high and mean low tides (Enclosure 6)
    - Quantities broken out per year and per reach (Enclosure 7) where stations coordinate back to Figures 1 and 2 and Table 1 from the Final Recommended Plan (Enclosure 1)

- NOAA request for amount and extent of dredging within the inlets and ebb shoals
    - On average 2.3M CY from the three inlets combined and ebb shoals for initial construction (as shown in Enclosure 7 1st tab rows 50 – 53)
    - On average 1.8M CY from the three inlets combined and ebb shoals for each re-nourishment cycle (as shown in Enclosure 7 remaining tab rows 47 - 49)

- NOAA request for the District to identify the offshore borrow areas
    - At this time 7 possible borrow area locations are identified and shown in Enclosure 8 (Figure B-3 shows 2A, 2B, 2C and 2H), Figure B-4 shows 5Bexp and Figure B-5 shows 8D).
    - Enclosure 7 Column D notes the sediment source (borrow area / inlet) per reach

- NOAA request for an estimate of the amount of material that will be removed and the frequency of disturbance of each borrow area or inlet

  - Enclosure 7 shows tabs for initial construction and estimated re-nourishment on a 4 year schedule for borrow areas and every 2 years for inlets. Refer to Column O for the total volume per reach and per sand placement cycle.

- NOAA request for detailed site specific information on the borrow areas and inlet ebb shoals
  - See Enclosures 7 and 8
  - The 2017 Borrow Area Report detailing study of Borrow Ares 2C and 5B (adjacent to 5bexp) (Enclosure 9)
  - The District will share additional information as additional pre-construction, during-construction and post construction monitoring of additional borrow areas is completed.

A NOAA recommended measure for an inlet dredging window from January 15 to June will be implemented as part of the FIMP project to the extent possible based on weather concerns and limited times allowed for dredging and placement related to seasonal restrictions for piping plovers and sea beach amaranth. The District requests that as part of finalizing the EFH Assessment, NOAA and District staff work together via meeting and conference calls to finalize the list of conservation measures.

The District requests that NOAA please provide a final EFH Assessment no later than March 30, 2019 in order to be included in the Final EIS and maintain the overall project schedule for project approval.

The District looks forward to working with your office to complete the Feasibility phase and throughout the Pre-Engineering and Design and Construction phases and thanks you for your continued assistance and input to this process which helps to advance the execution of this regionally-significant project.

If you require any additional information, please feel free to contact Mr. Robert Smith, Project Biologist at 917-790-8726.

Sincerely,

Peter Weppler
Chief, Environmental Analysis Branch

cc: NMFS - Greene

Enclosure 1 FIMP Final Project Description
Enclosure 2 FIMP Final Monitoring and Adaptive Management Plan

Enclosure 3 District Response to NOAA comments on July 2016 Draft GRR and EIS
Enclosure 4 Supplemental 2019 EFH Assessment for CPFs
Enclosure 5 July 2016 EFH Assessment (Appendix D of the Draft EIS)
Enclosure 6 CPF profile designs, each showing mean high and mean low tides
Enclosure 7 Quantities broken out per year and per reach (stations coordinate back to Figures 1 and 2 from the Final Recommended Plan)
Enclosure 8 Map of all Borrow Area
Enclosure 9 2017 Borrow Area Report (studying Borrow Areas 2C and 5B)

APPENDIX D1

Essential Fish Habitat Assessment
FIMP Recommended Plan

D.1 INTRODUCTION

D.1.1 Fire Island to Montauk Point EIS (Project)

This Project evaluates the reasonable alternatives that would help define a long-term solution to the risk imposed by coastal storms and their associated damage to human life and property, while maintaining, enhancing, and restoring the ecosystem integrity of coastal biodiversity. The key components to the proposed action are: Beach Restoration (Beach and Dune Fill), Sediment Management (including Inlet Modification), Groins (groin removal), Breach Response Plan (BRP), Non-Structural Methods, and Adaptive Management. This report presents the Essential Fish Habitat (EFH) assessment for the FIMP Recommended Plan. The FIMP study area is described in Section D.2.1. Refer to the EFH Assessment specific to the Coastal Process Feature sites (CPFs), included as Appendix D2 of the FEIS, for information on the potential impacts to EFH associated with that aspect of the Recommended Plan.

D.1.2 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.

D.2 PROJECT DESCRIPTION

D.2.1 Project Study Area

D.2.1.1 *Fire Island to Montauk Point Study Area*

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

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

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.

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 backbay. 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 D-1. FIMP Study Area

D.2.2 Proposed Action

The key components to the proposed action are: Beach Restoration (Beach and Dune Fill), Sediment Management (including Inlet Modification), Groins (specifically removal of the Ocean Beach groins), Breach Response Plan (BRP), Coastal Process Features, Non-Structural Methods, and Adaptive Management.

D.2.2.1 *Problem Identification*

The problems along the shorefront include storm damages due to erosion, wave attack, and flooding. Along the barrier island there is also the threat of barrier island overwash and breaching. Along the backbay, there is the threat of tidal flooding during no-breach conditions. Tidal flooding becomes worse when there is a breach of the barrier island, which allows for more storm surge from the ocean. These problems have occurred repeatedly in the past, resulting in damages to the built environment.

The principal problems are associated with extreme tides and waves that can cause extensive flooding and erosion both within barrier island and mainland communities. Breaching and/or inundation of the barrier islands also can lead to increased flood damages, especially along the mainland communities bordering Shinnecock, Moriches and Great South Bays. The following general conclusions can be made:

1. The greatest potential damages in the study area are along the mainland floodplain;
2. Among the mainland floodplain areas, Great South Bay is the most vulnerable to storm damages;
3. Along the mainland floodplain areas, specific measures need to be considered to address localized flooding;
4. The barrier island provides a high degree of protection to the mainland, which can be compromised by a breach. Specific measures need to be considered to address maintaining a stable barrier island;
5. Along the shorefront area, the area of greatest threat to storm damages under current conditions is Fire Island;
6. Along the shorefront, the potential for damages increases dramatically in all areas in the future;
7. It is clear from past degradation that storm damage reduction measures and coastal process restoration measures must be evaluated in conjunction to restore system functioning;
8. It is clear that restoration of longshore transport should be given priority, as restoration of all other processes is contingent upon a balanced sediment transport system.

D.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.

D.2.2.3 *Preferred Alternative (Recommended Plan)*

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 key components to the proposed action are: Beach Restoration (Beach and Dune Fill), Sediment Management (including Inlet Modification), Groins (specifically removal of the Ocean Beach groins), Breach Response Plan (BRP), Coastal Process Features, Non-Structural Methods, and Adaptive Management. A brief discussion of these key components follows.

Inlet Sand Bypassing

- Provides for sufficient sand bypassing across Fire Island, Moriches, and Shinnecock Inlets to restore the natural longshore transport of sand along the barrier island for 50 years. Scheduled O&M dredging of the authorized navigation channel and deposition basin with sand placement on the barrier island will be supplemented, as needed, by dredging from the adjacent ebb shoals of each inlet to obtain the required volume of sand needed for bypassing.

- The bypassed sand will be placed in a berm template at elevation +9.5 ft NGVD in identified placement areas.
- Monitoring is included to facilitate adaptive management changes.

Mainland Nonstructural

- Addresses approximately 4,432 structures within the 10 year floodplain using nonstructural measures, primarily, structural elevations and building retrofits, based upon structure type and condition.
- Includes localized acquisition in areas subject to high frequency flooding, and reestablishment of natural floodplain function.

Breach Response on Barrier Islands – Provides for the following types of Breach Response

- Proactive Breach Response – is a response plan which is triggered when the beach and dune are lowered below a 4% level of performance and provides for restoration of a dune at +13 ft. NGVD and a 90 ft. berm.
- Reactive Breach Response – is a response plan which is triggered when a breach has physically occurred, e.g. the condition where there is an exchange of ocean and bay water during normal tidal conditions. It is utilized, as needed, in locations that receive beach and dune placement, and also in locations where there is agreement that a breach should be closed quickly, such as Robert Moses State Park and the Talisman Federal tract.
- Conditional Breach Response – is a response plan that applies to the large, Federally-owned tracts within Fire Island National Seashore where the Breach Closure Team determines whether the breach is closing naturally, and if found not to be closed at Day 60 that closure would begin on Day 60. Conditional Breach closure provides for a 90 ft. wide berm at elevation +9.5 ft. and no dune.
- Wilderness Conditional Breach Response – is a response plan that applies to the Wilderness Federally-owned tracts within Fire Island National Seashore, where the Breach Closure Team determines whether a breach should be closed, based upon whether the breach is closing naturally and whether the breach is likely to cause significant damage.

Beach and Dune Fill on Shorefront

- Provides for a 90 ft. wide berm and +15 ft. dune along the developed shorefront areas on Fire Island and Westhampton barrier islands.
- All dunes will be planted with dune grass except where otherwise as detailed in the Recommended Plan description as presented in the GRR.
- On Fire Island the post-Sandy optimized alignment is followed and includes overfill in the developed locations to minimize tapers into Federal tracts.

- Renourishment takes place approximately every 4 years for up to 30 years after project completion; while proactive breach response takes place from years 31 to 50.
- Provides for adaptive management to ensure the volume and placement configuration accomplishes the design objectives of offsetting long-term erosion.
- Provides for construction of a feeder beach every 4 years for up to 30 years at Montauk Beach.

Groin Modifications

- Provides for removal of the existing Ocean Beach groins.

Coastal Process Features (CPFs)

- Provides for 12 barrier island locations and two mainland locations as coastal process features.
- Includes placement of approximately 4.2 M CY of sediment in accordance with the Policy Waiver for a Mutually Acceptable Plan between the Department of the Army and the Department of the Interior. Sediment will be placed along the barrier island bayside shoreline over the 50 year project period of analysis that reestablishes the coastal processes consistent with the reformulation objective of no net loss of habitat or sediment. The placement of sediment along the bay shoreline will be conducted in conjunction with other nearby beach fill operations undertaken on the barrier island shorefront.
- The CPFs will compensate for reductions in cross-island transport and sediment input to the Bay, offset Endangered Species Act impacts from the placement of sediment along the barrier island shorefront, augment the resiliency and enhance the overall barrier island and natural system coastal processes.

Adaptive Management

- Provides for monitoring and the ability to adjust specific project features to improve effectiveness and achieve project objectives.
- Climate change will be accounted for with the monitoring of climate change parameters, identification of the effect of climate change on the project design and identification of adaptation measures that are necessary to accommodate climate changes as it relates to all the project elements.

Integration of Local Land Use Regulations and Management

- Upon project completion, the U.S. Army Corps of Engineer's Project's Annual Inspection of Completed Works (ICW) program provides for monitoring and reporting of any new development within the project area to the appropriate federal, state, and local entities responsible for enforcing applicable land use regulations.

D.3 EXISTING ENVIRONMENT

The following sections provide a description of the invertebrate, finfish, bird, mammal, amphibian, and reptile species/communities that are in the same area as the Recommended Plan. Additional descriptions specific to the Coastal Process Features is provided in the EFH Analysis for the CPF Project Sites, included as Appendix D2 to the FEIS.

D.3.1 Marine Offshore Ecosystem

The 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.

D.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 geotechnical analyses, sand suitable for beach nourishment has been identified within the borrow areas.

D.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.

D.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*).

D.3.1.4 *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

D.3.1.5 *Reptiles*

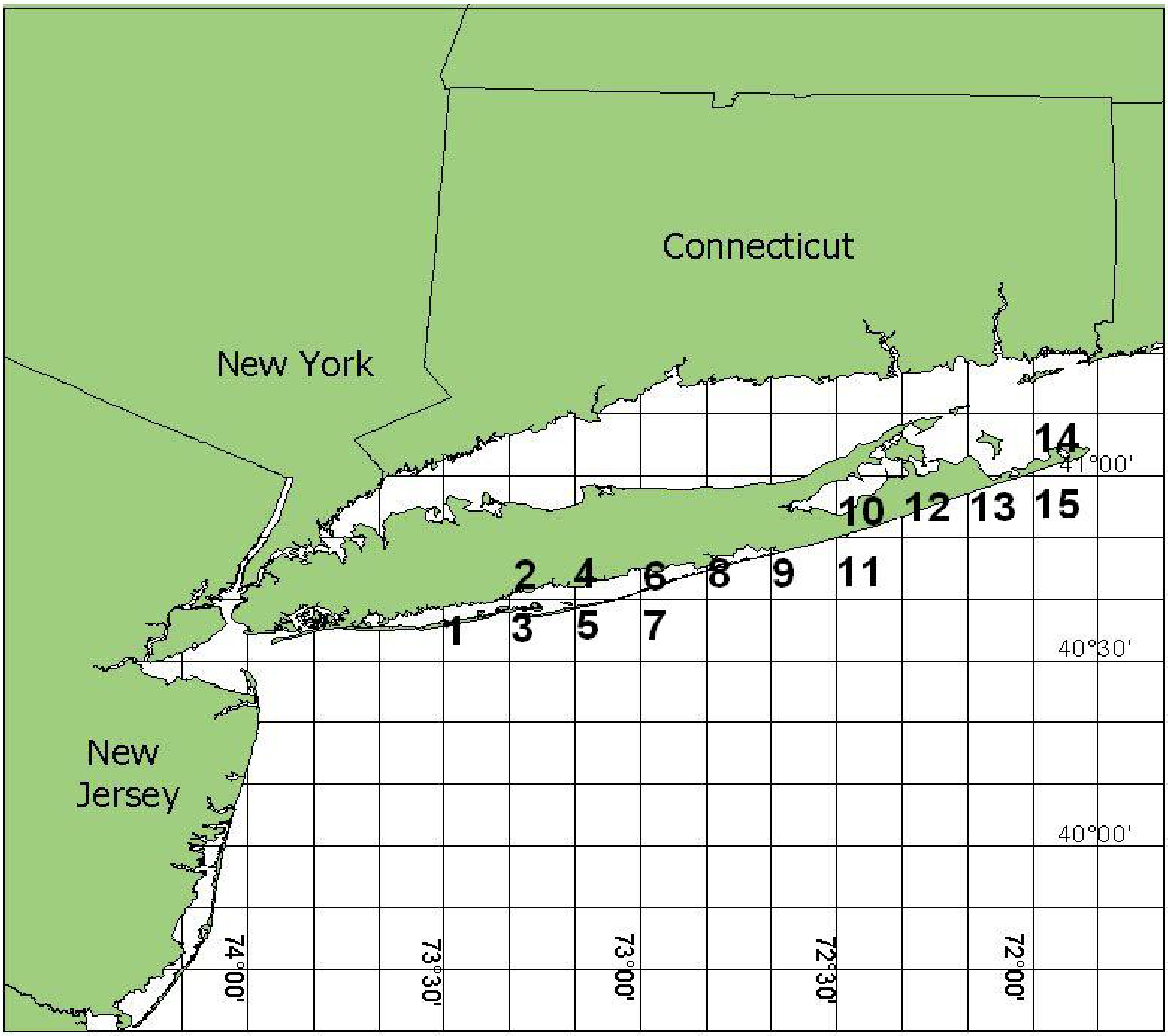
Several species of sea turtles, including Kemps Ridley turtle (*Lepidochelys kempii*, State and Federally Endangered), green sea turtle (*Chelonia mydas*; State and Federally Endangered), and loggerhead sea turtle (*Caretta caretta*; State and Federally Threatened) may also pass through the Marine Offshore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

D.4 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 D.4.1.1 provides individual species assessment of EFH-designated species.

D.4.1 EFH-Designated Species

EFH-designated species and life history stages in the project area were identified based on the lists in the NOAA Guide to EFH Designations in the Northeastern United States (NOAA 2008a) for the 10- minute by 10-minute areas of latitude and longitude (10’ by 10’ square) where project activity is proposed. The Study Area contains EFH for various life stages for up to 38 species of managed fish and protected invertebrate species. The NMFS has created a grid map overlay for areas that contain EFH within their jurisdiction, and provides species information for each species afforded EFH (NOAA 2008a). A map showing the fifteen grid squares associated with the Project study area and corresponding latitude and longitude coordinates is provided as Figure D-2. EFH descriptions for the species contained in the project area and life stages found within each grid square are provided in the below text. Species and life stages contained for each of the 15 grid squares within the project is provided as Attachment 1.



Source: NOAA 2008a

Figure D-2. Essential Fish Habitat Grids within the Project Study Area

D.4.1.1 *Bony Fishes*

Atlantic butterfish (*Peprilus triacanthus*)
Grid squares: 1-6, 8, 9, 10 All stages [Egg (E), Larvae (L), Juvenile (J), Adult (A)], 7 (E), 13 (L), 15 (J)

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

All life stages are listed for Atlantic butterfish in the 10' by 10' squares. 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*)
Grid squares: 1-9 (A); 10 (J, A)

Primary Source: Page and Burr (1991)

Juvenile and adult Atlantic salmon are listed in the 10' by 10' grid squares within the project area. 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*)
Grid squares: 1-6, 10-13 (J, A); 3 (A), 8 (L, J), 9 (J)

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

Larvae, Juvenile and Adult Atlantic sea herring are listed in the 10' by 10' grid squares within the project 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*)
Grid squares: 1-6, 8, 9, 10 (All stages); 11E

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

All life stages of Atlantic mackerel are listed in the 10' by 10' grid squares within the project area. 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 5-6ºC or above 15-16ºC 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)
Grid squares: 1,2,4,8 (A); 3 (L,J); 6,9,13,15 (J,A); 10, 11, 12, 14 (J)

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 feet MLW in the fall and 260 to 460 feet 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*)
Grid squares: 3,5,6-9,11-15 (J,A)

Source: Colette and Nauen (1983)

Adult and juvenile bluefin tuna are listed in the 10’ by 10’ grid squares within the project 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^{o}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)
Grid squares: 1-3,5,6,8,10,12-15(J,A); 4,7(J); 11 (E,J,A); 9 (L,J,A)

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

Eggs, juvenile and adult life stages are listed for bluefish are listed in the 10’ by 10’ grid squares within the project area. 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 30ºC and return to the continental shelf in the fall when water temperatures reach approximately 15ºC. 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 16ºC) and full salinity. Juveniles and adults are present in the fall and prefer depths greater than 35 feet MLW. Eggs and larvae are present in the MAB during the summer and are more commonly found at depths greater than 100 feet 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*)
Grid squares: 1-15 (All stages)

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

All life stages for cobia are listed in the 10’ by 10’ grid squares within the project area. 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.

Haddock (*Melanogrammus aeglefinus*)
Grid squares: 8,11,12,15 (L)

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

The larvae stage for Haddock are listed in the 10’ by 10’ grid squares within the project area. Larvae range in size from 2.0-4.99 mm in length. Haddock initially inhabit the upper reaches of the water column, feeding on pelagic prey (zooplankton). Larvae and early stage (pelagic) juveniles are passive foragers on less motile prey such as invertebrate eggs, copepods and phytoplankton. Juveniles undergo a transformation at age 3 to 5 months, after which they are closely associated with the bottom and feed on benthic prey. The egg and larval stages occur in the water column at depths of 10-50 m below the surface. Temperatures of 4-10^{o}C and high salinities, 34-36 ppt are preferred.

Project Area: Haddock larvae are not very mobile, and pelagic. Larvae density peaks in April and May. They may be present during with the project area; however, most of the larvae are likely to be encountered at greater depths (30-50 m). Therefore, minimal impact is expected to Haddock.

King and Spanish mackerel (*Scomberomorus cavalla and S. maculatus*)
Grid squares: 1-15 (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’ grid squares within the project area. 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*)
Grid squares: 1-15 (E,L)

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’ grid squares within the project area. Monkfish are solitary fish that make seasonal onshore–

offshore migrations in response to water temperature and can be found over a variety of substrates. 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 feet 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.

Ocean pout (*Macrozoarces americanus*)
Grid squares: 1-3,5,7-13,15 (E,L)

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

Eggs and larvae of Ocean pout are listed in the 10’ by 10’ grid squares within the project area. Ocean pout is a bottom-dwelling species that occurs in cool waters (< 10ºC) across the continental shelf from Labrador to Cape Hatteras It is non-migratory, but it will move seasonally to remain at preferred temperatures. The eggs are demersal and laid in gelatinous masses in a sheltered place on the bottom, such as rocky crevices, where they are guarded either by one or both parents until hatching. Egg development is about 2-3 months, but incubation time is temperature dependent and is shorter in the warmer MAB. Most of the population spawns in the fall and hatching occurs by mid-winter. The larvae are about 30 mm long at hatching and are relatively advanced in development. Adult ocean pout remain demersal and are not known to form schools or aggregations. In the Middle Atlantic Bight, ocean pout uses rocky habitats during some seasons. Adult ocean pout feed on a variety of benthic invertebrates, including polychaetes, mollusks, crustaceans, and echinoderms. Although ocean pout moves seasonally among habitats within a region, this species is considered nonmigratory.

Project Area: Ocean pout eggs and larvae would be found in the project area. Because the eggs and larvae are demersal, it is likely that they would be impacted by dredging operations.

Pollock (*Pollachius virens*)
Grid squares: 1-6,10 (J)

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

Juvenile pollock are listed in the 10’ by 10’ grid squares within the project area. 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 the project area 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*)
Grid squares: 1,3,5,8-11,13,15 (E,L,J); 7(E,L); 6(J)

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 grid squares within the project area. 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 ppt. Adults prefer depths from 100 to 425 feet 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*)
Grid squares: 1-9, 11-15(J,A); 10(All stages)

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

The juvenile and adult life stages for scup are listed in the 10’ by 10’ grid squares within the project area. 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*)
Grid squares: 1,3-13,15(A)

Source: Colette and Nauen (1983)

Adult skipjack tuna are listed in the 10' by 10' grid squares within the project area. 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*)
Grid squares: 1-4,11,14 (J,A); 7,12,13,15 (A); 5,10 (L,J,A); 6,8,9 (All stages)

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

Larvae, juvenile and adult summer flounder are listed in the grid squares within the project 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 flounder 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*)
Grid squares: 1,3,5-9,11,13-15(E,L,J); 10 (All stages); 12 (E,L)

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’ grid squares within the project area. 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*)
Grid squares: 1-12,15 (All stages); 13 (E,J,A); 14 (J,A)

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

All life stages for windowpane flounder are listed in the 10’ by 10’ grid squares within the project area. 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 feet 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*)
Grid squares: 1-15 (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’ grid squares within the project area. 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.

Witch flounder (*Glyptocephalus cynoglossus*)
Grid squares: 11,12,15 (L); 8,9(E)

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

Eggs and larvae life stages of witch flounder are listed in the 10’ by 10’ grid squares within the project area. Spawning occurs at or near the bottom, however the buoyant eggs rise into the water column where subsequent egg and larval development occurs. In the MAB spawning occurs from April to August, peaking in May or June and the most important spawning grounds are off Long Island. The main food items in the witch flounder diet are polychaetes and crustaceans, although mollusks and echinoderms are also important. The witch flounder is a deep water fish inhabiting depths down to approximately 1500 m. The egg and larval stages are pelagic, generally over deep water, at temperatures ranging from about 4 to 13oC. When metamorphosis is complete, juveniles settle to the bottom. Juveniles and adults are found at temperatures ranging from about 0 to 15ºC. They are found over mud, clay, silt, or muddy sand substrates at depths ranging from 20 to 1565 m. This close association with soft substrate may be the result of their preference for polychaete prey.

Project Area: Although eggs and larvae life stages of Witch flounder may be found within the project area, eggs are pelagic and larvae are pelagic until eye development occurs and they become demersal. Because of their preference for muddy bottoms, they would not likely be found in the clean sand areas that would be used for dredging. Thus, the witch flounder would not likely be impacted by dredging operations.

Yellowtail flounder (*Limanda ferruginea*)
Grid squares: 5,7,13 (E,A); 12 (E,L); 3 (E); 9,11,15 (All stages); 8 (E,L)

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

All life stages for yellowtail flounder are listed in the grid squares within the project 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, all life stages for yellowtail flounder can 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.

Yellowfin Tuna (*Thunnus albacares*)
Grid squares: 15 (J,A)

Source: USDOC (1999b)

Juvenile and adult yellowfin tuna are listed in the 10’ by 10’ grid squares within the project area. Atlantic yellowfin tuna are circumglobal in tropical and temperate waters. In the west Atlantic they range from 45° N to 40° S. Yellowfin tuna is an epipelagic, oceanic species, found in water temperatures between 18° and 31° C. It is a schooling species, with juveniles found in schools at the surface, Larger fish are found in deeper water and also extend their ranges into higher latitudes. Atlantic yellowfin tuna are opportunistic feeders. Stomachs have been found to contain a wide variety of fish and invertebrates Yellowfin tuna are believed to feed primarily in surface waters down to a depth of 100 m.

Project area: Yellowfin Tuna are highly migratory and epipelagic, and may be present in the project area. No impact on yellowfin tuna or EFH is anticipated as a result of the proposed project.

D.4.1.2 *Cartilaginous Fishes*

Basking shark (*Cetorhinus maximus*)
Grid squares: 13, 15 (J)

Source: USDOC (1999b)

Late juvenile life stages for the basking shark are listed in the 10' by 10' grid squares within the project area. The basking shark is the second largest fish in the world, and is a filter-feeding plankton eater. It is a migratory species of the subpolar and cold temperate seas throughout the world, spending the summer in high latitudes and moving into warmer water in winter. In spite of its size and local abundance in summer, its habits are very poorly known. Late juvenile basking sharks are found offshore the mid-Atlantic United States south of Nantucket Shoals at 70° W to the north edge of Cape Hatteras, NC at 35.5° N in waters 50 to 200 m deep; associated with boundary conditions created by the western edge of the Gulf Stream.

Project Area: EFH is designated within the project grid for basking shark late juveniles. Basking sharks are a cosmopolitan migratory, slow-moving pelagic species and will most likely be able to avoid the hydraulic dredge. Therefore, little to no impact to basking shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Blue shark (*Prionace glauca*)
Grid squares: 3,5,7,9,11,13,14,15 (L,J,A); 1,2,4,10,12(A); 6,8 (L,A)

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' grid squares within the project area. 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.

Common Thresher Shark (*Alopias vulpinus*)
Grid squares: 3,5,7,9,11,13,15 (L,J,A)

Source: USDOC (1999b)

Early juvenile, late juvenile and adult life stages for the common thresher shark are listed in the 10' by 10' grid squares within the project area. The common thresher shark is cosmopolitan in warm and temperate waters. It is found in both coastal and oceanic waters. It is a large shark that uses its tremendously large tail to hit and stun the small schooling fishes upon which it feeds.

Common thresher shark is found Offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70° W and 73.5° W, south to 40° N.

Project Area: EFH is designated within the project grid for common thresher shark early juveniles, late juveniles, and adults. Common thresher sharks are a pelagic, highly mobile species and will most likely be able to avoid the hydraulic dredge. Additionally, they are typically encountered at greater depths than where dredging will occur. Therefore, little to no impact to common thresher shark or EFH is anticipated as a result of the dredging activities associated with the proposed Project.

Dusky Shark (*Carcharhinus obscurus*)
Grid squares: 1,3,5-9, 11,12,14,15 (L,J); 2,4,10,13 (L)

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

Early juvenile and late juvenile life stages for the dusky shark are listed in the 10' by 10' grid squares within the project area. 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*)
Grid squares: 1-15(L)

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 feet. 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*)
Grid squares: 1-15 (L,J,A)

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’ grid squares within the project area. 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*)
Grid squares: 1,12,14(J); 3,5,7,11,15 (L,J,A); 8,9,13 (L,J)

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

Early juvenile, late juvenile and adult life stages for the shortfin mako shark are listed in the grid squares within the project area. 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.

Spiny dogfish (*Squalus acanthias*)
Grid squares: 14 (J,A); 15(J)

Source: Stehlik 2007

Birth occurs offshore in fall or winter. The pups at birth range from 20-33 cm in total length, with the majority at 26-27 cm. Spiny dogfish feed on squid and fish throughout life. They tend to eat small size classes or young fish, and as they grow they eat larger individuals of the same species. Squid are a major part of the diet in all geographical areas except for the Mid-Atlantic.

Worldwide, spiny dogfish favor the temperature range of 7-15°C . Migrations may be over great distances in order to seek out preferred conditions. The mean salinity in locations where they are caught is 33.5 ppt. Large females are abundant on the nearshore shelf and in lower salinities, perhaps to allow maximal growth of their embryos in warmer coastal waters. Juveniles are mainly pelagic and oceanic. Adults are demersal and pelagic, and spawning adults are pelagic or demersal on the outer continental shelf.

Project Area: Juvenile and adult Spiny dogfish may be present if the project area. However, they are mobile and would not likely be impacted by dredging operations.

Tiger shark (*Galeocerdo cuvieri*)
Grid squares: 3,5,6-9,11-13,15 (L,J); 10 (J); 1 (L)

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

Early juvenile and late juvenile life stages for the tiger shark are listed in the 10’ by 10’ grid squares within the project area. Tiger sharks typically inhabit 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*)
Grid squares: 3,5-13,15(J)

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

The late juvenile life stage for the white shark is listed in the 10’ by 10’ grid squares within the project area. 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.

D.4.1.3 *Invertebrate Species*

Atlantic surf clam (*Spisula solidissima*)
Grid squares: 1,3,5,7,13,15 (J,A); 9,11 (A)

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’ grid squares within the project area. 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*)
Grid squares: 6,7,11-13,15 (J,A); 1,3,9,10,14(J)

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’ grid squares within the project area. 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*)
Grid squares: 15 (J)

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’ grid squares within the project area. 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 within 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 shortfin squid or EFH is anticipated to result from the proposed Project.

Ocean quahog (*Arctica islandica*)
Grid squares: 3,7,9,11,13,15 (J,A); 5(A)

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

Juvenile and adult life stages for the ocean quahog are listed in the grid squares within the project area. 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.

D.5 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 D-2 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.

D.5.1 Habitat Impacts

The proposed dredging activities at the offshore borrow areas are described in Section D.2.2.3. The Marine Offshore ecosystem where the borrow areas are located is described in Section D.3. The proposed dredging activities associated with the project initial construction would be conducted in the 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.

D.5.2 Direct Impacts

The following subsections provide a general impact assessment for EFH-designated species (Table D-2). 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 D-2. 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 mackerel	E/L/J/ A	All life stages are pelagic. No significant impact.
Atlantic salmon	J/A	Not likely to occur in the project area. No significant impact
Atlantic sea herring	L/J/A	Pelagic, zooplankton-feeding species. No significant impact.
Black sea bass	J	Loss of benthic infaunal prey organisms would have minimal impact because fish feed primarily on more mobile benthic epifaunal species and small fish.
	L/A	
Bluefin tuna	J/A	Not likely to occur in the project area. No significant impact
Bluefish	E, 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.
Haddock	L	Pelagic, may 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.
Ocean pout	E/L	Eggs and larvae are demersal, potential to be impacted by dredging operations.

EFH-Designated Species	Life Stage	Potential Impacts
Pollock	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 flounder	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.
Cartilaginous Fish Species		

EFH-Designated Species	Life Stage	Potential Impacts
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/A	Not likely to occur in the project area. No significant impact.
Spiny dogfish	J/A	May occur in the 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	J/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	No significant impact from loss of benthic infaunal species because primary prey are fish and mobile epifaunal species.
Ocean quahog	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		

D.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.

D.6 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 offshore borrow areas and subsequent placement of dredged material on beaches will not cause adverse effects to EFH-designated species or EFH. The New York District will continue coordination with NOAA to get to a mutual understanding agreement on this policy.

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ATTACHMENT 1

SPECIES AND LIFE STAGES FOR THE 15 GRID SQUARES

<u>Grid 1 (40° 30.0’ N, 73° 20.0’ W)</u>

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square affecting the following: south of Amityville, NY, Lindenhurst, NY, Copiague, NY, Seaford, NY, Massapequa, NY, Biltmore Shores, NY, and Nassau Shores, NY, Seaford Creek and Amityville Creek. These waters are also within Great South Bay affecting the following: Jones Beach Island, Toby Beach, and Cedar Island from the western half of Cedar Island Beach to Jones Beach State Park. Also, these waters affect Zachs Bay, eastern Hempstead Bay and southern Oyster Bay, and around the following Islands: South Line, North Line, Goose, and Gilgo.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Pollock (Pollachius virens)			x	
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)			x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a			x
Surf Clam (Spisula solidissima)	n/a	n/a	x	x
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)				x
Dusky Shark (Charcharinus obscurus)		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Shortfin Mako Shark *(Isurus oxyrhyncus)*			x	
Tiger Shark (Galeocerdo cuvieri)		x		
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008
Notes: Boundary coordinates: North: 40° 40.0’ N, East: 73° 20.0’ W, South: 40° 30.0’ N, West: 73° 30.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 2 (40° 40.0’ N, 73° 10.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Great South Bay, south of East Islip, NY, Islip, NY, Bay Shore, NY, Great Cove, and Babylon, NY, from west of Nicoll Pt. to Bergen Pt.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Pollock (Pollachius virens)			x	
Redfish (Sebastes fasciatus)	n/a			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a		
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)			x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a			x
Surf Clam (Spisula solidissima)	n/a	n/a		
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)				x
Dusky Shark (Charcharinus obscurus)		x		
Sandbar Shark (Charcharinus plumbeus)		x	x	x

Source: NOAA 2008

Notes: Boundary coordinates: North: 40 50.0’ N, East: 73 10.0’ W, South: 40 40.0’ N, West: 73 20.0’ W.

n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 3 (40° 30.0’ N, 73° 10.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): The waters within the square within the Atlantic Ocean and within Great South Bay estuary affecting the following: East and West Fire Island, Saltaire, NY and Democrat Pt. on Fire Island. Captree I., Sexton I., Oak I., Cedar Island Beach, Oak Beach, and the Fire Island Inlet.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Pollock (Pollachius virens)			x	
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x			
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*				x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)			x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a	x	x	x
Surf Clam (Spisula solidissima)	n/a	n/a	x	x
Ocean Quahog (Artica islandica)	n/a	n/a	x	x
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Common Thresher Shark *(Alopias vulpinus)*		x	x	x
Blue Shark (Prionace glauca)		x	x	x
White Shark (Charcharadon carcharias)			x	
Tiger Shark (Galeocerdo cuvieri)		x	x	
Dusky Shark (Charcharinus obscurus)		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	x
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008
Notes: Boundary coordinates: North: 40 40.0’ N, East: 73 10.0’ W, South: 40 30.0’ N, West: 73 20.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 4 (40° 40.0’ N, 73° 00.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square and within Great South Bay, north of Ocean Beach, and south of Sayville, NY and Boheamia, NY, from Patchogue, NY and western Patchogue Bay to just west of Nicoll Pt. on Nicoll Bay, southeast of Great River, NY, and the Connetquot River.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Pollock (Pollachius virens)			x	
Redfish (Sebastes fasciatus)	n/a			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a		
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)			x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a			x
Surf Clam (Spisula solidissima)	n/a	n/a		
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)				x
Dusky Shark (Charcharinus obscurus)		x		
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008

Notes: Boundary coordinates: North: 40□ 50.0’ N, East: 73□ 00.0’ W, South: 40□ 40.0’ N, West: 73□ 10.0’ W.

n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 5 (40° 30.0' N, 73° 00.0' W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Great South Bay estuary south and north of Ocean Beach, NY on Fire Island.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Pollock (Pollachius virens)			x	
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Redfish (Sebastes fasciatus)	n/a			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x			x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)		x	x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a	x		x
Surf Clam (Spisula solidissima)	n/a	n/a	x	x
Ocean Quahog (Artica islandica)	n/a	n/a		x
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Common Thresher Shark *(Alopias vulpinus)*		x	x	x
Blue Shark (Prionace glauca)		x	x	x
White Shark (Charcharadon carcharias)			x	
Tiger Shark (Galeocerdo cuvieri)		x	x	
Dusky Shark (Charcharinus obscurus)		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	x
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008
Notes: Boundary coordinates: North: 40 40.0' N, East: 73 00.0' W, South: 40 30.0' N, West: 73 10.0' W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 6 (40° 40.0’ N, 72° 50.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Great South Bay estuary affecting the following: south of Great South Beach on Fire Island, within western Narrow Bay and Bellport Bay, from Mastic Beach, NY, to the Swan River in East Patchogue, NY. Also affected are eastern Patchogue Bay, and south of Bellport, NY, North Bellport, NY, Brookhaven, NY, Mastic, NY, and East Patchogue, NY.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Pollock (Pollachius virens)			x	
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)			x	
Redfish (Sebastes fasciatus)	n/a			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)	x	x	x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a		x	x
Surf Clam (Spisula solidissima)	n/a	n/a		
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)		x		x
White Shark (Charcharadon carcharias)			x	
Dusky Shark (Charcharinus obscurus)		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Tiger Shark (Galeocerdo cuvieri)		x	x	
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008

Notes: Boundary coordinates: North: 40 50.0’ N, East: 72 50.0’ W, South: 40 40.0’ N, West: 73 00.0’ W.

n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 7 (40° 30.0’ N, 72° 50.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): The waters within the square within the Atlantic Ocean one square south of the square affecting Great South Beach on Fire Island, and Mastic Beach, NY, East Patchogue, NY, Bellport, NY, North Bellport, NY, Brookhaven, NY, Mastic, NY, and East Patchogue, NY.

Species	Eggs	Larvae	Juveniles	Adults
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x		
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x			x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	x
Atlantic Butterfish (Peprilus triacanthus)	x			
Summer Flounder (Paralicthys dentatus)				x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a			x
Surf Clam (Spisula solidissima)	n/a	n/a	x	x
Ocean Quahog (Artica islandica)	n/a	n/a	x	x
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Common Thresher Shark *(Alopias vulpinus)*		x	x	x
Blue Shark (Prionace glauca)		x	x	x
White Shark (Charcharadon carcharias)			x	
Tiger Shark (Galeocerdo cuvieri)		x	x	
Dusky Shark (Charcharinus obscurus)		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	x
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008
Notes: Boundary coordinates: North: 40 40.0’ N, East: 72 50.0’ W, South: 40 30.0’ N, West: 73 00.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

<u>Grid 8 (40° 40.0’ N, 72° 40.0’ W)</u>

Square Description (i.e. habitat, landmarks, coastline markers): 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, south of Eastport, NY, Speonk, NY, and Remsenberg, NY, from Apaucuck Pt. to Mastic Beach, NY, along with waters within eastern Narrow Bay.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Haddock (Melanogrammus aeglefinus)		x		
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Witch Flounder (Glyptocephalus cynoglossus)	x			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x	x		
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*		x	x	
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a		
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)	x	x	x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a			x
Surf Clam (Spisula solidissima)	n/a	n/a		
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)		x		x
White Shark (Charcharadon carcharias)			x	
Dusky Shark (Charcharinus obscurus)		x	x	
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Tiger Shark (Galeocerdo cuvieri)		x	x	
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008

Notes: Boundary coordinates: North: 40□ 50.0’ N, East: 72□ 40.0’ W, South: 40□ 40.0’ N, West: 72□ 50.0’ W.

n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 9 (40° 40.0’ N, 72° 30.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): The waters within the square within the Atlantic Ocean and within the Great South Bay estuary affecting the following: south of Westhampton, NY, Quiogue, NY, Quogue, NY, and Tiana Beach, and within Quantuck Bay and the eastern tip of Moriches Bay.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*				x
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Witch Flounder (Glyptocephalus cynoglossus)	x			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*			x	
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)		x	x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)	x	x	x	x
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)	x	x	x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a		x	x
Surf Clam (Spisula solidissima)	n/a	n/a		x
Ocean Quahog (Artica islandica)	n/a	n/a	x	x
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Common Thresher Shark *(Alopias vulpinus)*		x	x	x
Blue Shark (Prionace glauca)		x	x	x
White Shark (Charcharadon carcharias)			x	
Dusky Shark (Charcharinus obscurus)		x	x	
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	
Tiger Shark (Galeocerdo cuvieri)		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008
Notes: Boundary coordinates: North: 40° 50.0’ N, East: 72° 30.0’ W, South: 40° 40.0’ N, West: 72° 40.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.
Grid 10 (40° 50.0’ N, 72° 20.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Gardiners Bay, western Little Peconic Bay and eastern Great Peconic Bay affecting the following: southwest of New Suffolk, NY, Cutchogue, NY, southern Nassau Pt., Robins I., along with and north of North Sea, NY, Sebonac Neck, NY, Southampton , NY, and Shinecock Hills, NY, from Shinecock Canal to south of Jessup Neck. Also, within the Atlantic Ocean south of Southampton, NY, from south of Mecox Bay to just west of the Shinnecock Inlet, within eastern Shinecock Bay. Also, waters within Great South Bay estuary can be found at the very bottom of the square.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic Salmon *(Salmo salar)*			x	x
Pollock (Pollachius virens)			x	
Whiting (Merluccius bilinearis)	x	x	x	x
Red Hake (Urophycis chuss)	x	x	x	
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Mackerel *(Scomber scombrus)*	x	x	x	x
Summer Flounder (Paralicthys dentatus)		x	x	x
Scup (Stenotomus chrysops)	x	x	x	x
Black Sea Bass (Centropristus striata)	n/a		x	
Surf Clam (Spisula solidissima)	n/a	n/a		
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)				x
White Shark (Charcharadon carcharias)			x	
Dusky Shark (Charcharinus obscurus)		x		
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Tiger Shark (Galeocerdo cuvieri)			x	
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008
Notes: Boundary coordinates: North: 41□ 00.0’ N, East: 72□ 20.0’ W, South: 40□ 50.0’ N, West: 72□ 30.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 11 (40° 40.0’ N, 72° 20.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square one square south of the square affecting the following: western Little Peconic Bay and eastern Great Peconic Bay, southwest of New Suffolk, NY, Cutchogue, NY, North Sea, NY, Sebonac Neck, NY, and within the Atlantic Ocean, waters affecting Southampton , NY, and Shinecock Hills, NY, and Southampton, NY.

Species	Eggs	Larvae	Juveniles	Adults
Haddock (Melanogrammus aeglefinus)		x		
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Witch Flounder (Glyptocephalus cynoglossus)		x		
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)	x		x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	x
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Mackerel *(Scomber scombrus)*	x			
Summer Flounder (Paralicthys dentatus)			x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a		x	
Surf Clam (Spisula solidissima)	n/a	n/a		x
Ocean Quahog (Artica islandica)	n/a	n/a	x	x
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Common Thresher Shark *(Alopias vulpinus)*		x	x	x
Blue Shark (Prionace glauca)		x	x	x
White Shark (Charcharadon carcharias)			x	
Tiger Shark (Galeocerdo cuvieri)		x	x	
Dusky Shark (Charcharinus obscurus)		x	x	
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	x
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008

Notes: Boundary coordinates: North: 40° 50.0’ N, East: 72° 20.0’ W, South: 40° 40.0’ N, West: 72° 30.0’ W.

n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 12 (40° 50.0’ N, 72° 10.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Waters within the square affecting the following: from south of East Hampton, NY, to half way through Mecox Bay, east of Southampton, NY, including south of Wainscott, NY, and Bridgehampton, NY, within the Atlantic Ocean.

Species	Eggs	Larvae	Juveniles	Adults
Haddock (Melanogrammus aeglefinus)		x		
Whiting (Merluccius bilinearis)	x	x		
Red Hake (Urophycis chuss)	x	x	x	
Redfish (Sebastes fasciatus)	n/a			
Witch Flounder (Glyptocephalus cynoglossus)		x		
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x	x		
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	x
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Summer Flounder (Paralicthys dentatus)				x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a		x	
Surf Clam (Spisula solidissima)	n/a	n/a		
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)				x
White Shark (Charcharadon carcharias)			x	
Dusky Shark (Charcharinus obscurus)		x	x	
Shortfin Mako Shark *(Isurus oxyrhyncus)*			x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Tiger Shark (Galeocerdo cuvieri)		x	x	
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x

Source: NOAA 2008

Notes: Boundary coordinates: North: 41° 00.0’ N, East: 72° 10.0’ W, South: 40° 50.0’ N, West: 72° 20.0’ W.

n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 13 (40° 50.0’ N, 72° 00.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Long Island Sound affecting north of Devon Yacht Club and Amagansett, NY, along with affecting south of Long Island from just southeast of Hither Hills State Park to southeast of East Hampton, NY.

Species	Eggs	Larvae	Juveniles	Adults
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Redfish (Sebastes fasciatus)	n/a			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x			x
Windowpane Flounder (Scopthalmus aquosus)	x		x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*			x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	x
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Atlantic Butterfish (Peprilus triacanthus)		x		
Summer Flounder (Paralicthys dentatus)				x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a		x	x
Surf Clam (Spisula solidissima)	n/a	n/a	x	x
Ocean Quahog (Artica islandica)	n/a	n/a	x	x
Spiny Dogfish (Squalus acanthias)	n/a	n/a		
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Common Thresher Shark *(Alopias vulpinus)*		x	x	x
Blue Shark (Prionace glauca)		x	x	x
White Shark (Charcharadon carcharias)			x	
Dusky Shark (Charcharinus obscurus)		x		
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Tiger Shark (Galeocerdo cuvieri)		x	x	
Bluefin Tuna (Thunnus thynnus)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x
Basking Shark (Cetorhinus maximus)			x	

Source: NOAA 2008
Notes: Boundary coordinates: North: 41° 00.0’ N, East: 72° 00.0’ W, South: 40° 50.0’ N, West: 72° 10.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 14 (41° 00.0’ N, 71° 50.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square affecting the northeast tip of Long Island from just west of Rocky Point on the north side around Fort Pond Bay, past Lake Montauk, Shagwong Pt., False Pt., Montauk Pt., and Montauk, NY, to just east of Hither Hills State Park.

Species	Eggs	Larvae	Juveniles	Adults
Whiting (Merluccius bilinearis)	x	x	x	
Redfish (Sebastes fasciatus)	n/a			
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)			x	x
Ocean Pout (Zoarces americanus)	x	x		x
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	
Short-finned Squid (Illex illecebrosus)	n/a	n/a		
Summer Flounder (Paralicthys dentatus)			x	x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a		x	
Surf Clam (Spisula solidissima)	n/a	n/a		
Ocean Quahog (Artica islandica)	n/a	n/a		
Spiny Dogfish (Squalus acanthias)	n/a	n/a	x	x
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)		x	x	x
Dusky Shark (Charcharinus obscurus)		x	x	
Shortfin Mako Shark *(Isurus oxyrhyncus)*			x	
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Bluefin Tuna (Thunnus thynnus)			x	x

Source: NOAA 2008
Notes: Boundary coordinates: North: 41□ 10.0’ N, East: 71□ 50.0’ W, South: 41□ 00.0’ N, West: 72□ 00.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

Grid 15 (40° 50.0’ N, 71° 50.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): The waters within the square within the Atlantic Ocean one square south of the eastern most tip of Long Island, south one square.

Species	Eggs	Larvae	Juveniles	Adults
Haddock (Melanogrammus aeglefinus)		x		
Whiting (Merluccius bilinearis)	x	x	x	
Red Hake (Urophycis chuss)	x	x	x	
Redfish (Sebastes fasciatus)	n/a			
Witch Flounder (Glyptocephalus cynoglossus)		x		
Winter Flounder (Pseudopleuronectes americanus)	x	x	x	x
Yellowtail Flounder (Limanda ferruginea)	x	x	x	x
Windowpane Flounder (Scopthalmus aquosus)	x	x	x	x
Ocean Pout (Zoarces americanus)	x	x		x
Atlantic Sea Herring *(Clupea harengus)*		x	x	x
Monkfish (Lophius americanus)	x	x		
Bluefish (Pomatomus saltatrix)			x	x
Long-finned Squid *(Loligo pealei)*	n/a	n/a	x	x
Short-finned Squid (Illex illecebrosus)	n/a	n/a	x	
Atlantic Butterfish (Peprilus triacanthus)			x	
Summer Flounder (Paralicthys dentatus)				x
Scup (Stenotomus chrysops)	n/a	n/a	x	x
Black Sea Bass (Centropristus striata)	n/a		x	x
Surf Clam (Spisula solidissima)	n/a	n/a	x	x
Ocean Quahog (Artica islandica)	n/a	n/a	x	x
Spiny Dogfish (Squalus acanthias)	n/a	n/a	x	
King Mackerel (Scomberomorus cavalla)	x	x	x	x
Spanish Mackerel (Scomberomorus maculatus)	x	x	x	x
Cobia (Rachycentron canadum)	x	x	x	x
Sand Tiger Shark (Odontaspis taurus)		x		
Blue Shark (Prionace glauca)		x	x	x
White Shark (Charcharadon carcharias)			x	
Dusky Shark (Charcharinus obscurus)		x	x	
Shortfin Mako Shark *(Isurus oxyrhyncus)*		x	x	x
Sandbar Shark (Charcharinus plumbeus)		x	x	x
Tiger Shark (Galeocerdo cuvieri)		x	x	
Bluefin Tuna (Thunnus thynnus)			x	x
Yellowfin Tuna (Thunnus albacares)			x	x
Skipjack Tuna (Katsuwonus pelamis)				x
Common Thresher Shark *(Alopias vulpinus)*		x	x	x
Basking Shark (Cetorhinus maximus)			x	

Source: NOAA 2008
Notes: Boundary coordinates: North: 41 00.0’ N, East: 71 50.0’ W, South: 40 50.0’ N, West: 72 00.0’ W.
n/a = these species either have no data available on the designated lifestages, or those lifestages are not present in the species' reproductive cycle.

APPENDIX D2

Essential Fish Habitat Analysis
CPF Project Sites

TAYLOR ENGINEERING, INC.

Coastal Process Features
Essential Fish Habitat Analysis
CPF Project Sites

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Coastal Process Features
Essential Fish Habitat Analysis
CPF Project Sites

Report

Prepared for

U.S. Army Corps of Engineers New York District

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1.0 ESSENTIAL FISH HABITAT FOR COASTAL PROCESS FEATURES

1.1 Purpose and Objective of Essential Fish Habitat Assessment

The regional fisheries management councils, with assistance from National Marine Fisheries Service (NMFS), are required under the 1996 amendments to Magnuson-Stevens Fishery Management and Conservation Act to delineate Essential Fish Habitat (EFH) for all managed species, minimize to the extent practicable adverse effects on EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1802(10)). In addition, the presence of adequate prey species is one of the biological properties that can define EFH. The regulations further clarify EFH by defining "waters" to include aquatic areas that are used by fish (either currently or historically) and their associated physical, chemical, and biological properties; "substrate" to include sediment, hard bottom, and structures underlying the water; areas used for "spawning, breeding, feeding, and growth to maturity" to cover a species' full life-cycle; and "prey species" as being a food source for one or more designated fish species.

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

The objective of this EFH assessment is to describe the potential adverse effects to designated EFH for federally-managed fisheries species within the project areas. It will also describe the conservation measures proposed to avoid, minimize or otherwise offset potential adverse effects to designated EFH resulting from the recommended plan.

1.2 Project Background

The developed areas of the barrier islands have a long history of storm damages due to wave attack, erosion of the beach and dune, and tidal flooding of infrastructure that occurs when water elevations during hurricanes and nor'easters exceed the beach and dune elevations. In addition to impacting infrastructure on the barrier island, the barrier island itself is also vulnerable to storms that erode the beach, overwash the dune system, deposit overwash fans on the bay side of the island and in the associated estuaries and create breaches (new inlets) through 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), destroying buildings and other infrastructure in the migration path. 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 bay environment from ocean tidal exchange combined with storm-associated elevated high water levels. This effect continues to increase as the breach grows. On the bay side of the island, breaches create open, unvegetated beach and gently sloping intertidal areas (overwash fans) of particular value to the piping plover and seabeach amaranth, federally listed Threatened species, and of value to a wide variety of other fauna that forage in the intertidal zone. One purpose of the Coastal Process Features projects is to reestablish coastal habitat features that are important to coastal flora and fauna that have been or could be reduced by projects intended to minimize overwash and breaching of the barrier islands. While the estuary bottoms include extensive shallow subtidal habitat, intertidal habitat is limited to the dynamic ribbon of shoreline at the edges of the barrier islands and Long Island. These shorelines are constantly undergoing change. Overwash fans locally convert vegetated beach to unvegetated coarse sand beach and add intertidal habitat in place of subtidal sandy and muddy bottom. The sand erodes, creating additional substrate for seagrass where less desirable physical substrate may have previously dominated. Elimination and stabilization of undeveloped barrier island overwash and erosion cycles result in elimination of significant sand addition to subtidal areas and changes to the associated plant and animal communities.

1.3 Study Area

The Study Area for the Fire Island Management Plan (FIMP) extends from Fire Island Inlet east to Montauk Point along the Atlantic coast of Suffolk County, Long Island, New York (Figure 2.1). The Coastal Process Features (CPF) study area runs (with a few exceptions) along the bay side of the barrier islands beginning at the west end of Fire Island Inlet and extending to sites along the western portion of Shinnocock Bay near Mastic Beach and West Hampton Dunes, more than 50 miles. Within that coastal reach, three CPF sites, Mastic Beach 1, Mastic Beach 2 Area 1, and Mastic Beach 2 Area 2 locate on Narrows Bay, along the south shore of Long Island opposite Pattersquash Reach. Within the study area, project footprints total about eight miles in length. Much of Fire Island lies within the legislative boundaries of the Fire Island National Seashore (FIIS), managed by the National Park Service (NPS).

Public lands throughout the barrier island segment provide areas where natural resources are protected to the greatest extent possible. FIIS is located along the Atlantic Ocean on Fire Island, Great South Bay, Moriches Bay, and Shinnecock Bay shorelines. As part of its mission statement for FIIS, NPS seeks to preserve natural processes and protect ecological resources.

2.0 PROPOSED FEDERAL ACTION

The key components to the proposed action for the larger FIMP project include: Beach Restoration (Beach and Dune Fill), Sediment Management (including Inlet Modification), Groins (including Groin Modification), Breach Response Plan (BRP), Coastal Process Features, Non-Structural Methods, and Adaptive Management. This analysis considers the effects of Coastal Process Features development on EFH. The analysis supplements the original FIMP project EFH assessment performed for the Atlantic Ocean project components. Note that the CPF features are just one of many FIMP project features.

2.1 Problem Identification

The problems along the shorefront include storm damages due to erosion, wave attack, and flooding. Along the barrier island there is also the threat of barrier island overwash and breaching. Along the back bay, there is the threat of tidal flooding during no-breach conditions. Tidal flooding becomes worse when there is a breach of the barrier island, which allows for more storm surge from the ocean to enter the bay. These storm-related conditions have occurred repeatedly in the past, resulting in damages to the built environment.

The principal problems are associated with extreme tides and waves that can cause extensive flooding and erosion within both barrier island and mainland communities. Breaching and/or inundation of the barrier islands also can lead to increased flood damages, especially along the mainland communities bordering Great South, Moriches, and Shinnecock Bays. The following are general conclusions regarding these damages.

- The greatest potential damages in the study area are along the mainland floodplain.
- Among the mainland floodplain areas, Great South Bay is the most vulnerable to storm damages.
- Along the mainland floodplain areas, specific measures need to be considered to address localized flooding.
- The barrier island provides a high degree of protection to the mainland and that protection can be compromised by a breach. Specific measures need to be considered to stabilize the barrier island.
- Along the shorefront area, the area of greatest threat from storm damages under current conditions is Fire Island.
- Along the shorefront, the potential for damages increases dramatically in all areas in the future.
- It is clear from past degradation that storm damage reduction measures and coastal process features must be evaluated together to reestablish system functioning.
- Reestablishment of longshore transport should be given priority, as most other coastal processes are contingent upon a balanced sediment transport system.

2.2 Project Authorization

The Fire Island Inlet to Montauk Point, New York, Combined Beach Erosion Control and Hurricane Coastal Strom Risk Management 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).

2.3 Preferred Alternative (Tentatively Selected Plan)

Recent storms such as Hurricanes Sandy and 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 storms. The proposed action has been developed to reinforce the existing dune and berm system along the island.

The key components to the proposed action are: Beach Restoration (Beach and Dune Fill), Sediment Management (including Inlet Modification), Groins (including Groin Modification), Breach Response Plan (BRP), Coastal Process Features, Non-Structural Methods, and Adaptive Management. The Coastal Process Features component seeks to replace barrier island components that will be created much less frequently due to the beach and dune fill program. The discussion below describes the Coastal Process Features component for each of the 10 project locations.

2.3.1 Recommended CPF Plan

Collaborative planning established specific objectives through the development of a Restoration Framework (USACE 2009). In a natural ecosystem, features such as barrier islands and dunes protect coastal lands and property, reduce danger to human life stemming from flooding and erosion, and support habitats important to coastal species. This framework called for the reestablishment of five coastal processes that are critical to the development and sustainability of the various coastal features (such as beaches, dunes, barrier islands and bluffs), which together form the natural system vital to maintain the natural coastal features: Longshore Sediment Transport; Cross Island Sediment Transport (washover areas); Dune Development and Evolution; Estuarine Circulation; and Bayside Shoreline Processes (USACE 2009).

2.3.2 Project Elements

Reestablishment of the coastal processes to provide coastal features that contribute to coastal storm risk management and include establishment of avian endangered species habitat occur at twelve locations (Figure 2.1). The CPF projects analyzed in this document (Table 2.1) include non-structural management measures to increase nesting and intertidal habitat for piping plover and simulate cross-island washover. The project also provides, and where existing, protects seabeach amaranth. These objectives are accomplished with the following management measures, applied variously at the ten sites as necessary to achieve the project goals: grading, additional of fill, and vegetation removal (except for seabeach amaranth).

Table 2.1 CPF Project Descriptions

	CPF Project Description	ESA Habitat Creation?
1	Democrat Point West – Improvement of natural conditions of the dune, upper beach, and shoreline. Regrading to simulate cross island washover topography. Regrading and devegetating to establish ESA avian habitat.	YES
2	Democrat Point East – Regrading and devegetating to establish ESA avian habitat	YES
3	Dunefield West of Field 4 – Devegetating to establish ESA avian habitat	YES
4	Clam Pond – Placement of fill to restore the preexisting sand lobe. Stabilization of disturbed areas to simulate cross island washover areas. Fill placement and devegetating to establish ESA avian habitat.	YES
5	Atlantique to Corneille – Placement of fill to improve natural conditions of the upper beach and shoreline. Stabilization of disturbed areas to simulate cross island washover areas. Placement of fill and devegetation to establish ESA avian habitat	YES
6	Talisman – Placement of fill to improve natural conditions of the upper beach and shoreline. Stabilization of disturbed areas to simulate cross island washover areas. Fill placement and devegetating to establish ESA avian habitat.	YES
7	Pattersquash Reach – Placement of fill to simulate cross island washover areas and reestablish bay shoreline. Fill placement and devegetation to establish ESA avian habitat.	YES
8	New Made Island – Placement of fill to simulate cross island washover areas and reestablish bay shoreline. Fill placement and devegetation to establish ESA avian habitat.	YES
9	Smith Point County Park Marsh salt marsh enhancement by filling and grading to eliminate drainage ditches and restore typical salt marsh topography, including supratidal areas.	

	CPF Project Description	ESA Habitat Creation?
10	Great Gun – Devegetation to establish ESA avian habitat.	YES
11	Dune Road – Remove existing bulkheads, placement of fill to simulate cross island washover.	
12	Tiana Bayside Park – Address existing gabions, placement of fill to simulate cross island washover.	
MB1	Mastic Beach 1 – restore upland forest, high marsh and low marsh communities at Pattersquash Creek	
MB2-1	Mastic Beach 2 Area 1 – Restore upland maritime forest, high marsh and low marsh communities east of Pattersquash Creek	
MB2-2	Mastic Beach 2 Area 2 – Restore upland maritime forest, high marsh and low marsh communities along the west side of Lawrence Creek	

Note that all the projects provided benefits to ESA listed avian species, as the projects not specifically designed to create and/or enhance avian nesting and foraging habitat provide valuable wetlands and beach areas also beneficial to the critical life behaviors of the same listed species.

Barrier Islands are physically dynamic, with erosion and accretion occurring simultaneously at various locations on both the ocean and estuarine shorelines. Storms may rapidly and dramatically alter both ocean and estuarine shores, as occurred most recently during Hurricane Sandy in 2012. The Pattersquash Reach and New Made Island CPF project areas obtained new intertidal and supratidal habitat during that storm; by 2017 those areas had undergone significant erosion. Review of historic aerial photography suggests that several of the other CPF project sites have experienced significant long-term erosion losses of beach and intertidal areas. Much of the loss appears associated with seawalls and other man-made structures. The CPF projects proposed for those locations will replace the areas lost to erosion.

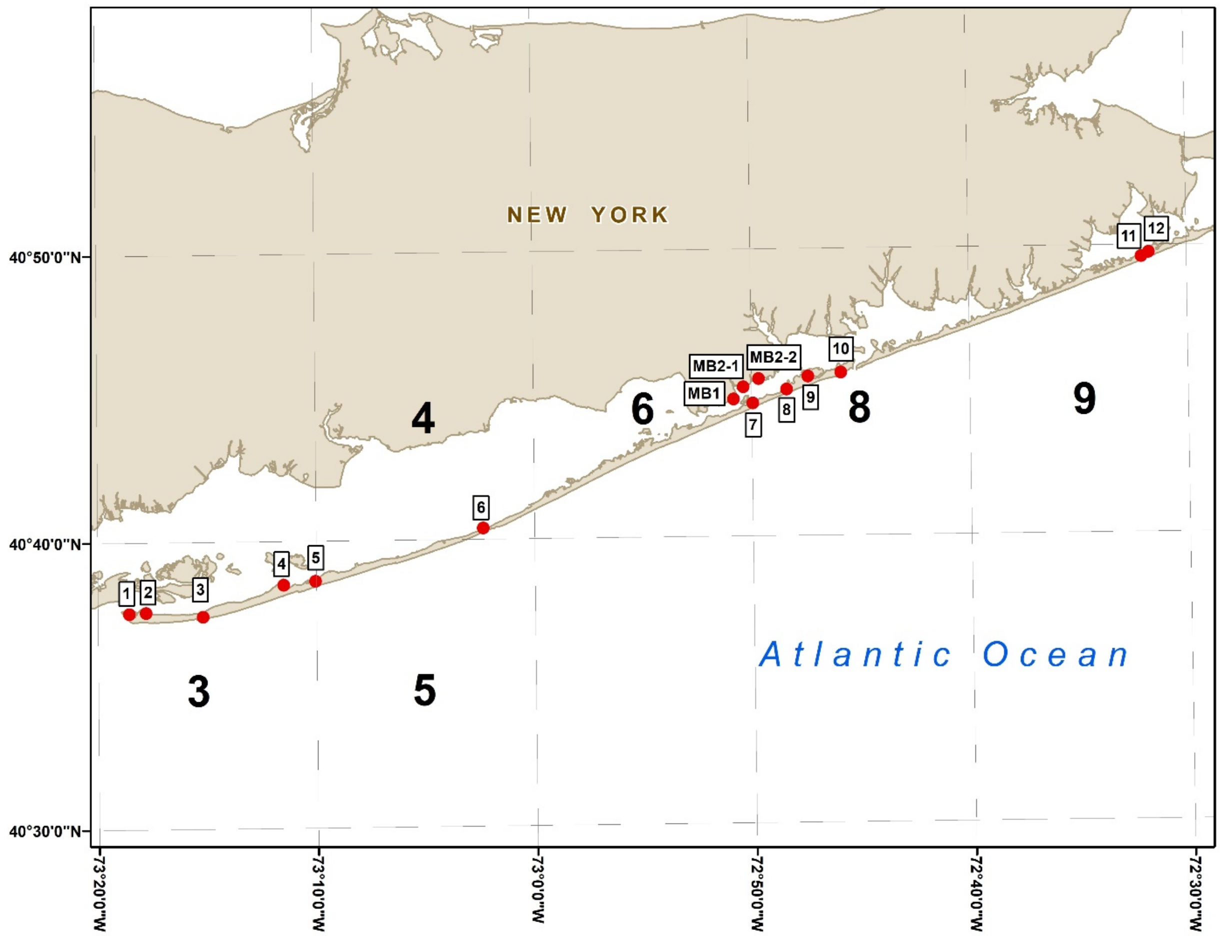

Figure 2.1 CPF Project Locations by Numbered 10-Minute Graticules in Which They Occur

2.3.3 CPF Detailed Descriptions

For the CPF project designs, USACE has substituted Highest Astronomical Tide (HAT) and Lowest Astronomical Tide (LAT) for the typical Mean High Water (MHW) and Mean Low Water (MLW) design elevations for consistency with the overall program goals and objectives of creating additional shore nesting and foraging habitat.

Sand placement at the CPF sites will be performed in coordination with renourishment cycles of the beachfill features and subject to monitoring to ensure resolution of project objectives. The USACE will not implement vegetation management or manipulation of the sites unless conducted as an incidental action associated with future placement. The USACE recommends the local land management agency consider predator management in newly created CPF's. In addition, the USACE anticipates the park's ORV policy will be implemented during nesting season.

# CPF Site 1 Democrat Point West	**West of Jetty-Reach GSB-1A** **40.625280° N / 73.307751° W**

Democrat Point West is located on the western end of Fire Island within Robert Moses State Park. Democrat Point West defines the south and east boundary of Fire Island Inlet. Democrat Point West is a complex coastal area. At the western end lies a continuously evolving sand spit. A rock jetty spanning the width of the island defines the east boundary of Democrat Point West. Democrat Point West contains heavily vegetated dunes near the center of the site. These dunes taper in elevation toward the water on the north, west, and south sides. A small tidal pond, located just east of the Point's center, is surrounded by wetlands.

To create early successional habitat that provides nesting and foraging for shorebirds, plans call for regrading and devegetating approximately 69.6 acres (ac) of proposed habitat. The regrading template includes a 3% slope extending from the lowest astronomical tidal (LAT) elevation and/or the wetland boundary to the +7 ft-NAVD88 contour. Along the spine of the site, a raised dune feature will extend to +8.3 ft-NAVD88 (+9.5 ft-NGVD29). Foraging habitat (81.4 ac) encompasses the area between the LAT and the highest astronomical tide (HAT), while nesting habitat (52.1 ac) extends from the HAT to an elevation of +8.33 ft-NAVD88. The migrating sand spit (35.9 ac) along the western side of the CPF is considered foraging habitat. On the eastern side of the project area a 23.4 ac wetland and tidal pond exists. The pond will be filled to an elevation of -2.0 ft-NAVD88 to improve the wetland's overall productivity and functionality and establish the area as foraging habitat. Connectivity to bayside foraging habitat is maintained along the shallow creek on the northeast corner of the pond. Through the proposed activities at Democrat Point West, early upland successional habitat will be created.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	-187,017
Fill Volume	168,514
Volume Difference (Fill minus Cut)	-18,503
Project Area	**139.5 acres**
OCEANSIDE TIDAL ENVIRONMENT (ft-NAVD88)	
Highest Astronomical Tide (HAT)	3.00
Mean Higher High Water (MHHW)	2.06
Mean High Water (MHW)	1.76
Mean Sea Level (MSL)	-0.18
Mean Tide Level (MTL)	-0.22
Mean Low Water (MLW)	-2.20
Mean Lower Low Water (MLLW)	-2.36
Lowest Astronomical Tide (LAT)	-3.24
Range (MHW-MLW)	3.64
Diurnal Range (MHHW - MLLW)	4.06
Largest Tidal Range (HAT-LAT)	5.89
Diurnal Range (MHHW - MLLW)	4.06
Largest Tidal Range (HAT-LAT)	5.89
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88)	
Highest Astronomical Tide (HAT)	2.79
Mean Higher High Water (MHHW)	1.85
Mean High Water (MHW)	1.58
Mean Sea Level (MSL)	-0.16
Mean Tide Level (MTL)	-0.24
Mean Low Water (MLW)	-2.06
Mean Lower Low Water (MLLW)	-2.22
Lowest Astronomical Tide (LAT)	-3.10
Range (MHW-MLW)	3.64
Diurnal Range (MHHW - MLLW)	4.06
Largest Tidal Range (HAT-LAT)	5.89
Diurnal Range (MHHW - MLLW)	4.06
Largest Tidal Range (HAT-LAT)	5.89

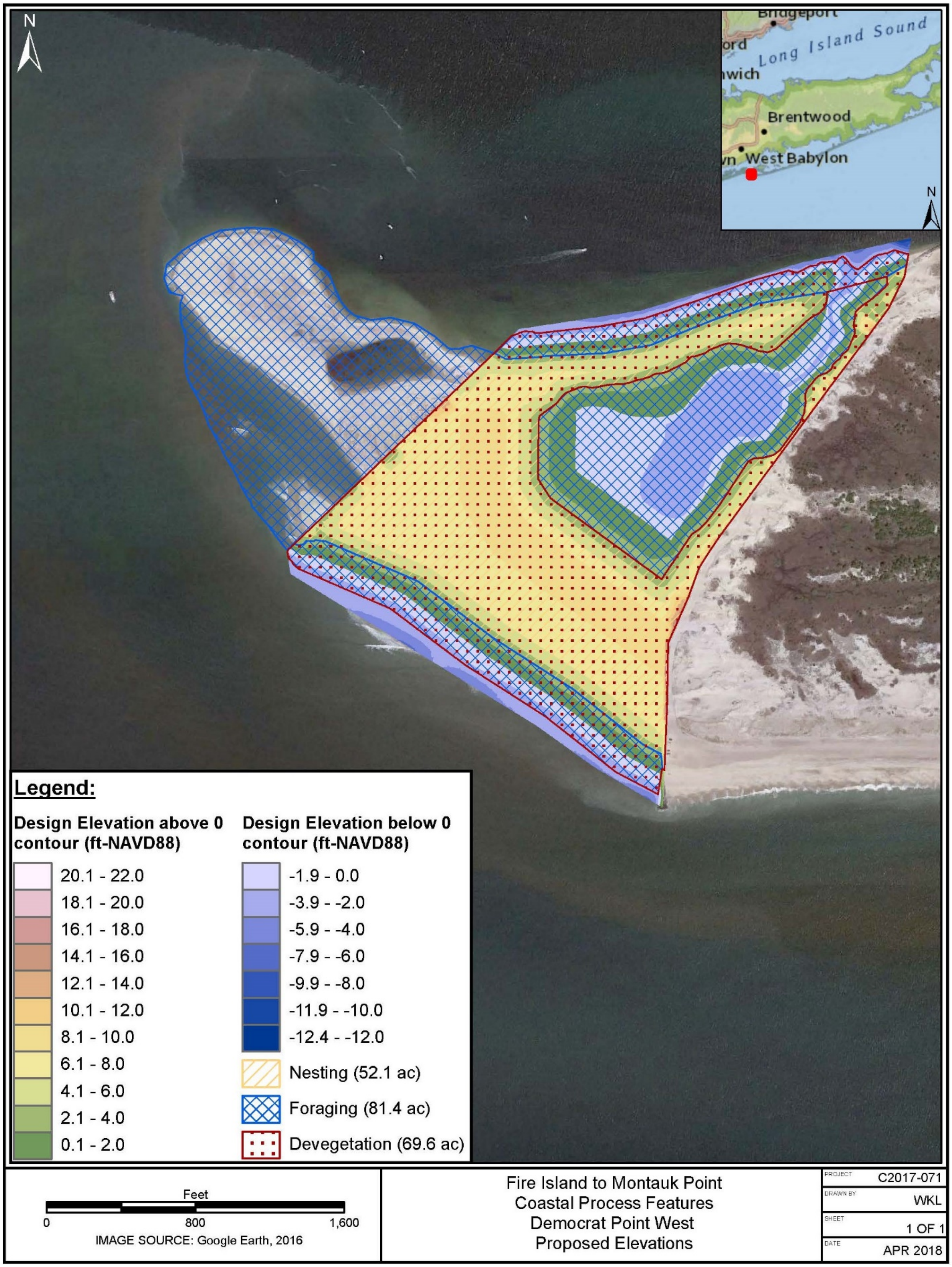

Figure 2.2 Democrat Point West Proposed Elevations

CPF Site 2

Democrat Point Bayside East of Jetty

East of Jetty-Reach GSB-1A

40.626794° N / 73.293164° W

Democrat Point (East of Jetty) is located on the western end of Fire Island within Robert Moses State Park. Democrat Point (East of Jetty) lies just east of the Fire Island Inlet. Oak Beach lies across the inlet to the north and west. Democrat Point (East of Jetty) is a sandy bayside beach, where sand was previously stockpiled during nearby dredging projects. The project area contains coastal dunes with sporadic vegetation.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	-42,997
Fill Volume	40,428
Net Volume	-2,569
Project Area	**27.0 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.16 ft. NGVD)	
Highest Astronomical Tide (HAT)	2.01
Mean Higher High Water (MHHW)	1.54
Mean High Water (MHW)	1.30
Mean Sea Level (MSL)	-0.14
Mean Tide Level (MTL)	-0.15
Mean Low Water (MLW)	-1.59
Mean Lower Low Water (MLLW)	-1.72
Lowest Astronomical Tide (LAT)	-2.20
Range (MHW-MLW)	2.89
Diurnal Range (MHHW - MLLW)	3.26
Largest Tidal Range (HAT-LAT)	4.21

To create early successional habitat that provides nesting and foraging for shorebirds, plans call for regrading and devegetating approximately 27.0 ac. This includes 5.1 ac of foraging habitat and 19.3 ac of nesting habitat. The regrading template includes a 2% slope on the north bank to allow for viable shorebird habitat. Foraging habitat encompasses the area between the LAT and the HAT, while nesting habitat extends from the HAT to a constructed elevation of +5 ft-NAVD88.

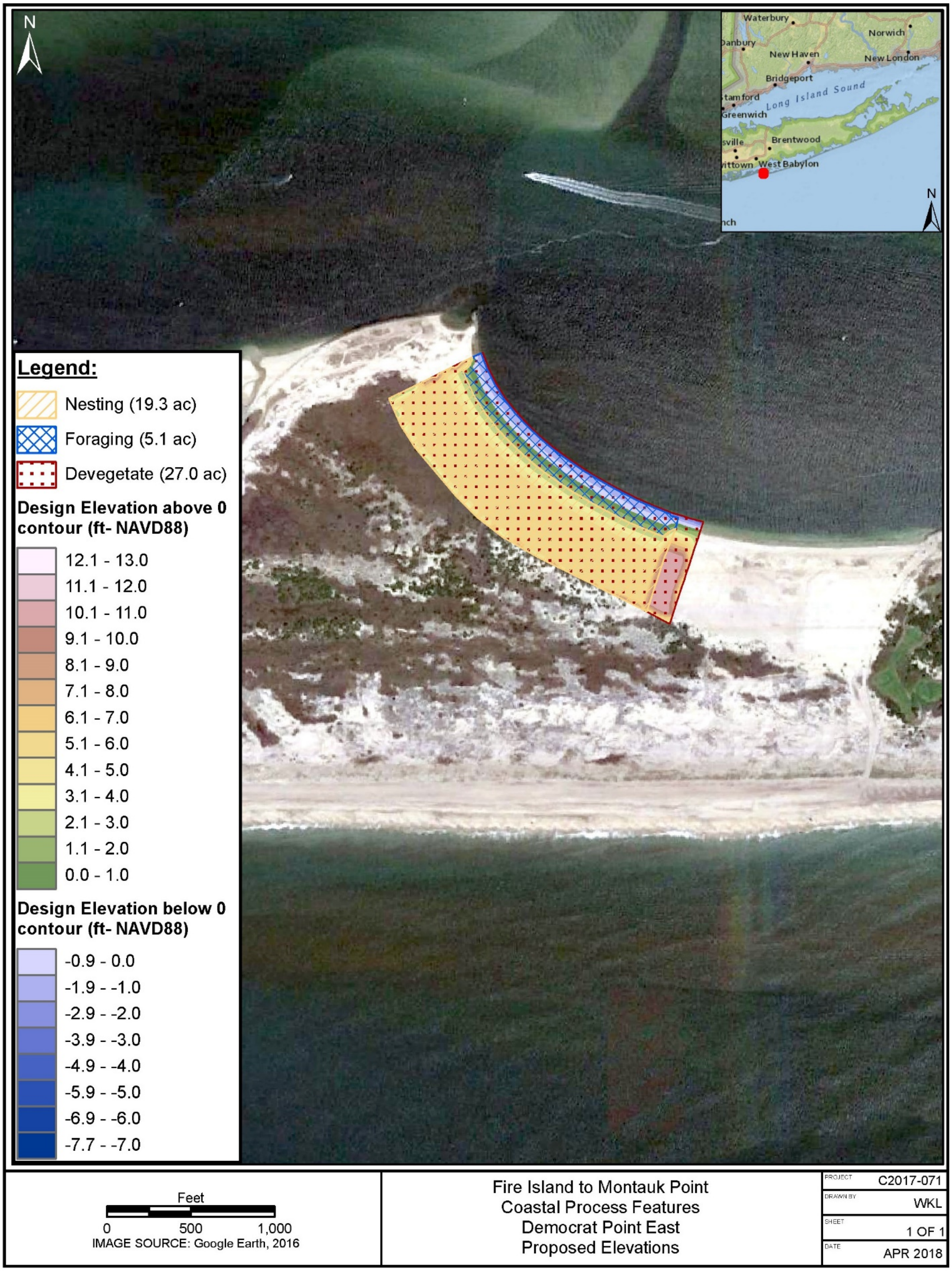

Figure 2.3 Democrat Point East Proposed Elevations

CPF Site 3
Dunefield West of Field 4 Reach GSB-1A

Reach GSB-1A

40.622158° N / 73.252615° W

Dunefield West of Field 4 is located on the western end of Fire Island, southeast of the Robert Moses Causeway, on the ocean side of Robert Moses State. Dune Field West of Field 4 contains dunes with areas of heavy vegetation. This CPF design seeks to devegetate uplands to provide ESA bird habitat (foraging and nesting).

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	0
Net Volume	0
Project Area	**19.4 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.14 ft. NGVD)	
Highest Astronomical Tide (HAT)	2.97
Mean Higher High Water (MHHW)	2.03
Mean High Water (MHW)	1.72
Mean Sea Level (MSL)	-0.22
Mean Tide Level (MTL)	-0.25
Mean Low Water (MLW)	-2.21
Mean Lower Low Water (MLLW)	-2.37
Lowest Astronomical Tide (LAT)	-3.25
Range (MHW-MLW)	3.93
Diurnal Range (MHHW - MLLW)	4.40
Largest Tidal Range (HAT-LAT)	6.22

To create early successional habitat that provides nesting and foraging for shorebirds, plans call for removing vegetation from approximately 18.7 ac to create 3.9 ac of foraging habitat and 11.4 ac of nesting habitat. Foraging habitat encompasses the area between the LAT and the HAT, while nesting habitat extends from the HAT to the +10 ft-NAVD88 elevation contour. Beachfront topography will approximate the anticipated FIMP beach fill template between stations 139+00 and 160+00. A high elevation dune exists on the eastern side of the project area behind the FIMP beach fill template. No regrading of the site beyond the FIMP beach fill plan is anticipated.

Figure 2.4 Dunefield West of Field 4 Proposed Elevations

CPF Site 4
Clam Pond

Clam Pond-Reach GSB-2B

40.642437° N / 73.191492° W

Clam Pond is located on the western portion of Fire Island between Saltaire and Fair Harbor. Clam Pond is shallow with an average depth of approximately 1 ft and a maximum depth of about 5 ft. Historically a sand spit existed at this location.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	51,312
Net Volume	51,212
Project Area	**15.3 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.14 ft. NGVD)	
Highest Astronomical Tide (HAT)	
Mean Higher High Water (MHHW)	0.60
Mean High Water (MHW)	0.44
Mean Sea Level (MSL)	-0.02
Mean Tide Level (MTL)	-0.04
Mean Low Water (MLW)	-0.52
Mean Lower Low Water (MLLW)	-0.62
Lowest Astronomical Tide (LAT)	-1.10
Range (MHW-MLW)	0.96
Diurnal Range (MHHW - MLLW)	1.22
Largest Tidal Range (HAT-LAT)	2.18

To create early successional habitat that provides nesting and foraging for shorebirds, plans call for fill placement and grading over a project area of approximately 15.3 ac. The project area includes 4.4 ac of proposed newly created nesting habitat and 8.2 ac of proposed foraging habitat. The foraging habitat consists of both newly created and existing habitat between the HAT and LAT elevations. On the north side of the project, fill will slope from the +5 ft-NAVD88 contour to the intersection with existing grade. A living shoreline may be constructed on the north side of the project site to help retain fill. On the south side, fill will slope at 3% between +5 ft-NAVD88 and the HAT elevation, then at 1% to the intersection with existing grade.

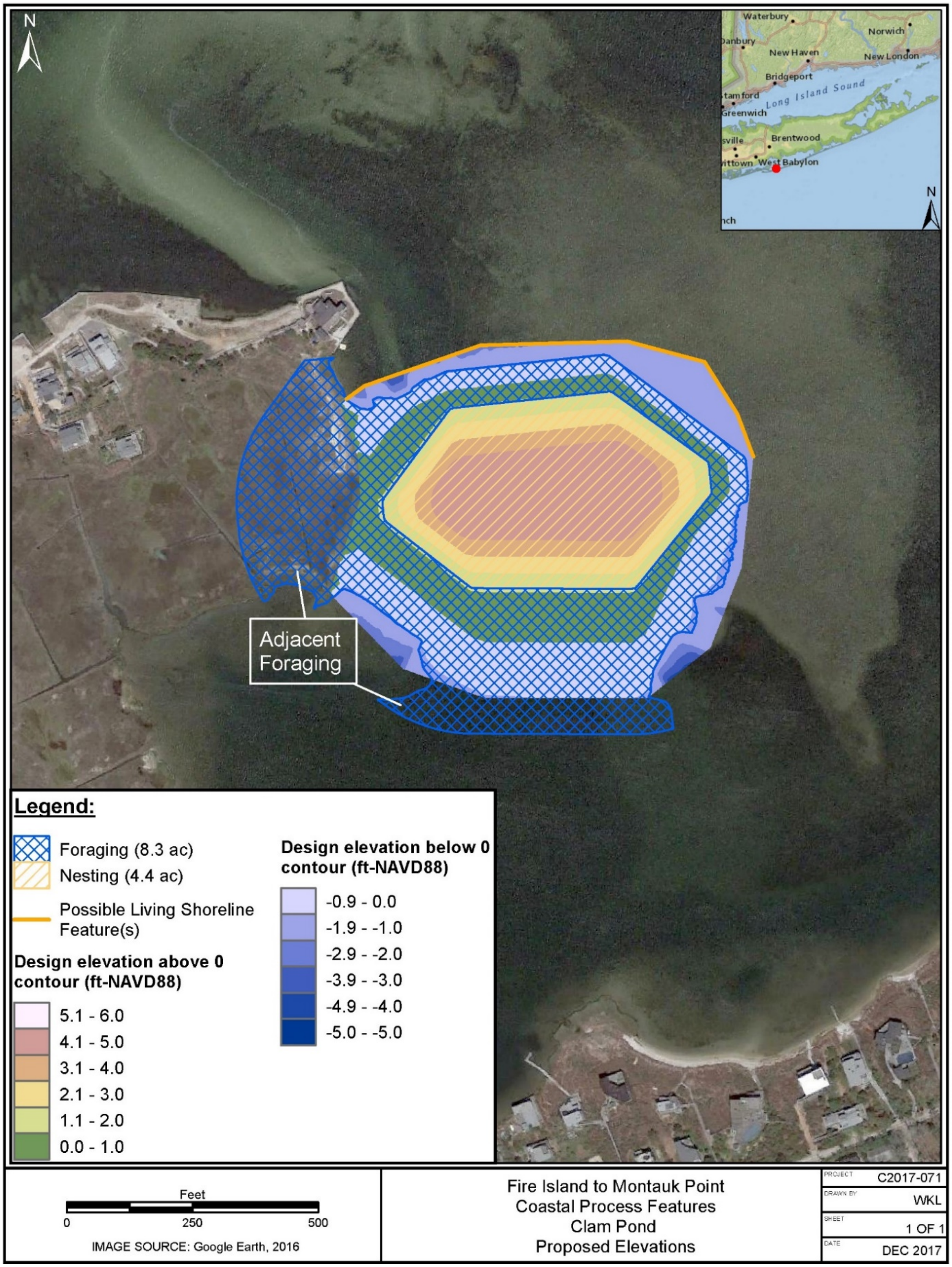

Figure 2.5 Clam Pond Proposed Elevations

CPF Site 5
Atlantique to Corneille

Reach GSB-2B

40.644944° N / 73.167889° W

Atlantique to Corneille is located on the western portion of Fire Island, on the bay just east of Atlantique Park. The average nearshore water depth on the bayside at Atlantique to Corneille is approximately 3 ft. Boat docks exist east and west of this CPF, while several small bulkheads lie on either side of the site. The CPF design fill must limit impacts to navigation features. This CPF design adds fill to provide ESA bird habitat (foraging and nesting) as well as provide CSRM benefits by simulating cross island transport.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	62,694
Net Volume	62,694
Project Area	**15.8 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.13ft. NGVD)	
Highest Astronomical Tide (HAT)	1.09
Mean Higher High Water (MHHW)	0.62
Mean High Water (MHW)	0.45
Mean Sea Level (MSL)	-0.01
Mean Tide Level (MTL)	-0.03
Mean Low Water (MLW)	-0.52
Mean Lower Low Water (MLLW)	-0.61
Lowest Astronomical Tide (LAT)	-1.09
Range (MHW-MLW)	0.97
Diurnal Range (MHHW - MLLW)	1.23
Largest Tidal Range (HAT-LAT)	2.18

The plans call for the placement of fill over 15.8 ac, transitioning from the western bulkhead area to the spit to the east. The fill will result a total of 4.2 ac of foraging habitat and 9.9 ac of nesting habitat. The regrading template includes 3% and 1% slopes on the north bank to allow for viable shorebird habitat, and a 4% slope below the LAT to tie into the existing grade. The landward side of the fill profile will tie into existing grade at +4 ft-NAVD88.

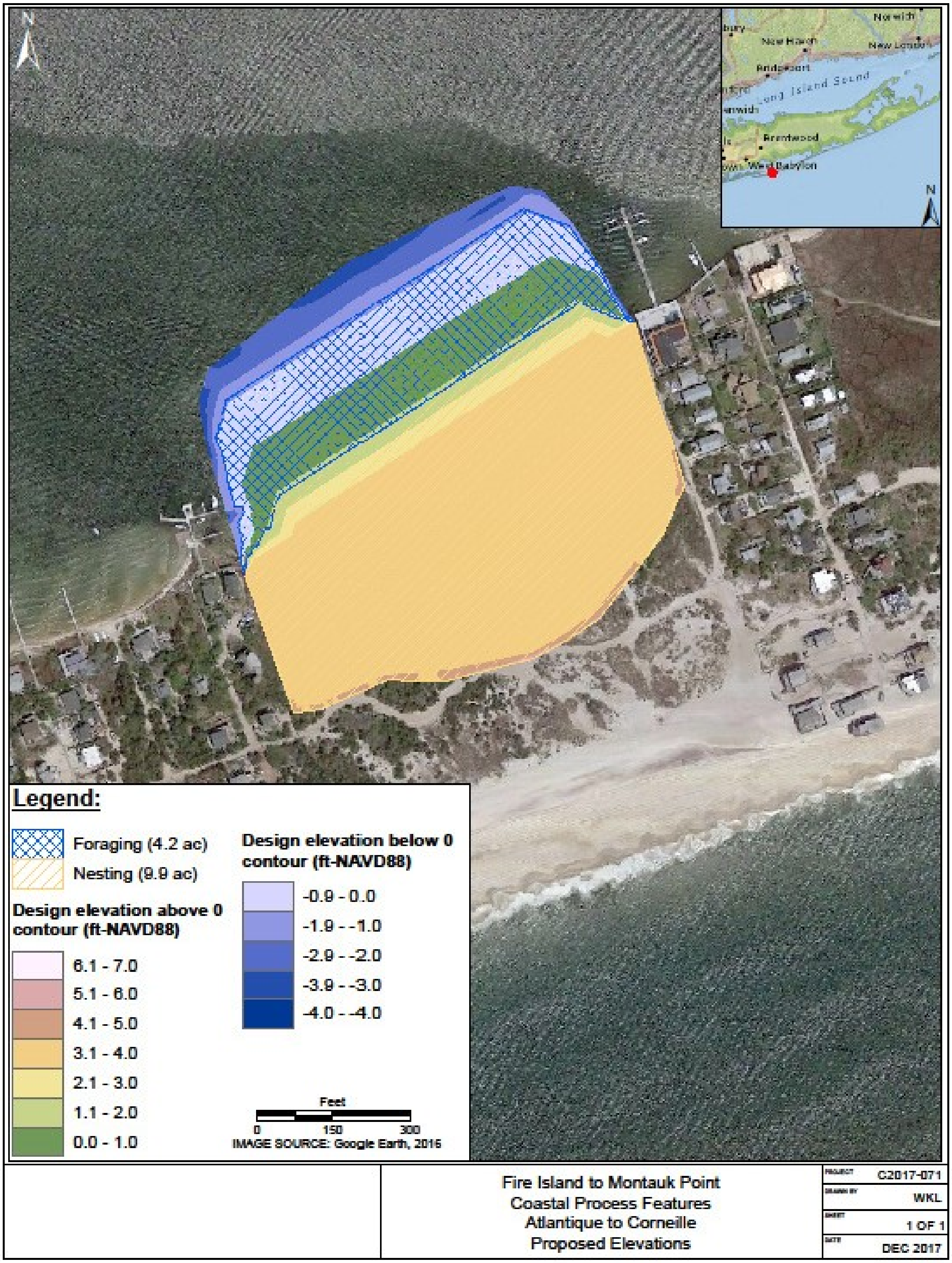

Figure 2.6 Atlantique to Corneille Proposed Elevations

CPF Site 6
Talisman

Reach GSB-3D

40.674629° N / 73.039332° W

Talisman is located in the central portion of Fire Island within Barrett Island Park between Fire Island Pines and Water Island. The average nearshore water depth on the bayside at Talisman ranges from 1 ft to 3 ft. Historically a sand spit existed at this location. The west side of Talisman includes a dock extending approximately 400 ft into the bay. A private dock lies to the east of this CPF. Fill placed at this CPF should account for potential impacts to these structures. This CPF design seeks to add fill to provide ESA bird habitat (foraging and nesting) as well as provide CSRM benefits by simulating cross island transport.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	85,880
Net Volume	85,880
Project Area	**16.1 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.08 ft. NGVD)	
Highest Astronomical Tide (HAT)	1.18
Mean Higher High Water (MHHW)	0.70
Mean High Water (MHW)	0.54
Mean Sea Level (MSL)	-0.02
Mean Tide Level (MTL)	-0.02
Mean Low Water (MLW)	-0.57
Mean Lower Low Water (MLLW)	-0.67
Lowest Astronomical Tide (LAT)	-1.15
Range (MHW-MLW)	1.11
Diurnal Range (MHHW - MLLW)	1.37
Largest Tidal Range (HAT-LAT)	2.33

The plans call for the reestablishment of approximately 1,400 ft of the historic shoreline through the placement of fill over 16.1 ac. A living shoreline may be placed on the north side of the project site to help reduce the erosion rate. The project will result in a total of 7.0 ac of foraging habitat and 7.1 ac of nesting habitat. The regrading template includes 3% and 1% slopes on the north bank to create viable shorebird habitat, and a 4% slope below the LAT to tie into the existing grade. Some of the upland portions of this CPF lie below the design berm elevation of +4 ft-NAVD88. The landward side of the fill profile will transition to existing grade at a 4% slope, where necessary. Otherwise the berm will tie in to the existing grade at +4 ft-NAVD88. This will preserve the area as nesting habitat.

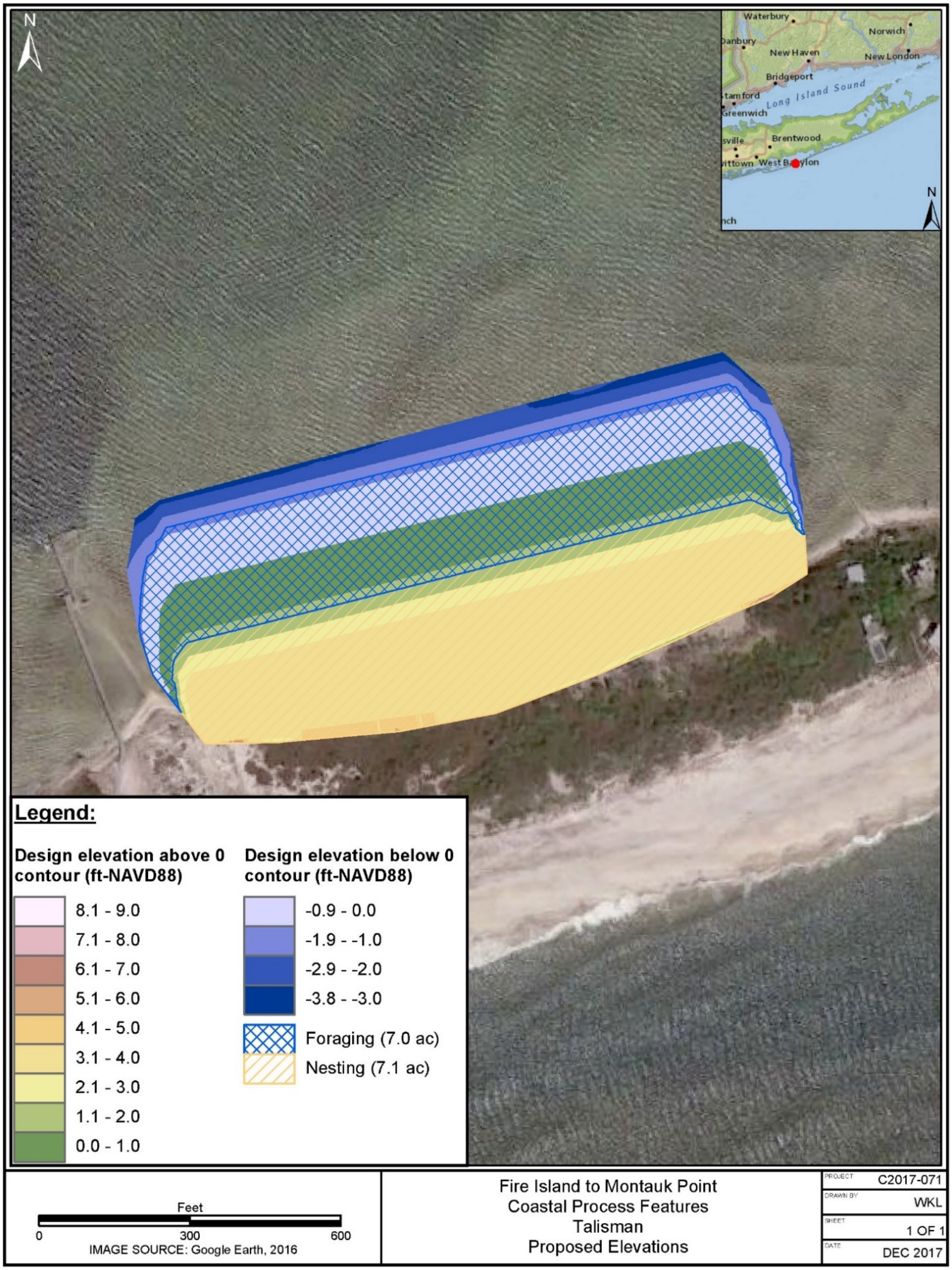

Figure 2.7 Talisman Proposed Elevations

CPF Site 7
Pattersquash Reach

Reach MB-1B

40.746433° N / 72.83247° W

Pattersquash Reach is located on the eastern portion of Fire Island on the bay side within Smith Point County Park. Pattersquash Reach lies between two inlets, Old Inlet to the west and Moriches Inlet to the east. The project area contains coastal dunes with vegetation and an historically ephemeral sand spit. This CPF design seeks to devegetate uplands to provide ESA bird habitat (foraging and nesting) as well as provide CSRM benefits by placing fill to simulate cross island transport.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	19,396
Net Volume	19,396
Project Area	**49.4 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.04 ft. NGVD)	
Highest Astronomical Tide (HAT)	1.42
Mean Higher High Water (MHHW)	0.95
Mean High Water (MHW)	0.75
Mean Sea Level (MSL)	-0.09
Mean Tide Level (MTL)	-0.10
Mean Low Water (MLW)	-0.95
Mean Lower Low Water (MLLW)	-1.07
Lowest Astronomical Tide (LAT)	-1.55
Range (MHW-MLW)	1.70
Diurnal Range (MHHW - MLLW)	2.01
Largest Tidal Range (HAT-LAT)	2.97

The plans call for devegetating approximately 44.8 ac, all of which qualify as proposed habitat. All devegetation will occur north of Burma Road. The project will result in 21.4 ac of foraging habitat and 27.0 ac of nesting habitat. In addition, in-water sediment placement extends from the +1 ft-NAVD88 contour offshore to -1 ft-NAVD88. Fill then follows the -1 ft-NAVD88 contour offshore for approximately 300 ft at which point the fill toes into the existing grade at a 2% slope. No upland regrading is anticipated.

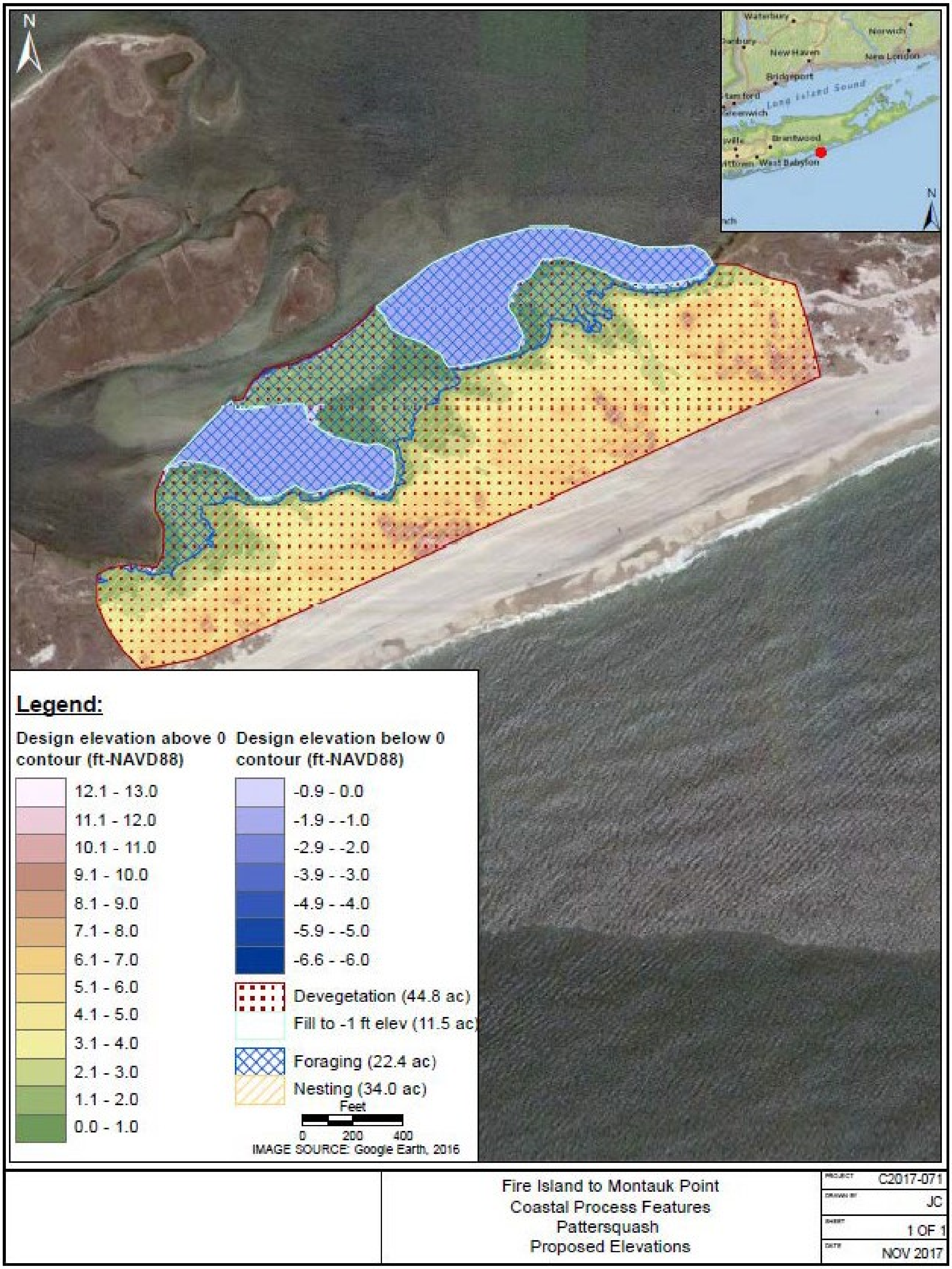

Figure 2.8 Pattersquash Proposed Elevations

CPF Site 8
New Made Island Reach

Reach MB-2A

40.753186° N / 72.80777° W

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	100,583
Net Volume	100,583
Project Area	**107.9 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.14 ft. NGVD)	
Highest Astronomical Tide (HAT)	1.46
Mean Higher High Water (MHHW)	0.99
Mean High Water (MHW)	0.78
Mean Sea Level (MSL)	-0.11
Mean Tide Level (MTL)	-0.12
Mean Low Water (MLW)	-1.02
Mean Lower Low Water (MLLW)	-1.14
Lowest Astronomical Tide (LAT)	-1.62
Range (MHW-MLW)	1.80
Diurnal Range (MHHW - MLLW)	2.12
Largest Tidal Range (HAT-LAT)	3.08

New Made Island Reach is located on the eastern portion of Fire Island on the bayside, within Smith Point County Park. New Made Island Reach lies between two inlets, Old Inlet to the west and Moriches Inlet to the east. The project area contains coastal dunes with vegetation and an historically ephemeral sand spit. This CPF design seeks to devegetate uplands to provide ESA bird habitat (foraging and nesting) as well as provide CSRM benefits by placing fill to simulate cross island transport.

To create early successional habitat that provides nesting and foraging for shorebirds, plans call for devegetating approximately 100.1 ac, all of which qualify as proposed habitat. All devegetation will occur north of Burma Road and will result in 28.9 ac of foraging habitat and 71.1 ac of nesting habitat. In addition, in-water sediment placement extends at a 1% slope from +1 ft-NAVD88 to the intersection with existing grade in the offshore direction. No upland regrading is anticipated.

Vehicular traffic on Burma Road presents a potential hazard for chicks and older birds. A physical barrier shall be constructed to limit the ability of birds to enter traffic lanes. Past efforts using sand/snow fencing have had limited success primarily due to pedestrian openings in the fencing. Additional types of barriers shall be considered during the PED phase of the project. Possible physical barrier components may include dredge pipe, sand/snow fencing, and elevated pedestrian cross walks to limit the number of openings through the barriers. Future detailed CPF design will be completed in close coordination with FWS, Suffolk County, and NY State Parks.

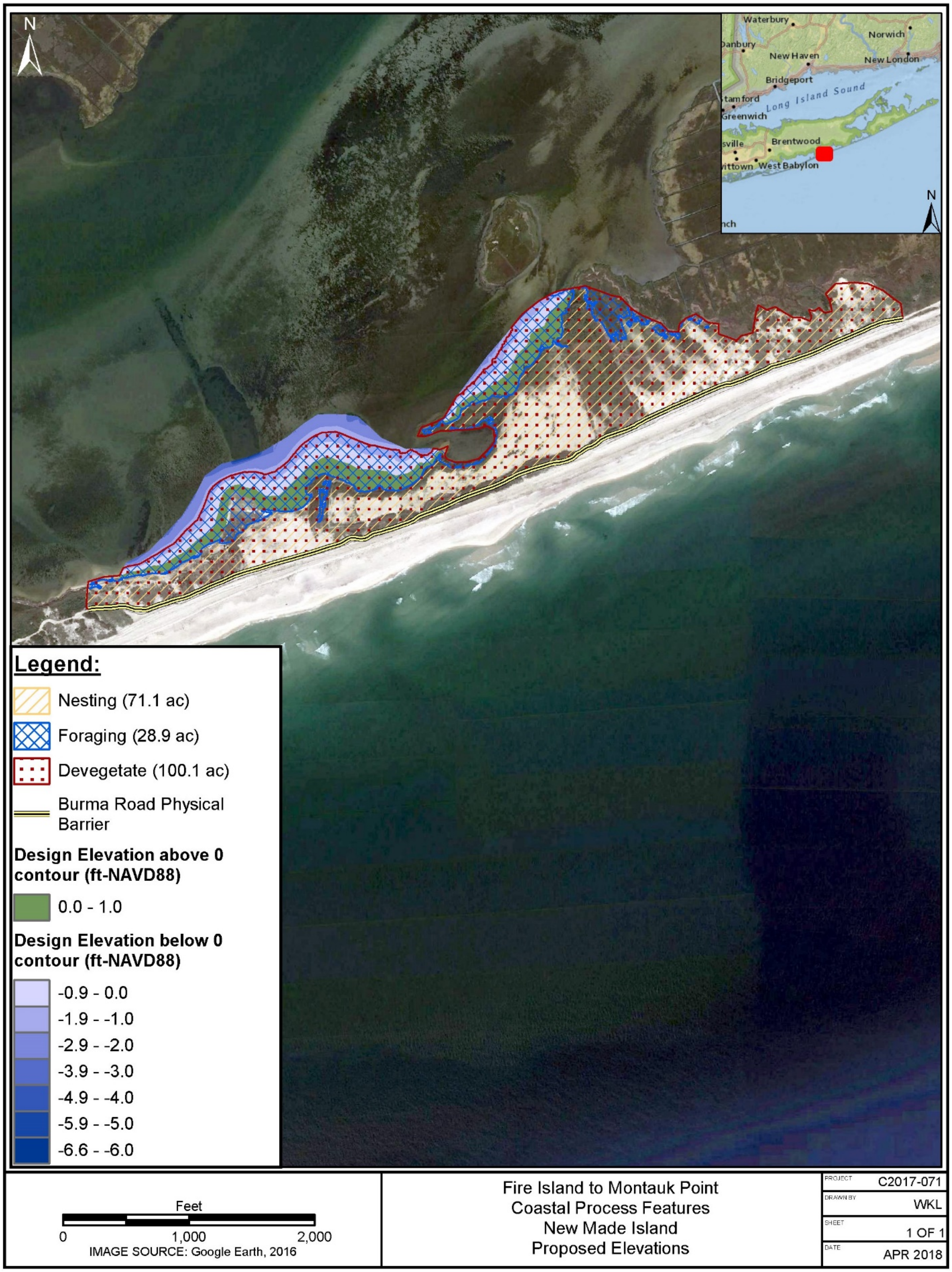

Figure 2.9 New Made Island Proposed Elevations

CPF Site 9
Smith Point County Park Marsh

Reach MB-2A

40.763611° N / 72.79122° W

Smith Point County Park Marsh is located on the eastern portion of Fire Island on the bay side, within Smith Point County Park. Smith Point County Park Marsh lies between two inlets, Old Inlet to the west and Moriches Inlet to the east. The project area contains a large coastal salt marsh with linear man-made ditches cut through the wetland. The north/south running ditches are cut at approximately 1,000 ft intervals while the east/west running ditches are cut at approximately 200 ft intervals. This CPF design seeks to add fill to provide CSRM benefits by simulating cross island transport.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	-61,523
Fill Volume	320,953
Net Volume	259,430
Project Area	**284.7 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.02 ft. NGVD)	
Highest Astronomical Tide (HAT)	1.53
Mean Higher High Water (MHHW)	1.06
Mean High Water (MHW)	0.84
Mean Sea Level (MSL)	-0.13
Mean Tide Level (MTL)	-0.14
Mean Low Water (MLW)	-1.11
Mean Lower Low Water (MLLW)	-1.23
Lowest Astronomical Tide (LAT)	-1.71
Range (MHW-MLW)	1.95
Diurnal Range (MHHW - MLLW)	2.28
Largest Tidal Range (HAT-LAT)	3.24

To restore cross island transport, plans call for placement of fill across 284.7 ac of salt marsh. The site will be regraded to allow for wetland vegetation reestablishment. . The ditches will be filled to reestablish a uniform marsh across the entire project area. A series of tidal channels will be established to promote tidal exchange within the interior of the marsh.

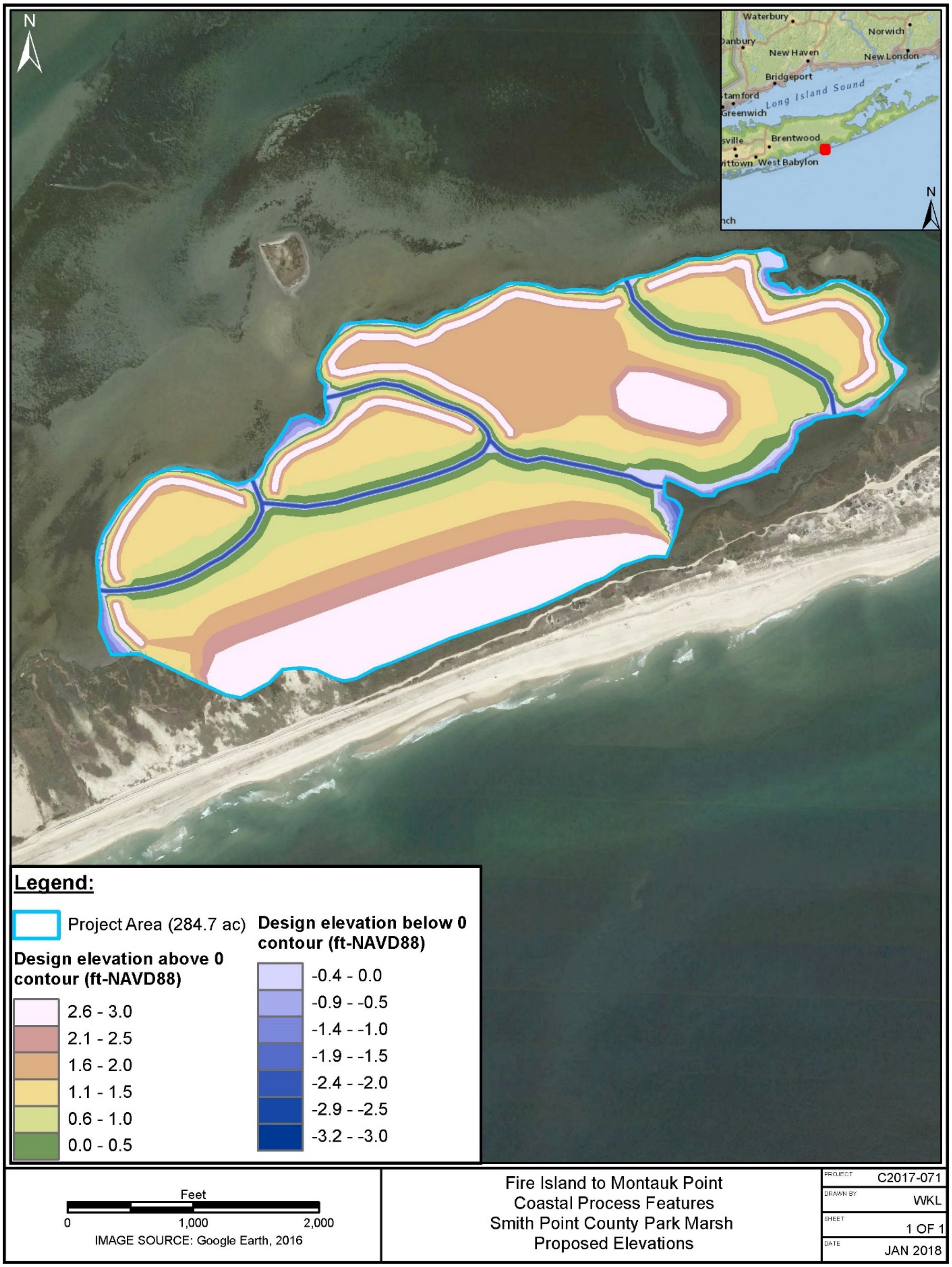

Figure 2.10 Smith Point County Park Proposed Elevations

CPF Site 10
Great Gun

Reach MB-2B

40.760937° N / 72.762574° W

Great Gun is located on the eastern portion of Fire Island on the Atlantic Ocean side within Smith Point County Park. Great Gun lies immediately west of Moriches Inlet. The project area contains coastal dunes with vegetation. This CPF design seeks to devegetate uplands to provide ESA bird habitat (foraging and nesting).

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	n/a
Fill Volume	n/a
Net Volume	n/a
Project Area	**107.7 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.01 ft. NGVD)	
Highest Astronomical Tide (HAT)	2.67
Mean Higher High Water (MHHW)	1.73
Mean High Water (MHW)	1.45
Mean Sea Level (MSL)	-0.23
Mean Tide Level (MTL)	-0.25
Mean Low Water (MLW)	-1.94
Mean Lower Low Water (MLLW)	-2.08
Lowest Astronomical Tide (LAT)	-2.96
Range (MHW-MLW)	3.38
Diurnal Range (MHHW - MLLW)	3.80
Largest Tidal Range (HAT-LAT)	5.63

The plans call for removing vegetation from approximately 107.7 ac, resulting in 82.7 ac of nesting habitat and 6.3 ac of foraging habitat. Foraging habitat encompasses the area between the LAT and the HAT, while nesting habitat extends from the HAT to the naturally occurring +10 ft-NAVD88 elevation contour or 640 ft from the HAT. Beachfront topography will approximate the anticipated FIMP beach fill template between stations 1572+00 and 1623+00. The design template includes a high dune extending above the vertical limit for ESA bird habitat. No regrading of the site beyond the FIMP beach fill plan is anticipated.

Vehicular traffic on Burma Road presents a potential hazard for chicks and older birds. A physical barrier shall be constructed to limit the ability of birds to enter traffic lanes. Past efforts using sand/snow fencing have had limited success primarily due to pedestrian openings in the fencing. Additional types of barriers shall be considered during the PED phase of the project. Possible physical barrier components may include dredge pipe, sand/snow fencing, and elevated pedestrian cross walks to limit the number of openings through the barriers. Future detailed CPF design will be completed in close coordination with FWS, Suffolk County, and NY State Parks.

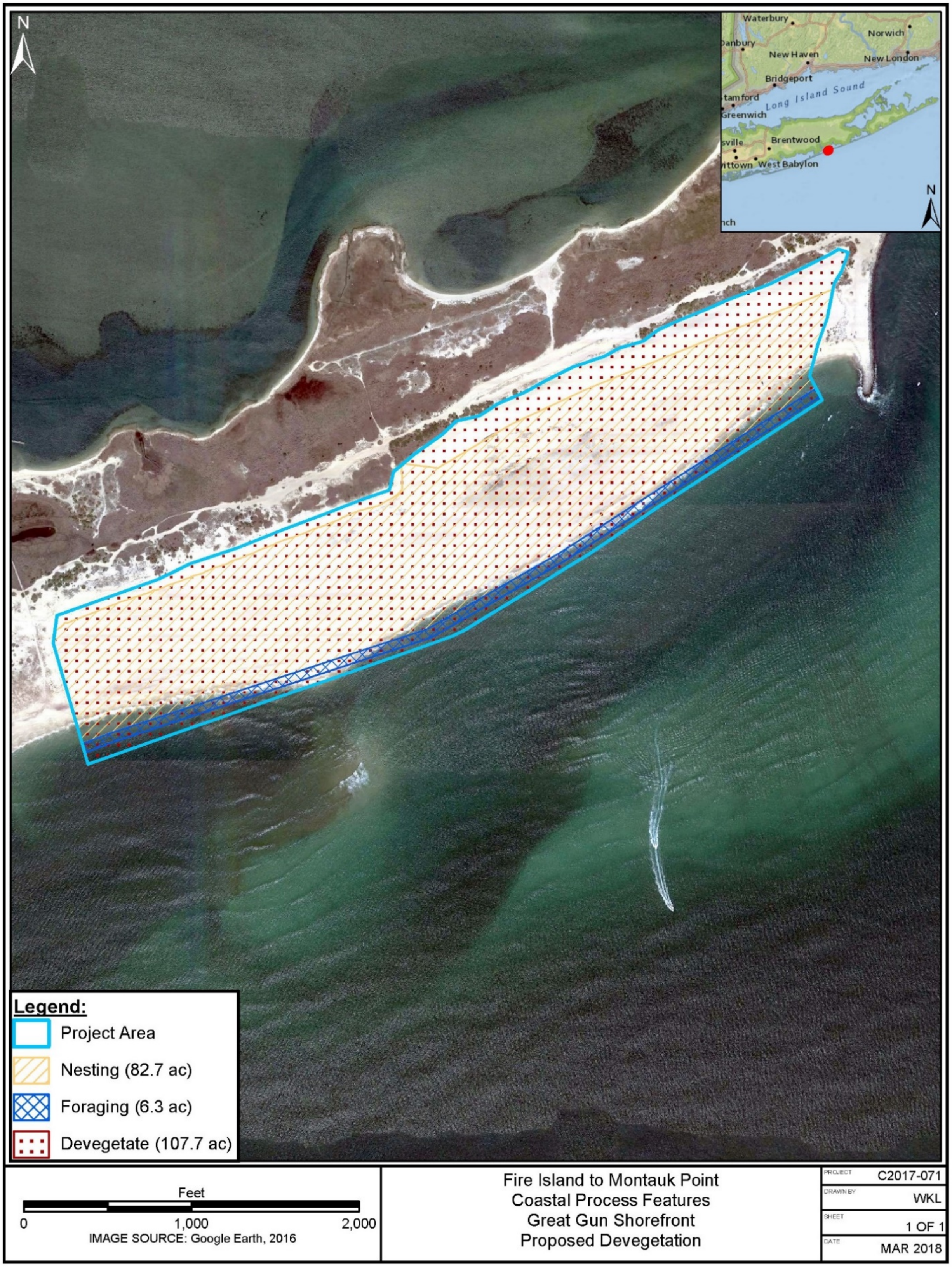

Figure 2.11 Great Gun Shorefront Proposed Devegetation

CPF Site 11
45, 47, and 51 Dune Road, East Quogue

Reach GSB-2D

40.826855° N / 72.534709° W

45, 47, and 51 Dune Road, East Quogue is located on the eastern portion of Westhampton Island, on the bayside just west of Shinnecock Inlet and Shinnecock County Park West. The average nearshore water depth on the bayside at 45, 47, and 51 Dune Road, East Quogue is approximately 3 ft with a maximum of about 6 ft.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	49,890
Net Volume	49,890
Project Area	**10.2 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.01 ft. NGVD)	
Highest Astronomical Tide (HAT)	1.79
Mean Higher High Water (MHHW)	1.31
Mean High Water (MHW)	1.05
Mean Sea Level (MSL)	-0.30
Mean Tide Level (MTL)	-0.28
Mean Low Water (MLW)	-1.60
Mean Lower Low Water (MLLW)	-1.71
Lowest Astronomical Tide (LAT)	-2.19
Range (MHW-MLW)	2.66
Diurnal Range (MHHW - MLLW)	3.02
Largest Tidal Range (HAT-LAT)	3.98

To restore cross island transport, plans call for removal of the bulkheads and groins currently within the project footprint and placement of fill over 10.2 acres (ac) extending across the embayment centered on the currently bulkheaded properties. The fill template includes a 75 ft berm extending bayward from the existing HAT contour with a landward extension to the intersection with native ground. The template includes an assumed 5% slope from the bayside edge of berm to the intersection with the bay bottom. The cross shore extent of this CPF is limited due to the overall site configuration.

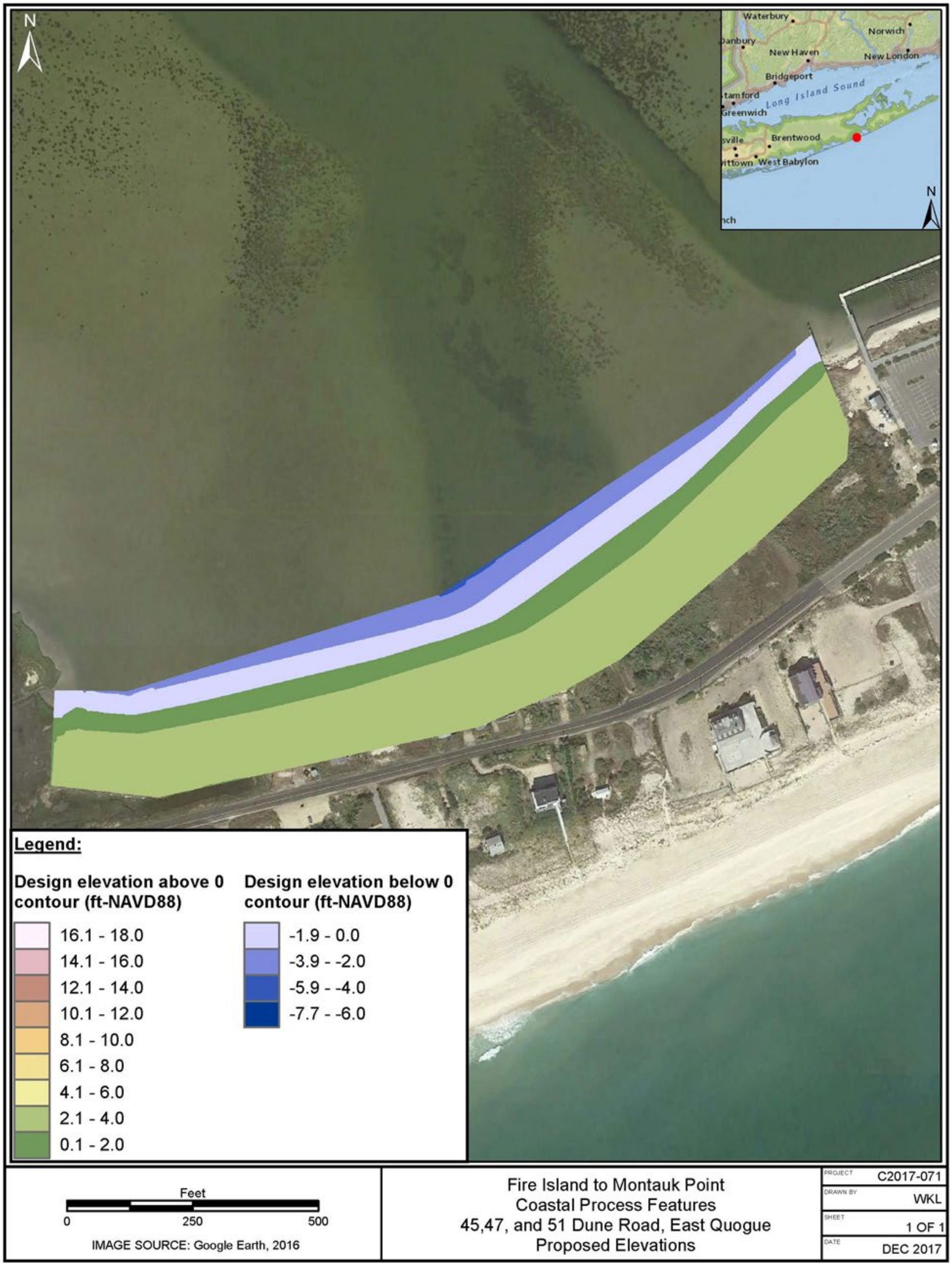

Figure 2.12 45,47, and 51 Dune Road, East Quogue Proposed Elevations

CPF Site 12
Tiana Bayside Park

Reach GSB-2D

40.828985° N / 72.530510° W

Tiana Bayside Park is located on the eastern portion of Westhampton Island on Shinnecock Bay, just west of Shinnecock Inlet and Shinnecock County Park West. The average nearshore water depth on the bayside at Tiana Bayside Park is approximately 3 ft with a maximum of 6 to 7 ft in an offshore channel. Several pile-supported and floating docks lie along the western half of the project site. A 750 ft long line of rock-filled gabions fronts the shoreline within the dock structures.

The base design includes fill placed to -3 ft-NAVD88 within the eastern half of the navigation channel immediately offshore of the project area. The total fill volume proposed in the project area is 36,647 cy.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	36,674
Net Volume	36,674
Project Area	**12.2 acres**
BAYSIDE TIDAL ENVIRONMENT (ft-NAVD88) (0 ft NAVD = 1.01 ft. NGVD)	
Highest Astronomical Tide (HAT)	1.79
Mean Higher High Water (MHHW)	1.31
Mean High Water (MHW)	1.05
Mean Sea Level (MSL)	-0.30
Mean Tide Level (MTL)	-0.28
Mean Low Water (MLW)	-1.60
Mean Lower Low Water (MLLW)	-1.71
Lowest Astronomical Tide (LAT)	-2.19
Range (MHW-MLW)	2.66
Diurnal Range (MHHW - MLLW)	3.02
Largest Tidal Range (HAT-LAT)	3.98

The eastern 350 ft of gabions may be treated in one of three possible ways. First, they may be left as-is in place. Second, they may be removed and replaced with a small amount of fill to soften the shoreline. Finally, they may be left in place and buried beneath a small amount of fill to soften the shoreline while retaining the shoreline protection should erosion re-expose the gabions.

To restore cross island transport, plans call for the placement of fill over 12.2 acres (ac) extending from the eastern bulkhead area across the adjacent bayside shoreline to the east. The landward side of the fill profile will tie into the closer of the existing grade at +4 ft-NAVD88 or the adjacent roadway right of way. The fill template includes a berm extending bayward. The template includes an assumed 5% slope from the bayside edge of berm to the intersection with the bay bottom. The cross shore extent of this CPF is limited due to the overall site configuration. The base design includes fill placed to -3 ft-NAVD88 within the eastern half of the navigation channel immediately offshore of the project area. The total fill currently envisioned in the project area is 36,647 cy.

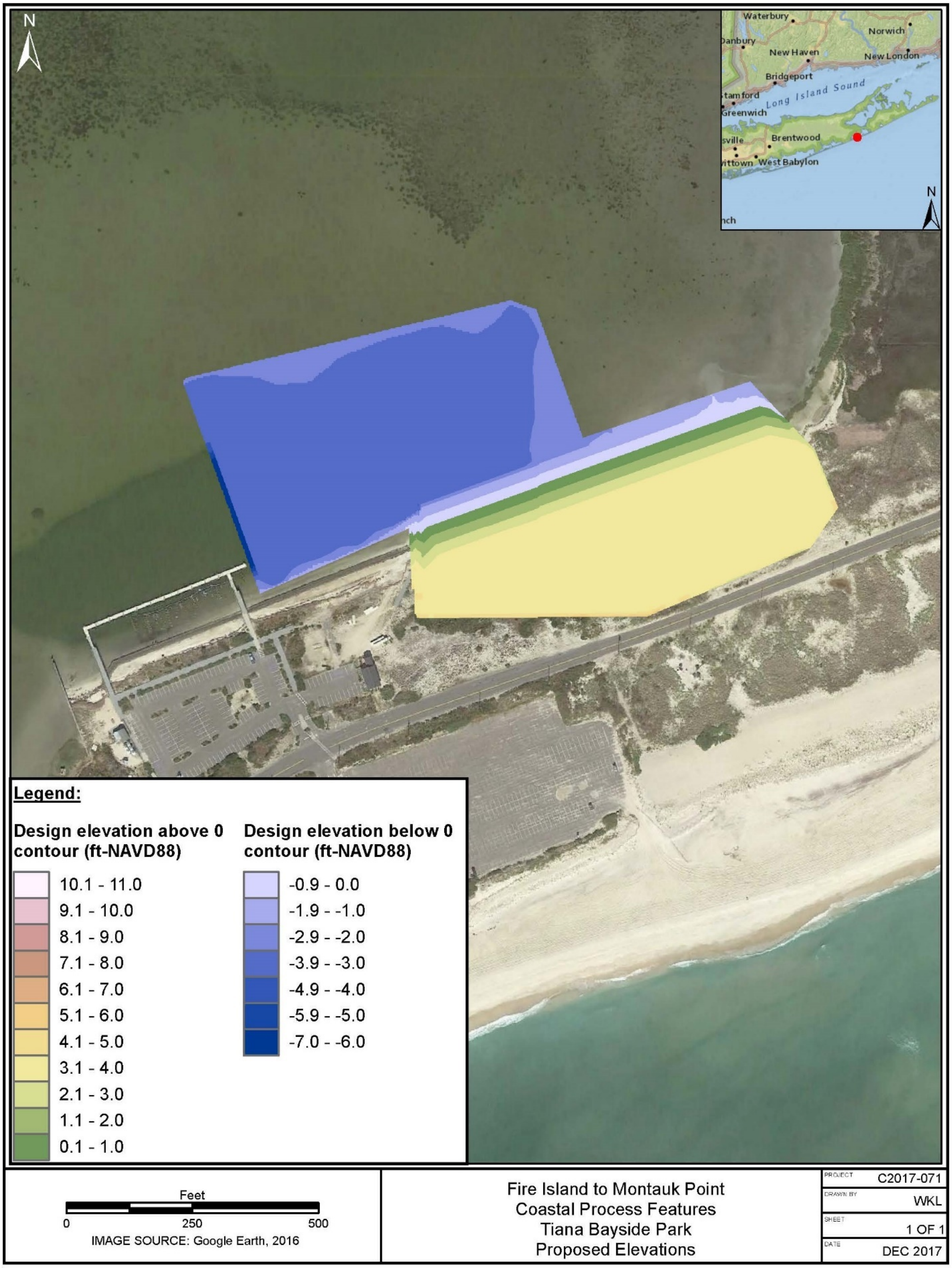

Figure 2.13 Tiana Bayside Park Proposed Elevations

CPF Site MB1

Mastic Beach 1

Town of Brookhaven, NY
east of William Floyd
Parkway & West of Pattersquash Creek
40.746981° N / -72.846617° W

Mastic Beach 1 is located on Long Island along the southern shore of the town of Town of Brookhaven, NY/ east of William Floyd Parkway & West of Pattersquash Creek bordering Narrow Bay. The project area includes undeveloped lands and eight properties targeted for buyouts as part of the non-structural plan. The undeveloped land consists primarily of common reed dominated wetlands, some existing uplands and high marsh shrub areas adjacent to medium density residential development. The project goals are to combine non-structural acquisition with restoration of natural floodplain function and to create a natural buffer to attenuate waves and reduce flooding impacts to developed areas.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	0
Volume Difference (Fill minus Cut)	0
Project Area	~25 acres
Maritime Forest	2
High Marsh	14
Low Marsh	9
TIDAL ENVIRONMENT (ft-NAVD88; 0 ft NAVD88 = -1.17 ft- NGVD29)	
Highest Astronomical Tide (HAT)	1.50
HAT 2048 Sea Level Rise (SLR)	1.90
HAT – 2048 Intermediate SLR	2.10
Flood Frequency Data	
2 - Year	3.10
10 - Year	4.50
25 - Year	5.30
100 - Year	6.10

The conceptual CPF plan for Mastic Beach 1 consists of reestablishment of a 25-acre natural vegetation community, beginning with forested uplands adjacent to the remaining residential areas, followed by high marsh shrub, high marsh grasses and low marsh near the shoreline at appropriate elevations. Following selective acquisition, former private parcels would be restored with native vegetation suited for the site conditions, thereby enhancing the CPF function of this vegetation type by increasing the width of vegetated area. If possible, higher elevations along the shoreline, will be expanded to create and enhance a high marsh shrub vegetation community. Although not depicted on the concept plan, existing linear channels, would be altered to create more sinuous natural configurations to enhance the hydrologic function of the wetland and facilitate restoration of native vegetation. Details on existing channel configuration and natural channel restoration would be developed during the PED phase.

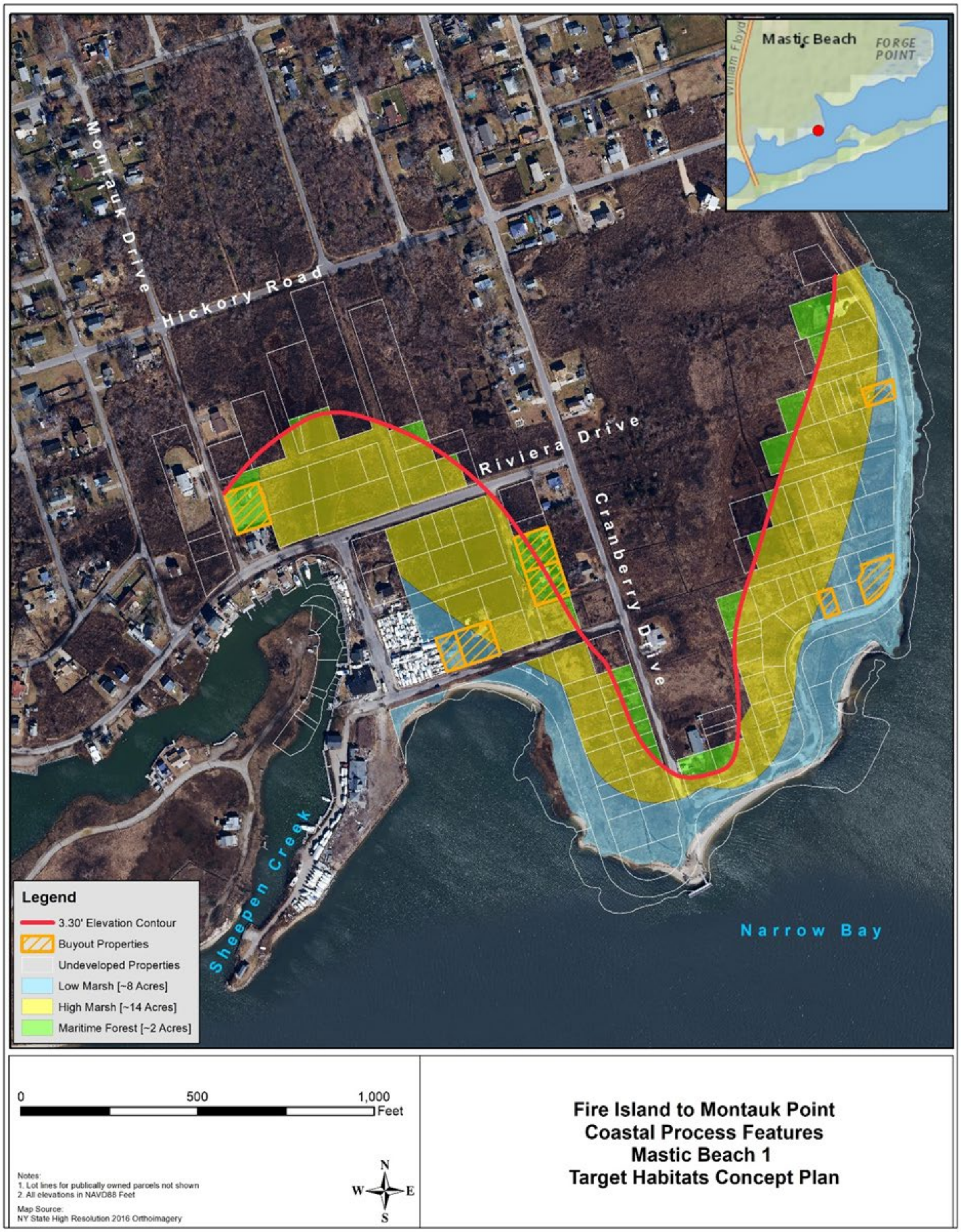

Figure 2.14 Proposed Elevations

CPF Site MB2-1
Mastic Beach 2 – Area 1

Town of Brookhaven, NY
east of Pattersquash Creek
40.7535° N / -72.840596° W

Mastic Beach 2 Area 1 is located along and east of Pattersquash Creek in the town of Brookhaven NY. The project site includes undeveloped lands and one property targeted for buyout as part of the non-structural plan. The undeveloped land, adjacent to medium density residential development, consists primarily of common reed dominated wetlands, some existing uplands and high marsh shrub areas. The common reed dominated wetlands appear to have been hydrologically altered as a result of linear channel construction and in some locations are low lying and may have restrictions to normal semi-diurnal tidal flow. Low marsh vegetation is present in lower lying areas and adjacent to channels. Uplands are present throughout and adjacent to the site. Project goals are to combine non-structural acquisition with restoration of natural floodplain function and create a natural buffer to attenuate waves and reduce flooding impacts to developed areas

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	0
Volume Difference (Fill minus Cut)	0
Project Area	~24 acres
Maritime Forest	2
High Marsh	9
Low Marsh	13
TIDAL ENVIRONMENT (ft-NAVD88; 0 ft NAVD88 = -1.17 ft- NGVD29)	
Highest Astronomical Tide (HAT)	1.50
HAT 2048 Sea Level Rise (SLR)	1.90
HAT – 2048 Intermediate SLR	2.10
Flood Frequency Data	
2 - Year	3.10
10 - Year	4.50
25 - Year	5.30
100 - Year	6.10

The conceptual CPF plan for Mastic Beach 2 - Area 1 consists of reestablishment of a natural vegetation community transition, beginning with forested uplands adjacent to the remaining residential areas, followed by high marsh shrub, high marsh grasses and low march near the shoreline at appropriate elevations. The former private parcel would be restored with suitable native vegetation increasing the width of restored vegetated area. Higher elevations within the project area would be expanded to create and enhance a high marsh shrub vegetation community. Although not depicted on the concept plan, existing linear channels, would be altered to create more sinuous natural configurations to enhance the hydrologic function of the wetland and facilitate restoration of native vegetation.

Figure 2.15 Proposed Elevations

CPF Site MB2-2
Mastic Beach 2 – Area 2

Town of Brookhaven, NY
West of Lawrence Creek
40.758649° N / -72.828377° W

Mastic Beach 2 Area 2 is located on about 7 acres along the west side of Lawrence Creek in the town of Brookhaven NY. Area 2 includes undeveloped lands and five properties targeted for buyout. The undeveloped land consists primarily of common reed dominated wetlands and high marsh shrub areas, with some adjoining uplands. The project goals are to Combine non-structural acquisition with restoration of natural floodplain function and create natural buffer to attenuate waves and reduce flooding impacts to developed areas.

CPF Cut and Fill Volumes	
Feature	**Volume (cy)**
Cut Volume	0
Fill Volume	0
Volume Difference (Fill minus Cut)	0
Project Area	~7 acres
Maritime Forest	3
High Marsh	2
Low Marsh	2
TIDAL ENVIRONMENT (ft-NAVD88; 0 ft NAVD88 = -1.17 ft- NGVD29)	
Highest Astronomical Tide (HAT)	1.50
HAT 2048 Sea Level Rise (SLR)	1.90
HAT – 2048 Intermediate SLR	2.10
Flood Frequency Data	
2 - Year	3.10
10 - Year	4.50
25 - Year	5.30
100 - Year	6.10

The conceptual CPF plan for Mastic Beach 2 - Area 2 consists of reestablishment of a natural vegetation community, beginning with forested uplands adjacent to the remaining residential areas, followed by high marsh shrub, high marsh grasses and low marsh near the shoreline. Following acquisition, former private parcels would be restored with native vegetation, increasing the width of vegetated area. Although not depicted on the concept plan, existing linear channels, would be altered to create more sinuous natural configurations to enhance the hydrologic function of the wetland and facilitate restoration of native vegetation. Details on existing channel configuration and natural channel restoration would be developed during the PED phase.

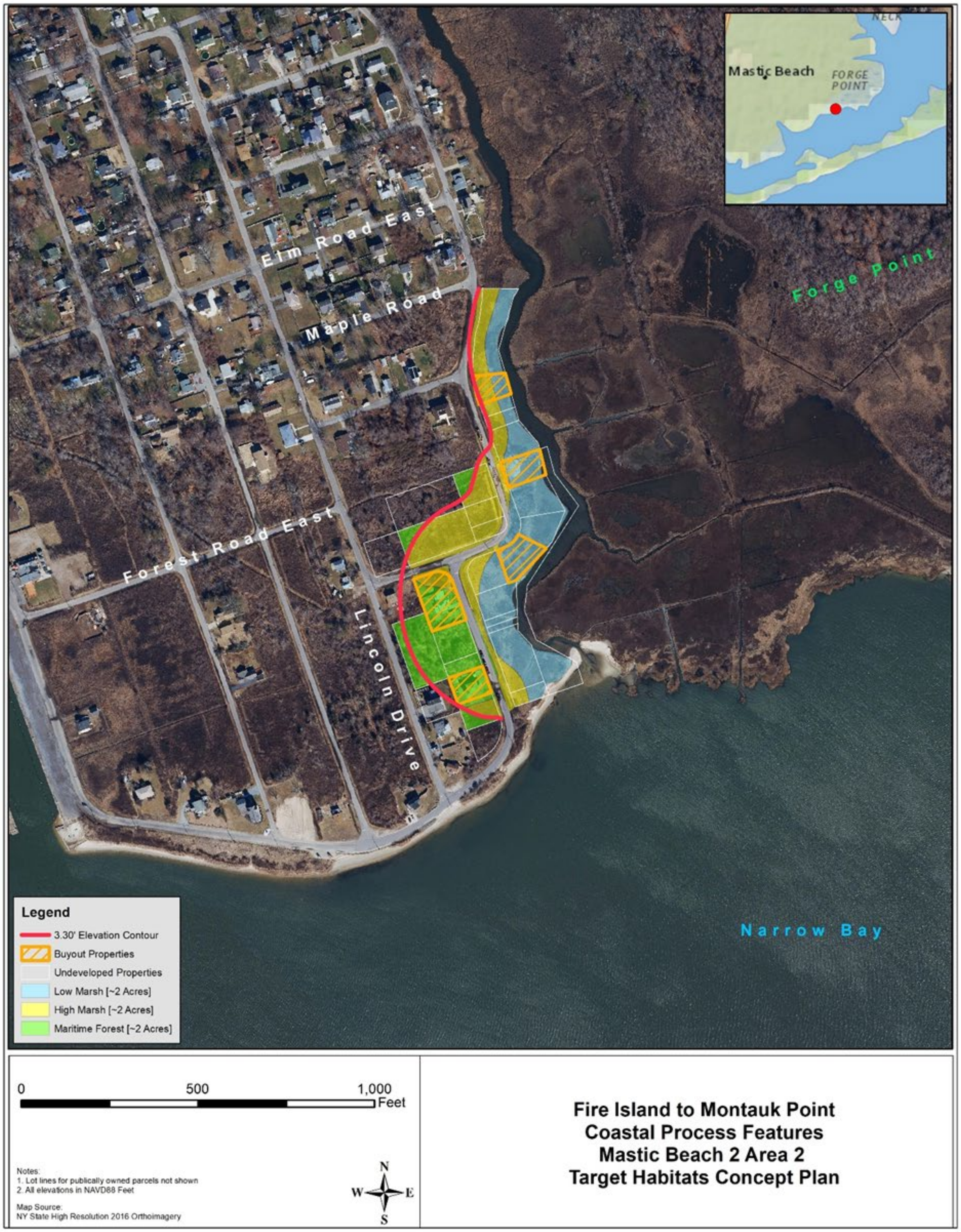

Figure 2.16 Proposed Elevations

2.3.4 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions include reestablishment of CPF design features over time in coordination with Atlantic beach renourishment cycles (nominally about 4 years), subject to monitoring to verify resolution of project objectives. The USACE will not implement vegetation management or manipulation of the sites unless conducted as an incidental action associated with future fill placement. The USACE recommends the local land management agency consider predator management in newly created CPF's. In addition, the USACE anticipates the FIIS's Off Road Vehicle policy will be implemented during nesting season.

3.0 EFH ENVIRONMENT, DESIGNATIONS AND LIFE HISTORIES

The section provides an overview of the EFH communities in the project area and discusses managed species life history details pertinent to the project actions.

3.1 Existing Regional Environment

The Long Island nearshore zone at Montauk Point is composed of eroded glacial features formed over twenty thousand years ago. A terminal glacial moraine divides the island, with a ground moraine to the north and an extensive outwash plain to the south. The nearshore bottom is a gently sloping terrace composed of a remarkably uniform sand sediment surface.

The nearshore and inshore zones of Long Island and New Jersey are shallow marine waters and estuarine waters respectively. They share several characteristics and are part of a larger ecosystem called the Mid-Atlantic Bight (MAB). Because this ecosystem is located between the boreal waters of southern New England and the semi-tropical region to the south, it is especially significant to marine species diversity.

The benthic habitat and the shallow water column habitat above it support different assemblages of organisms. The benthic zone refers to the bottom or substrate and includes sediments and other material present on the bay or nearshore seafloor. Project area benthic substrates include clean sand in open beach intertidal zones and shallow sand flats and muddy sand in subtidal zones. The pelagic zone refers to the water column and organisms within it.

3.2 Project Ecosystems and Habitats

Great South Bay is the largest shallow saltwater bay in New York State, and one the largest in the region. The Great South Bay habitat complex, including the barrier islands and Long Island shoreline, supports regionally significant populations of marine and estuarine fish, migrating and wintering waterfowl, rare plants, and other species associated with open water marshes, barrier beaches, and estuarine watersheds, and includes the largest undeveloped barrier beach in the New York Bight area.

The Coastal Process Feature projects occur within the dunes, beaches, estuarine and nearshore marine ecosystems. The focus of the EFH analysis includes the following habitats within those ecosystems: estuarine marsh (low marsh and high marsh), intertidal mud flats, subtidal benthic habitat, and subtidal water column; marine intertidal, marine nearshore benthic habitat, and marine nearshore water column.

The EFH analysis below presents a quantitative analysis of the changes to the habitat categories associated with the CPF conceptual designs and interpretation of project area EFH changes due to the CPF conceptual designs.

Except for sea turtles and birds, all biota associated with the habitats below the mean high water line are aquatic. Aquatic biota that use these habitats include fish, infaunal and epifaunal invertebrates, and marine mammals.

3.3 Marine Invertebrates

Marine benthic invertebrates are bottom-dwelling species that can be grouped into two categories: infaunal (benthic invertebrates living within the substrate) and epifaunal (benthic invertebrates living on the surface of the substrate). Benthic invertebrates are found in and on the substrate of the intertidal and subtidal habitats. Polychaetes (segmented worms with bristles) are an important component of the benthic infaunal community; epifaunal biota include amphipods, crabs, Atlantic horseshoe crabs (*Limulus polyphemus*), various univalve and bivalve mollusks such as oyster (*Crassostrea virginica*), blue mussel (*Mytilus edilus*), hardshell clams (*Mercenaria mercenaria*), surf clams (*Spisula solidissima*) on the ocean-side of the island), and echinoderms (e.g., sand dollars). Invertebrates provide an important food source for bottom feeding fish and include species that are commercially and recreationally important. The benthic invertebrates of these habitats include a variety of taxa common to the variety of sediments found in the estuaries and in the ocean shoreline (USFWS 1997).

The Atlantic horseshoe crab is a marine chelicerate arthropod found along the US Atlantic and Gulf of Mexico coasts. It merits specific attention as a significant, at risk component of the intertidal and subtidal zones in the project area. It provides food for endangered sea turtles and migrating shorebirds. It provides a key food resource for federally listed shorebird species, particularly the red knot. Horseshoe crab burrowing activities affect the habitat available for other species through bioturbation. Adult predatory activities affect the intertidal and subtidal meio- and macrofauna Undisturbed sandy beach is the crabs' optimal spawning habitat; the availability of optimal spawning habitat is considered a limiting factor on population growth. Fire Island's sandy bay beaches have long been a preferred breeding location. Spawning in the project area occurs for the most part in late spring and early summer, with the crabs arriving during high tides of full and new moons. Nearshore, shallow water, intertidal flats are considered essential habitats for development of juvenile horseshoe crabs; juveniles usually spend their first two years on the sand and mud flats just off the breeding beaches. The species is now in decline across most of its geographic range. For many decades it has been over-harvested for bait, its blood, fertilizer, and other uses. Harvesting horseshoe crab has been prohibited in New Jersey and restricted to males in Delaware. New York has an annual harvest quota and harvest gear restrictions. The bay and Atlantic Ocean beaches of the Fire Island National Seashore including all the CPF project shorelines have been closed to hand-harvest of horseshoe crab (Smith et al 2016). Project construction will temporarily disrupt intertidal habitat in the CPF footprints and may bury crabs if they are present.

3.4 Finfish

More than 60 species of marine and anadromous fish, sometimes known as shore fishes, use this ecologically productive ecosystem as a feeding area. These fish include boreal, temperate, and semi-tropical seasonally migratory species. In the spring and summer is the fish generally movement inshore and somewhat toward the north, while in the fall and winter the movement is offshore and southerly, with some species undertaking long coastal migrations to semi-tropical waters. Some examples of commercially and recreationally important species in the nearshore zone are Atlantic menhaden (*Brevoortia tyrannus*), weakfish (*Cynoscion regalis*), striped bass (*Morone saxatilis*), winter flounder (*Pleuronectes americanus*), summer flounder (*Paralichthys dentatus*), bluefish (*Pomatomus saltatrix),* *tautog (Tautoga onitis), Atlantic mackerel (Scomber scombrus), black sea bass (Centropristis striata*), Atlantic croaker (*Micropogonias undulatus*), northern kingfish (*Menticirrhus saxatilis*), spot (*Leiostomas xanthurus*), American sandlance (*Ammodytes americanus*), and silverside (*Menidia menidia*). The nearshore waters of the Bight are a natural focus or funneling area for a number of anadromous species that eventually enter the Hudson River or other coastal rivers and streams to spawn. These anadromous species include Atlantic tomcod (*Microgadus tomcod*), Atlantic sturgeon (*Acipenser oxyrhynchrus*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), and striped bass (*Morone saxatilis*).

The shallow waters of Great South Bay are a highly productive and regionally significant habitat for marine finfish, shellfish, and wildlife. This productivity is due, in part, to the many salt marshes and mudflats fringing the mainland and the barrier islands; the estuarine habitats around stream and river outlets on the mainland; and the sandy shoals and seagrass (primarily *Zostera marina*) beds that characterize the open water areas of the bay. As a result, Great South Bay has a commercial and recreational fishery of regional importance, affording essential habitat to many economically valuable finfish species that are estuarine-dependent during at least one stage in their life histories. Annual fish surveys in the bays by the New York Department of Environmental Conservation have shown a great diversity of fish species; during eight years of surveys; 85 species have been identified, about 40 of which occur regularly in the bay. The most abundant fish species in the bay, accounting for over 90% of all fish caught, are silversides (*Menidia spp*.), killifish *(Fundulus spp*.), Atlantic menhaden, and bay anchovy (*Anchoa mitchilli*). Forage fish species are found throughout the various aquatic habitats in the bay at different times of the year. Atlantic silverside, the most dominant member of the ichthyofauna throughout much of the year, is found virtually everywhere in the bay. Bay anchovy is the major mid-bay water column occupant in the summer during its spawning time in late June and July. Killifishes include mummichog (*Fundulus heteroclitus*) in the salt marsh habitats, striped killifish (*Fundulus majalis*) over sandy habitat, and sheepshead minnow (*Cyprinodon variegatus*) in both habitats. Sticklebacks, including fourspine (*Apeltes quadracus*) and threespine (*Gasterosteus aculeatus*), are spring and summer spawners associated with SAV; although they are very abundant, their use as prey by other fish and birds is limited due to spines, body armor, and close association with vegetative cover. Northern pipefish (*Syngnathus fuscus*) is a zooplankton consumer preyed upon by both striped bass and summer flounder. American sandlance, probably the most abundant winter species, provides important forage for many species of special emphasis in the Bight (USFWS 1997)

3.5 Marine Mammals

The pelagic zone and beaches also provide habitat for marine mammals. During the spring, adult seals and pups recently weaned from their mothers can occasionally be seen resting on Fire Island's beaches or swimming just offshore in the ocean. Common seal species include Harbor seals (*Phoca vitulina*), harp seals (*Phoca groenlandica*), grey seals (*Halichoerus grypus*), ringed seals (*Pusa hispida*), and hooded seals (*Cystophora cristata*). These animals may come ashore to molt, get warm from the sun, avoid rough waters, or even just to rest after a long day of hunting fish. The harbor seal and the grey seal are the most commonly seen marine mammals other than porpoises along the New York state coastline (Johnston et al. 2015; NY State Department of Environmental Conservation, 2018).

3.6 Reptiles

Several species of sea turtles, including juvenile and adult loggerhead sea turtle (*Caretta*; State and Federally Threatened), Kemps Ridley turtle (*Lepidochelys kempii*, State and Federally Endangered), and juvenile and adult green sea turtle (*Chelonia mydas*; State and Federally Endangered) are found in the Great South Bay and other nearshore bays within the New York Bight area. However, no nesting occurs in the project area or in other New York waters.

3.7 Species-Specific EFH 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.

Each species EFH summary considers two levels of EFH coverage: one associated with coverage at the 10-minute graticule square scale and the second at a finer level of detail when available. The EFH discussions consider the 10-minute graticule GIS coverages provided in NOAA (2015, 2018a)).

3.7.1 EFH 10-Minute Graticule Descriptions

<u>Grid 3 (40° 30.0’ N, 73° 10.0’ W)</u>

Square Description (i.e. habitat, landmarks, coastline markers): The waters within the square within the Atlantic Ocean and within Great South Bay estuary affecting the following: East and West Fire Island, Saltaire, NY and Democrat Pt. on Fire Island. Captree I., Sexton I., Oak I., Cedar Island Beach, Oak Beach, and the Fire Island Inlet.

<u>Grid 4 (40° 40.0’ N, 73° 00.0’ W)</u>

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square and within Great South Bay, north of Ocean Beach, and south of Sayville, NY and Boheamia, NY, from Patchogue, NY and western Patchogue Bay to just west of Nicoll Pt. on Nicoll Bay, southeast of Great River, NY, and the Connetquot River.

<u>Grid 5 (40° 30.0’ N, 73° 00.0’ W)</u>

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Great South Bay estuary south and north of Ocean Beach, NY on Fire Island.

<u>Grid 6 (40° 40.0’ N, 72° 50.0’ W)</u>

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Great South Bay estuary affecting the following: south of Great South Beach on Fire Island, within western Narrow Bay and Bellport Bay, from Mastic Beach, NY, to the Swan River in East Patchogue, NY. Also affected are eastern Patchogue Bay, and south of Bellport, NY, North Bellport, NY, Brookhaven, NY, Mastic, NY, and East Patchogue, NY.

<u>Grid 8 (40° 40.0’ N, 72° 40.0’ W)</u>

Square Description (i.e. habitat, landmarks, coastline markers): 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, south of Eastport, NY, Speonk, NY, and Remsenberg, NY, from Apaucuck Pt. to Mastic Beach, NY, along with waters within eastern Narrow Bay.

Grid 9 (40° 40.0’ N, 72° 30.0’ W)

Square Description (i.e. habitat, landmarks, coastline markers): The waters within the square within the Atlantic Ocean and within the Great South Bay estuary affecting the following: south of Westhampton, NY, Quiogue, NY, Quogue, NY, and Tiana Beach, and within Quantuck Bay and the eastern tip of Moriches Bay.

3.7.2 GIS Data Descriptions

The GIS data used in this analysis came from three sources: NMFS (2009), NOAA (2015), and NOAA (2018a). NMFS (2009) provides site-specific EFH coverages for Atlantic Highly Migratory Species. While both NOAA (2015) and NOAA (2018a) provide EFH coverage at a 10’ x 10’ latitude/longitude scale, the NOAA (2015) dataset includes additional finer scale detail provided by The Nature Conservancy. Note that the grid square numbering shown in Figure 2.1 is the same as used for the FIMP Borrow Area EFH report.

The CPF Project Site numbers (integers) in the EFH descriptions below refer to those shown in the Preferred Alternative section (Figure 2.1).

The designs of CPF #3 (Dunefield West of Field 4) and CPF #10 (Great Gun) do not include construction below the HAT (High Annual Tide) line; these project sites include only devegetation to enhance piping plover nesting and foraging habitat. Therefore, only high marsh habitat may be impacted at these sites and they are not included in individual species EFH descriptions. Finally, EFH described at the 10’ x 10’ grid square scale used in the Borrow Area EFH analysis (for Atlantic butterfish (*Peprilus triacanthus*), Atlantic mackerel, Atlantic surf clam (*Spisula solidissima)*, black sea bass, bluefish, longfin inshore squid (*Loligo pealeii)*, ocean quahog (*Arctica islandica)*, scup (*Stenotomus chrysops)*, spiny dogfish (*Squalus acanthias)*, and summer flounder) may be inaccurate due to scale; that dataset may miss EFH at the corners of the grid square and it includes ocean-side EFH that does not apply to the CPF sites. The individual species analyses below take that into account and provide analysis of more detailed EFH where finer scale GIS data are available. Where no better information than the 10’ x 10’ grid EFH information is available, information from species literature and best professional judgement has been applied to fairly account for species EFH.

3.8 Species EFH-Summaries

The species EFH summaries are divided into bony fishes, cartilaginous fishes, and invertebrates. Life stages for each species are abbreviated as follows: eggs (E), larvae (L), Neonates (N), Juveniles (J), Adults (A). Attachment 1 provides a complete list of species and life stages by CPF locations.

3.8.1 Bony Fish Species

Atlantic butterfish (*Peprilus triacanthus*)

Grid Squares: 3, 5, 9
CPF Project Sites: 1 (E, L, J); 4, 5, 11, 12 (L)

Primary Source: Cross et al. (1999)

Butterfish are relatively small, fast-growing, short-lived, pelagic fish that form loose schools, often near the surface. Butterfish eggs and larvae are pelagic and occur from the outer continental shelf to the lower, high salinity parts of estuaries in the Mid-Atlantic Bight (MAB). Juveniles and adults are common in inshore areas, including the surf zone, as well as in sheltered bays and estuaries in the MAB during the summer and fall. Inshore EFH is the “mixing” and/or “seawater” portions of all estuaries on the Atlantic coast where butterfish eggs are common, abundant, or highly abundant, which includes the waters of the project area. Butterfish eggs are buoyant, and the larvae are nektonic. 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 – 23 meters with water temperatures ranging from 8 – 26° C, salinities ranging from 19 – 32 ppt, and DO ranging from 3 – 10 mg/l.

Project Area: All life stages except adult can be found at CPF #1 (Democrat Point West). Only larval and juvenile stages occur two other CPF sites., with summer and fall as the most likely seasons for their presence. While some impacts to larvae may occur, since adult butterfish are pelagic and even juveniles are highly mobile, only minimal impact to butterfish and EFH is expected to occur as a result of the proposed CPF designs.

Atlantic sea herring (*Clupea harengus*)

Grid Squares: 3, 4
CPF Project Sites: 1 (A); 6 (J, A)

Primary Source: Stevenson and Scott (2005)

The Atlantic sea herring (herring) is a pelagic, schooling, plankton-feeding species that inhabits both sides of the North Atlantic Ocean. In the western North Atlantic this species ranges from Labrador to Cape Hatteras and supports major commercial fisheries. Adults 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 on Nantucket Shoals. Eggs occur predominantly in offshore, well-mixed waters of 32 – 33 ppt salinity, with tidal currents between 1.5 and 3.0 knots, water temperatures below 15° C, and in depths of 20 – 80 meters. 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. Atlantic sea herring prefer higher salinities (26 – 32 ppt) and juveniles and adults (including spawning adults) are typically found at depths of 15 – 130 meters.

Project Area: Mapped EFH for larvae, juvenile and adult Atlantic sea herring occur variously at four CPF project sites. However, based on Stevenson and Scott (2005), larvae are unlikely to occur in the project area. EFH for these species in the project area is, with the exception of CPF #6 (Talisman), near an inlet. For CPF #6, the Atlantic sea herring EFH coverage includes only an upland portion of the site as the northern edge of the EFH coverage extends across the barrier island from the Atlantic Ocean. The life stages likely found in the project areas will occur in low numbers and, as a mobile species, the herring should be able to avoid any project construction activities. Therefore, no impact on Atlantic herring or EFH is anticipated as a result of the CPF project designs.

Atlantic mackerel (*Scomber scombrus*)

Grid Squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 4-9, 11, 12, MB1, MB2-1 (E, L, J, A); 1 (L)

Primary Source: Studholme et. al. (1999)

Atlantic mackerel is a fast swimming, pelagic schooling species distributed over the western Atlantic Ocean primarily in open water. EFH for this species is mostly pelagic waters over the continental shelf with salinities greater than 25 ppt, but Atlantic mackerel may also be found in estuarine zones. All life stages of this species are pelagic. Eggs are typically found offshore but may also occur in large bays. Juveniles may be found in varying (but typically low) abundance in bays and estuarine areas from New Jersey north to Canada; juveniles and adults are common in saline waters of the Hudson-Raritan estuary in the spring and fall. However, Atlantic mackerel are intolerant of temperatures below 5-6° C or above 15 – 16° C and they undergo substantial seasonal migrations in response to changes in seawater temperature. Atlantic mackerel are opportunistic feeders that either select individual prey organisms or filter planktonic prey organisms when abundant. Juveniles eat mostly small crustaceans such as copepods, amphipods, mysid shrimp, and decapod larvae. They also feed on small pelagic mollusks (*Spiratella* spp. and *Clione* spp.) when available. Adults feed on similar food as juveniles but on a wider assortment of organisms and larger prey items.

Project Area: While Atlantic mackerel may be present in the estuarine waters near the inlets located by some of the CPF project sites, no life stage is likely to be abundant in these waters. Eggs are buoyant, larvae and juveniles mobile. No impact to Atlantic mackerel or EFH is anticipated as a result of the proposed CPF designs.

Black sea bass (*Centropristis striata*)

Grid Squares: 3, 5, 6, 8, 9
CPF Project Sites: 1, 4, 5 (L, J, A); 2, 7, 11, 12, MB1, MB2-1 (J, A); 8, 9, MB2-2 (A)

Primary Source: Drohan et al. (2007)

The black sea bass is a warm temperate serranid that ranges from southern Nova Scotia and the Bay of Fundy to southern Florida and into the Gulf of Mexico. Black sea bass are typically found on the continental shelf in complex habitats such as reefs and shipwrecks, but YOY fish also occur in large numbers in structurally complex estuarine habitats. 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. 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. Eggs are pelagic with high average egg densities generally located on the continental shelf in the vicinity of large estuaries. Black sea bass eggs also occur infrequently in large bays. When larvae reach 10 to 16 mm total length, 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 waters between July and September. The estuarine nursery habitat for YOY black sea bass is relatively shallow 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 migrate offshore to avoid cold inshore winter temperatures. After overwintering they return to inshore estuaries in late spring and early summer. They are uncommon in open unvegetated sandy intertidal flats or beaches. The diet of larval black sea bass is poorly known, but probably consists of zooplankton. Juvenile black sea bass are diurnal, visual predators and often prey on small benthic crustaceans (isopods, amphipods, small crabs, sand shrimp, copepods) and other epibenthic estuarine and coastal organisms. During the summer, adult black sea bass feed on a variety of infaunal and epibenthic invertebrates, especially crustaceans.

Project Area: Project construction is not likely to impact black sea bass larvae and EFH. Juveniles and adults are motile and can avoid the fill activities in subtidal habitat within the project sites by moving to similar adjacent habitats found throughout the bay that contain their prey items. Therefore, no or minimal impact on black sea bass or EFH is anticipated as a result of the proposed CPF designs.

Bluefin tuna (*Thunnus thynnus*)

Grid Squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4-9, 11, 12, MB1, MB2-1 (J)

Primary Source: Collette and Nauen (1983)

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 squid. Known spawning areas include the Gulf of Mexico and the Mediterranean Sea (Pew Memorial Trust 2018). Juveniles and adults are typically found in inshore and pelagic surface waters warmer than 12° C from Florida to Maine.

Project Area: Juveniles may occur in pelagic areas of the bays associated with the project areas but are unlikely to occur in the very shallow waters associated with the project construction activities. In any case they are highly mobile and can avoid construction activities associated with the CPF projects. Therefore, no impact to bluefin tuna or EFH within the project area is expected to occur as a result of the proposed CPF designs.

Bluefish (*Pomatomus saltatrix*)

Grid Squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 4-9, 11, 12, MB1, MB2-1 (J, A)

Primary Source: Shepherd and Packer (2005)

Bluefish is 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 – 33 ppt but can tolerate salinities as low as 3 ppt. Adults are generally pelagic.

Project Area: Juvenile and adult bluefish are pelagic species whose occurrence in large bays and estuaries may be expected and therefore could be found in the water column of the project area between the spring, summer and fall. Bluefish eggs and larvae are not expected to occur in the project area. Juveniles and adults are motile and should be able to avoid the fill activities proposed in the CPF project areas. Therefore, no impact to bluefish or EFH within the project area is expected to occur as a result of the proposed CPF designs.

Cobia (*Rachycentron canadum*)

Grid Squares: 3, 4, 5, 8
CPF Project Sites: 1, 2, 4-9, 11, 12 (E, L, J, A – *Summer Only*)

Primary Sources: NOAA (2014), EPA (2015)

Cobia is a coastal migratory pelagic species. A southern species that overwinters near the Florida Keys and migrates in the spring and summer to the mid-Atlantic states to spawn, EFH for this species in the MAB includes sandy shoals of capes and offshore bars, high profile rocky bottom, coastal inlets, and barrier island ocean-side waters (from the surf to the shelf break zone and from the Gulf Stream shoreward, including sargassum) during warm water periods (summer). In the project area, Cobia are found in water temperatures that are greater than 20° C. For cobia, EFH also includes high salinity bays, estuaries, and seagrass habitat. Cobia spawn offshore and eggs and larvae are transported by surface currents. The presence of cobia eggs or larvae in the project area would be unusual and highly seasonal.

Project Area: Cobia are pelagic, warm water species and would only be found in the project area during the summer. If present, juvenile and adult cobia would likely avoid or leave the area during disturbance events and therefore, would not be impacted by the proposed activities. Therefore, no impact to cobia and minimal impact to Cobia EFH is expected as a result of the proposed CPF designs.

Haddock (*Melanogrammus aeglefinus*)

Grid Squares: 8
CPF Project Sites: 7, 8, 9 (L)

Primary Source: Cargnelli et al. (1999d)

Haddock initially inhabit the upper reaches of the water column, feeding on pelagic prey (zooplankton). Larvae density peaks in April and May. Larvae and early stage (pelagic) juveniles are passive foragers on less motile prey such as invertebrate eggs, copepods and phytoplankton. Juveniles undergo a transformation at age 3 to 5 months, after which they are closely associated with the bottom and feed on benthic prey. Most of the larvae are likely to be encountered at greater depths (30 – 50 m). The egg and larval stages occur in the water column at depths of 10 – 50 m below the surface. Temperatures of 4 – 10° C and high salinities; the species prefers 34 – 36 ppt.

Project Area: Haddock larvae are pelagic and may be present within the project areas listed above, but most of the larvae occur in deeper waters than the estuarine nearshore affected by the project. Therefore, no impact to haddock or EFH is expected as a result of the proposed CPF designs.

Monkfish (*Lophius americanus*)

Grid Squares: 3, 5, 8, 9
CPF Project Sites: 1, 2, 4, 5, 7-9, 11, 12 (E, L)

Primary Source: Steimle et al. (1999a)

Monkfish are solitary fish that make seasonal onshore – offshore migrations in response to water temperature and can be found over a variety of substrates. All stages of monkfish are primarily oceanic. Spawning locations are not well known but are thought to be on inshore shoals and in offshore southern New England (SNE), MAB, and Gulf of Maine Shelf waters. Eggs and larvae are most abundant on the continental shelf at 30 – 90 m deep and at temperatures between 10 – 16° C. Juveniles have not been collected at depths <20 m, such as inshore along the MAB. Small numbers of adult monkfish have been collected in estuarine/inshore bottom trawl surveys. Neither juveniles or adults are typically found in the estuarine waters around Long Island or similar waters of the MAB except in very small numbers.

Project Area: Monkfish are primarily an oceanic species. Based on their range of habitat utilization, no impact on monkfish or EFH is anticipated as a result of the proposed CPF designs.

Ocean pout (*Macrozoarces americanus*)

Grid Squares: 3, 5, 8, 9
CPF Project Sites: 1, 2, 4, 5, 7-9, 11, 12 (E, L, A)

Primary Source: Steimle et al. (1999d)

Ocean pout is a bottom-dwelling species that occurs in cool waters (< 10° C), across the continental shelf from Labrador to Cape Hatteras. It is also found in coastal areas and estuaries from southern New England north. It is non-migratory but moves seasonally to remain at preferred temperatures. Adult ocean pout remains demersal and are not known to form schools or aggregations. Adult ocean pout occurs on most sediment types. Nesting and spawning habitat includes the saline parts of New England estuaries. Eggs are demersal and laid in gelatinous masses in a sheltered place on the bottom, such as rocky crevices, where they are guarded either by one or both parents until hatching. Egg development is about 2 – 3 months, but incubation time is temperature dependent and is shorter in the warmer MAB. Most of the population spawns in the fall and hatching occurs by mid-winter. The advance development stage of the new larva results in a short larval stage. Juvenile habitat includes water temperatures below 14° C, depths less than 80 meters, and salinities greater than 25‰. Juvenile ocean pout is not commonly found in Middle Atlantic Bight estuaries, but when found, they are located most commonly toward the mouths of large estuaries and at inlets. The seasonal distribution of adult ocean pout is similar to that of the juveniles. In the winter, they were collected from Georges Bank to the Middle Atlantic Bight. They were also collected in the Gulf of Maine during other seasons. Adult ocean pout is among the most abundant fish collected in coastal Cape Cod and Massachusetts Bay during the spring; the abundance and size of the fish decreased during summer and fall. Adults are commonly collected at depths < 100 m, in coastal waters of New England and in saline estuaries during most months. In the Middle Atlantic Bight, ocean pout uses rocky habitats during some seasons. Adult ocean pout feed on a variety of benthic invertebrates, including polychaetes, mollusks, crustaceans, and echinoderms.

Project Area: The project area includes EFH for eggs, larvae and adults. The New York Bight is at the southern end of the general habitat range of this species; eggs and larvae, the most commonly found life stages, may be buried during fill operations. No juveniles and few adults occur in the MAB. Therefore, no to minimal impact on ocean pout and EFH is anticipated as a result of the proposed CPF designs.

Pollock (*Pollachius virens*)

Grid Squares: 4, 6, 8
CPF Project Sites: 6, 7, MB1, MB2-1 (J)

Primary Sources: Cargnelli et al. (1999a), NOAA (2018b)

Pollock is a gadoid species inhabiting both sides of the North Atlantic. EFH for this species includes the waters from the Gulf of Maine south to New Jersey. This demersal species prefers colder water and in the northwest Atlantic it is most common on the Scotian Shelf and Georges Bank, and in the Great South Channel and the Gulf of Maine. Pollock is a schooling species and is found throughout the water column. Spawned in the ocean, eggs are pelagic, free floating, and found in waters 50 – 250 m deep. Larvae occur in the ocean between the shore and about 200 m deep. Inshore subtidal and intertidal zones are utilized by age 0+ and 1+ juveniles and serve as important habitat areas. 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. Individuals normally spend their first two years in nearshore coastal waters and then migrate out to deeper waters. Age 2+ juveniles move offshore, inhabiting depths of 130 – 150 m. Juveniles prefer bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks and feed primarily on crustaceans with nematodes, fish and annelids.

Project Area: Intertidal and subtidal zones of the project sites may be important nursery areas. Juveniles may be present in shallow intertidal zone at all tide stages throughout summer. Juvenile pollock will likely occupy the project area when water temperatures are less than 18° C. Project construction will impact intertidal and subtidal zones of the project sites. Intertidal EFH impacts are temporary as most of the intertidal benthic community members will rapidly colonize new or disturbed habitat. Juveniles are motile and can avoid construction disturbances. Therefore, no to minimal impact on pollock and to Pollock EFH are anticipated as a result of the proposed CPF designs.

Red hake (*Urophycis chuss*)

Grid Squares: 3, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4, 5, 7-9, 11, 12 MB1, MB2-1 (E, L, J)

Primary Source: Steimle et al. (1999b)

Red hake occur in continental waters from the Gulf of St. Lawrence to the Mid-Atlantic states. During warmer months, they are most common in depths less than 100 m; during colder months, they are most common in depths greater than 100 m. In the MAB, red hake occur most frequently in coastal waters in the spring and fall; then move offshore to avoid the warm summer temperatures (Bigelow and Schroeder 1953), although juveniles can be found in deep holes and channels in coastal bays during the summer. In the winter, most of the population moves offshore, but the degree of movement may depend on the severity of the winter. Winter migrants return inshore the following spring. During the summer, in the bays and estuaries south of Cape Cod juveniles (< 24 cm) usually avoid shallow waters that are warmer than about 22° C, but they do inhabit deeper bays such as Narragansett Bay, Rhode Island. 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 – 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. Red hake juveniles are typically found in water temperatures below 16° C, depths less than 100 meters and a salinity range from 31 – 33 ppt. Demersal settlement generally occurs between September and December with peaks in October to November. Shelter is a critical habitat requirement for red hake juveniles, which are found in bottom environments and are commonly associated with scallops, surf clam shells, and seabed depressions where they seek shelter. Note that surf clams are mostly oceanic, and their distribution is limited by salinity but can be found in some estuarine areas. Adults prefer depths from 30 – 130 m and temperatures between 2 – 22° C. They occur along coastal New England and into Canadian waters from spring to fall. Red hake eggs, larvae and juveniles are listed in the 10' by 10' squares for grid squares within the project area. Examination of more detailed GIS EFH data (NOAA 2015) revealed that no eggs or larval EFH occurs in the intertidal and immediately adjacent subtidal waters of the project area.

Project Area: While most common in shallow oceanic waters, juvenile red hake could be present in the estuarine bottom habitats of the project area between spring and fall. Fill activities are proposed where preferred juvenile shellfish shelter habitat may occur. Eggs are buoyant. Adults are motile and should be able to avoid construction-related disturbances. Therefore, minimal impact may occur to red hake juveniles and EFH as a result of the proposed CPF designs.

Scup (*Stenotomus chrysops*)

Grid squares: 3, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4, 5 ,7-9, 11, 12, MB1, MB2-1, MB2-2 (J, A)

Primary Source: Steimle et al. (1999c)

Scup is considered a demersal species. It spawns 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 seagrass 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. Juveniles and adults feed on variety of epifaunal and water column prey.

Project Area: Juvenile and adult Scup would be found in the project during the warmer seasons. Juveniles and adults migrate offshore to deeper waters when the water temperature falls. The project activities will include fill in intertidal and nearshore subtidal waters. Juveniles and adults are mobile and will move to similar adjacent benthic areas; they will not likely be impacted by fill activities. No to minimal impact on scup individuals or to scup EFH are anticipated as a result of the proposed CPF designs.

Skipjack tuna (*Katsuwonus pelamis*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4-7 (J); 8, 9, 11, 12 MB1, MB2-1 (A)

Primary Source: Collette and Nauen (1983)

Skipjack tuna is a highly migratory, circumglobally, pelagic fish inhabiting tropical and warm-temperate waters, and 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 occurs 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 – 31° C.

Project Area: Skipjack tuna are highly migratory and pelagic and may be present in the estuaries associated with the CPF projects. However, they are unlikely to be present in the very shallow subtidal areas where project construction will occur and are highly mobile. They are expected to easily avoid any CPF construction activity. Therefore, no impact on skipjack tuna or EFH is anticipated as a result of the proposed CPF designs.

Summer flounder (*Paralichthys dentatus*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4, 6, MB1, MB2-1 (J, A); 5 (L, J, A); 7, 8, 9, 11, 12 MB2-2 (E, L, J, A)

Primary Source: Packer et al. (1999)

The geographical range of the summer flounder, or fluke, encompasses the shallow estuarine waters and outer continental shelf from Nova Scotia to Florida. Throughout the U.S. Exclusive Economic Zone (EEZ), summer flounder is managed and assessed as a single stock by the Mid-Atlantic Fishery Management Council. Spawning occurs over the open ocean areas of the continental shelf during fall and winter. Summer flounder exhibit strong inshore–offshore movements with adults and juveniles normally inhabiting shallow coastal and estuarine waters during the warmer months of the year and moving offshore during the fall and winter for growth and spawning. Summer flounder eggs are planktonic and buoyant. Summer flounder eggs are present 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 are defined as follows: "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 reestablish native species."

Project Area: Given their association with sandy substrates, and 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 designs. Small juveniles tend to seek protection in structure or by "hiding in plain sight" via cryptic coloration. Juveniles in the path of the construction might be impacted. Because the project area (within or adjacent to the project footprint) may include SAV beds, for this analysis we have assumed large numbers of early stage juveniles are expected in most of the project footprints. Note however that the relatively ephemeral nature of discrete SAV patches and age of the available data could lead to erroneous conclusions regarding potential impacts, as no recent data are available for the various project locations. USACE plans to work with NMFS to develop a multi-year baseline SAV survey program to accurately establish habitat baseline conditions at the CPF project sites.

Impacts to summer flounder and EFH are expected as a result of the proposed CPF designs. As the USACE further develops the project and resolves current SAV conditions, it will modify this conclusion appropriately.

Whiting (or Silver Hake - *Merluccius bilinearis*)

Grid squares: 3, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4, 5, 7-9, 11, 12, MB1, MB2-1 (E, L, J)

Primary Source: Lock and Packer (2004)

Whiting (silver hake) is distributed on the continental shelf of the northwest Atlantic Ocean from the Gulf of St. Lawrence and the southern edge of the Grand Banks, Newfoundland, Canada to Cape Fear, North Carolina, and, perhaps, as far south as South Carolina. The species spawns on the outer continental shelf, where buoyant 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. Eggs may occasionally occur, particularly around inlets, within the project area. Significant egg production occurs during May to October, with a peak in August. Larvae are pelagic and settle to the bottom as they become juveniles. Juveniles are common during the spring and summer in relatively shallow waters in SNE and south of Long Island. Juvenile summer flounder make use of several different estuarine habitats including seagrass beds, mud flats and open bay areas. Coastal waters off New Jersey, Long Island and Rhode Island are centers of abundance in the fall. 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.

Project Area: Larvae and juveniles are identified in all CPF project areas except for CPF #6 (Talisman); which is located furthest from the inlets. Eggs may occasionally occur within the project footprint, but they are buoyant. Larvae are pelagic. Juveniles are motile and should be able to avoid fill activities. The impacted habitats within the CPF projects include only a small portion of the total available habitat within each of the bays. Therefore, no to minimal impact to whiting individuals or whiting EFH are expected as a result of the proposed CPF designs.

Windowpane flounder (*Scophthalmus aquosus*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4-9, 11, 12 MB1, MB2-1 (E, L, J, A)

Primary Source: Chang et al. (1999)

Windowpane flounder is 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 – 12° C in the spring and 9 – 12° C in the fall), and salinities (5.5 – 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 feet of shore EFH for windowpane flounder is described as those areas of the coastal and offshore waters (out to the offshore boundary of the EEZ). These waters include seawater (salinity > 25.0 ppt) and brackish salinity zones (0.5 < salinity < 25.0 ppt) in South Bay and similar estuaries where the CPF projects occur. All life cycle stages (eggs, larvae, juveniles, adults, and spawning adults) may be found in these zones.

Project Area: All stages of windowpane flounder may be found on shallow, sandy substrates and are expected to occur in the project area most of the year. Eggs and larvae are expected be found in the project area at all times of the year except during the winter. Smaller, YOY juveniles prefer shallow water, and therefore are more likely to occupy the project area than older juveniles and adults. Eggs and larvae may be buried by CPF construction activities, but larger life stages should be able to move away from this disturbance. Therefore, minimal impact to windowpane flounder and EFH are expected as a result of the proposed CPF designs.

Winter flounder (*Pseudopleuronectes americanus*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4-9, 11, 12, MB1, MB2-1 (E, L, J, A)

Primary Source: Pereira et al. (1999)

Winter flounder is a small-mouthed, right-eyed flounder that is a valuable commercial and recreational species. It is 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 – 15° C, dissolved oxygen 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 subtidal areas affected by project construction provide may provide suitable spawning and foraging habitat for eggs, larvae, juveniles and adults of this species. Adults are expected occupy the estuarine project areas during the fall, winter, and spring. Winter flounder would be expected to be present on the bottom habitats while fill activities are proposed to take place. Adults and juveniles should be able to avoid fill placement by swimming away to adjacent habitat. However, if present, eggs and larvae could be buried during fill placement. Additionally, direct impacts to subtidal areas within the CPF project footprint are expected. However, the project areas represent a small fraction of the total Great South Bay subtidal habitat suitable for this species. Therefore, minimal impacts to winter flounder and related EFH are expected because of the proposed CPF designs.

Witch flounder (*Glyptocephalus cynoglossus*)

Grid squares: 8, 9
CPF Project Sites: 7-9 (E, L); 11, 12 (L)

Primary Source: Cargnelli et. al. (1999e)

The witch flounder is a deepwater fish inhabiting ocean depths down to about 1500 m. Life cycle stages occur in marine coastal and offshore waters. Spawning occurs at or near the bottom, however the buoyant eggs rise into the water column where subsequent egg and larval development occurs. In the MAB spawning occurs from April to August, peaking in May or June and the most important spawning grounds are off Long Island. The main food items in the witch flounder diet are polychaetes and crustaceans, although mollusks and echinoderms are also important. The egg and larval stages are pelagic and generally occur over deep water at temperatures ranging from about 4 – 13° C. When metamorphosis is complete, juveniles settle to the bottom. Juveniles and adults are found at temperatures ranging from about 0 – 15°

C. They are found over mud, clay, silt, or muddy sand substrates at depths ranging from 20 – 1565 m. This close association with soft substrate may be the result of their preference for polychaete prey.

Project Area: The estuarine waters of the project area are not the preferred habitat for this species. Although eggs and larvae life stages of witch flounder may be found within the project area, because of their preference for muddy open ocean bottoms they would not likely be found in significant numbers the intertidal and shallow subtidal waters of the estuaries where the project occurs. Therefore, no impact to the witch flounder or EFH is expected as a result of the proposed CPF designs.

Yellowtail flounder (*Limanda ferruginea*)

Grid squares: 3, 5, 8, 9
CPF Project Sites: 1, 2, 4 (E); 5, 7, 8, 9 (E, L); 11, 12 (E, L, J, A)

Primary Source: Johnson et al. (1999)

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 coastal and continental shelf bottom environments off the Atlantic coast in 20 – 50 m depths. Adults prefer sand or sand–mud sediments. Spawning takes place from March through August but occurs from 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 – 90 meters and a salinity range from 32.4 – 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 pelagic. Larvae are initially pelagic then become benthic.

Project Area: Based on their range of habitat utilization, while eggs and larvae may occur in the project footprints, preferred yellowtail flounder habitat does not include shallow estuarine waters. If present, adults and larger juveniles should be to avoid the fill activities by swimming away and eggs and larvae would remain in the water column. Therefore, no impact to the yellowtail flounder or EFH is expected as a result of the proposed CPF designs.

3.8.2 Cartilaginous Fish Species

Blue shark (*Prionace glauca*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: None

Primary Sources: USDOC (1999), Compagno (1984)

While the blue shark is found within the grid squares listed above, the more detailed GIS EFH coverages do not include this species in the project estuarine area. Early juvenile, late juvenile, and adult life stages for the blue shark are listed in the 10’ by 10’ grid squares within the project area. The 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 – 18° C.

Project Area: EFH is designated within the project grid for the blue shark for early juveniles, late juveniles, and adults but does not occur within the project sites that are primarily on the bay side of the barrier islands. Blue sharks are a highly mobile species. Should any blue shark be present during construction, it would be able to avoid the subtidal fill activities. Therefore, no impact to blue shark or EFH is anticipated as a result of the proposed CPF designs.

Common thresher shark (*Alopias vulpinus*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4-9, 11, 12, MB1, MB2-1 (L, J, A)

Primary Source: USDOC (1999)

The common thresher shark is an epipelagic cosmopolitan of warm, temperate, and cold waters. It is found in both coastal and oceanic waters. It is a large shark that uses its tremendously large tail to hit and stun the small schooling fishes upon which it feeds. Common thresher shark is found offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70° W and 73.5° W, south to 40° N.

Project Area: EFH is designated within the project grid for common thresher shark early juveniles, late juveniles, and adults. Common thresher sharks are a pelagic, highly mobile species and will most likely be able to avoid CPF project fill activities. Additionally, they are typically encountered at greater depths than the shallow shoreline areas where fill will occur. Therefore, no impact to common thresher shark or EFH is anticipated as a result of the proposed CPF designs.

Dusky shark (*Carcharhinus obscurus*)

Grid squares: 3
CPF Project Sites: 1 (N)

Primary Sources: USDOC (1999), Compagno (1984)

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. Small juveniles use nearshore coastal waters as nursery habitat in the northwest Atlantic Ocean from off New Jersey to South Carolina during the summer months (McCandless et al. 2014).

Project Area: Dusky shark neonate EFH occurs at one CPF project location, #1 (Democrat Point West), which is directly adjacent to an inlet. Although migratory and pelagic, dusky sharks spawn in nearshore waters, and therefore neonates may occur in the project area. Neonate dusky sharks are mobile and should be able to avoid any construction activities. No impact to dusky shark or EFH is anticipated as a result of the proposed CPF designs.

Little skate (*Leucoraja erinacea*)

Grid squares: 3, 5, 6, 8, 9
CPF Project Sites: 1, 4, 5, 7-9, 11, 12 MB1, MB2-1 (A)

Primary Sources: Packer et al. (2003a), Sulikowski et al. (2009)

The little skate is considered a shallow water species and occurs from the top of the subtidal zone to depths of 90 m. It has a relatively narrow distribution, found only in the northwest Atlantic from Grand Banks, Canada to Cape Hatteras, North Carolina. It is one of the dominant members of the demersal fish community of the northwest Atlantic. Its center of abundance is in the northern section of the Mid-Atlantic Bight and on Georges Bank, where it is found all year over almost the entire range of temperatures recorded for those areas. Little skate make no extensive migrations, although where it occurs inshore the species moves onshore and offshore with seasonal temperature changes. Little skate are generally found on sandy or gravelly bottoms, but also occur on mud. Skates are known to remain buried in depressions during the day, but they may feed at any time during a 24-hour period. In Long Island Sound (1984 – 1994) in spring and fall, they were most abundant on transitional and sand bottoms. Little skate deposit eggs in water not deeper than 27 m on sandy bottoms.

Project Area: The little skate may occur in the project area for all life stages, although EFH maps show only juveniles and adults. Eggs are the only non-motile life stage; juveniles and adults are highly mobile and can likely avoid the fill activities in the shallow subtidal waters of the CPF project areas. Therefore, no to minimal impact to the little skate or EFH should occur as a result of the proposed CPF designs.

Sand tiger shark (*Carchari cellarus*)

Grid squares: 8, 9
CPF Project Sites: 9, 11, 12 (N)

Primary Source: Pollard and Smith (2009)

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 183 m. 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 neonates (≤125 cm) is shallow coastal waters to 25 meters deep from Barnegat Inlet, NJ south to Cape Canaveral, FL.

Project area: Neonate sand tiger sharks may be present in the near-bottom habitats as well as other parts of the water column in the estuaries associated with the CPF projects. Neonate sand tiger sharks are mobile and should be able to avoid the CPF fill activities. No impact to sand tiger shark or EFH is anticipated as a result of the proposed CPF designs.

Sandbar shark (*Carcharinus plumbeus*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4-9, 11, 12, MB1, MB2-1 (J, A)

Primary Sources: Compagno (1984), USDOC (1999)

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. Neonates and juveniles 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 SNE and Long Island.

Project Area: Habitat preference and distribution of this species make it likely that juveniles and adults may occur at the project sites. Sandbar sharks are a mobile species and should be able to avoid the fill activities that comprise the EFH impacts. No impact to sandbar shark or EFH is anticipated as a result of the proposed CPF designs.

Scalloped hammerhead shark (*Sphyrna lewin*i)

Grid squares: 3, 4, 5
CPF Project Sites: 1, 2, 4-6 (A)

Primary Source: Baum et al. (2007)

The scalloped hammerhead shark is a coastal and semi-oceanic pelagic shark, found over continental and insular shelves, as well as nearby deep-water areas, ranging from the intertidal zone and surface to at least 275 m depth. This species has been observed close inshore and even entering estuarine habitats, as well as offshore to depths of 1,000m. In the Northwest and Western Central Atlantic, the coastal area between South Carolina and central Florida is believed to be an important nursery area and this species sometimes form large schools which migrate to higher latitudes in summer. Horizontal migration is also observed from inshore bays to a pelagic habitat as the sharks grow. Adult scalloped hammerhead sharks feed on mesopelagic fish and squids. In certain areas stingrays are the preferred food. While the grid square-scale EFH maps show no EFH for this species, detailed EFH maps show that several of the CPF project sites contain adult EFH for this species, though they are located in the northern extremity of its nearshore/inshore habitat range.

Project Area: Habitat preference and distribution of this species make it possible but not likely that this species may occur at the listed CPF project sites. Its open water feeding preference and mobility will likely result in no presence of this species in the project construction areas. Therefore, no impact to the scalloped hammerhead shark or EFH is anticipated as a result of the proposed CPF designs.

Spiny dogfish (*Squalus acanthias*)

Grid squares: 6, 8
CPF Project Sites: 7, MB1, MB2-1 (A [male], Sub-A [female])

Primary Sources: Stehlik (2007), Fordham et al. (2008)

Spiny dogfish is a marine oceanic species; however marginal adult habitats include marine neritic and estuarine waters. Birth occurs offshore in fall or winter. The pups at birth range from 20-33 cm in total length, with the majority at 26-27 cm. Spiny dogfish feed on squid and fish throughout life. They tend to eat small size classes or young fish, and as they grow they eat larger individuals of the same species. Squid are a major part of the diet in all geographical areas except for the Mid-Atlantic. Worldwide, spiny dogfish favor the temperature range of 7-15° C. Migrations may be over great distances to seek out preferred conditions. The mean salinity in locations where they are caught is 33.5 ppt. Large females are abundant on the nearshore shelf and in lower salinities, perhaps to allow maximal growth of their embryos in warmer coastal waters. Juveniles are pelagic and oceanic. Adults are demersal and pelagic, and spawning adults are pelagic or demersal on the outer continental shelf.

Project Area: Adult and sub-adult spiny dogfish may be present in the project area. However, they are highly mobile and no impact to the species or EFH should occur as a result of the proposed CPF designs.

Tiger shark (*Galeocerdo cuvieri*)

Grid squares: 3, 4, 5, 6, 8, 9
CPF Project Sites: 1, 2, 4-9, 11, 12, MB1, MB2-1 (J)

Primary Sources: Compagno (1984), USDOC (1999)

Tiger sharks typically inhabit tropical and sub-tropical waters on or adjacent to the continental and insular shelves and make 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 sharks may occur at the project site, particularly around inlets. Adult tiger sharks may also be present, although EFH maps did not identify them in the project area. Tiger sharks are a mobile species and will most likely be able to avoid the project fill activities. No to minimal impact to tiger shark or EFH is anticipated as a result of the proposed CPF designs.

White shark (*Carcharod cellatesias*)

Grid squares: 3
CPF Project Sites: 1 (L, J, A)

Primary Sources: Compagno (1984), USDOC (1999)

The white shark, an apex predator, has one of the most extensive ranges of any cartilaginous fish. Detailed EFH maps show that white sharks may occur at CPF locations nearest inlets. 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. The life cycle of this species is poorly known. It is likely that the nurseries will be found in the warmer parts of the range in deep water. Its presence is usually sporadic throughout its range. EFH for these large, apex predators include pelagic northern New Jersey and Long Island waters of depths between 25 and 100 meters. White sharks typically feed on bony fishes, other sharks, rays, seals, dolphins and porpoises, sea birds, carrion, cephalopods, crabs, and whales. The types of habitats and locations of nursery areas are unknown.

Project Area: Habitat preference and distribution of this species make it possible but not highly likely that the white shark may occur at the project site. White sharks are highly mobile and will most likely not occur in the subtidal and intertidal waters associated with CPF construction activities. Therefore, no impact to white sharks or EFH is anticipated as a result of the proposed CPF designs.

Winter Skate (*Leucora cellateata*)

Grid squares: 3, 5, 6, 8, 9
CPF Project Sites: 1, 4, 5, 7-9, 11, 12, MB1, MB2-1 (J)

Primary Sources: Packer et al. (2003b), Kulka et al. (2009)

The winter skate occurs from the south coast of Newfoundland and the southern Gulf of St. Lawrence to Cape Hatteras. Its center of abundance is on Georges Bank and in the northern section of the MAB; however, in both areas it is often second in abundance to the little skate, a sympatric species. Habitat in the MAB includes estuarine and nearshore coastal shelf waters. The winter skate is a benthic species. Habitat ranges from shoreline to 317 m, but it is most abundant at depths <150 m. Eggs of winter skate are deposited throughout the year off southern New England and from summer to autumn off Nova Scotia. Winter skate migrate to deeper colder waters during summer months in some areas and the species is sometimes termed a winter periodic. Research vessel survey data for the Scotian Shelf, however, show that winter skate appear to concentrate in deeper, warmer waters in the winter and move into shallower waters during spring and summer. Juveniles prefer sand and gravel bottoms but have been reported from muddy bottoms in the Passamaquoddy Bay. In the Long Island Sound during spring 1984-1994, it was found most abundantly on sand bottoms in the Mattituck Sill and Eastern Basin. The winter skate remains buried in depressions during the day and is more active at night. It may feed at any time during a 24-hour period.

Project Area: The CPF project areas include winter skate juvenile EFH. However, this is a motile species and should be able to avoid fill activities associated with CPF construction. No or minimal impact to this species or EFH is anticipated as a result of the proposed CPF designs.

3.8.3 Invertebrate Species

Atlantic surf clam (*Spisula solidissima*)

Grid squares: 3, 5, 9
CPF Project Sites: 1, 2, 4, 5 (J, A); 11, 12 (A)

Primary Sources: Cargnelli et al. (1999b), Fay et al. (1983)

Surf clams are the largest bivalve in the MAB 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 are mostly oceanic, and their distribution is limited by salinity. The species generally occurs from the beach zone to a depth of about 200 feet, but below about 125 feet abundance is low. It prefers turbulent waters at the edge of the breaker zone. Encroachment into estuarine zones is probably limited by salinity requirements but it 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. Most surf clam beds of the MAB are located from the beach zone to a depth of 44 m off Long Island, and to a depth of 60 m off New Jersey.

Project Area: Juvenile and adult surf clams do not typically occur in the estuarine beaches of the project area. However, if present in the CPF project construction areas they would likely be buried by the fill component of CPF project plans. The "seeding" mechanisms of the surf clam are at work continuously and establish populations regularly. Surf clams will reestablish after the fill activities are completed. Therefore, no to minimal impact to the Atlantic surf clam or EFH is anticipated as a result of the proposed CPF designs.

Longfin inshore squid (*Loligo pealeii*)

Grid squares: 3, 5, 6, 8, 9
CPF Project Sites: 1, 4, 5, 7-9, 11, 12, MB1, MB2-1 (E, J)

Primary Source: Jacobson (2005)

The longfin inshore squid is a schooling species of the molluscan family Loliginidae. It is distributed in continental shelf and slope waters from Newfoundland to the Gulf of Venezuela and occurs in commercial abundance from southern Georges Bank to Cape Hatteras. The squid is commonly encountered throughout Long Island Sound in late spring, though it appears more dispersed in summer. In fall, small squid are abundant and distributed throughout the Sound. During the fall, abundance tends to increase with depth, highest over mud bottom; abundance over transitional and sand bottoms rank second and third respectively. Although the abundance of squid is very low in November, it is still commonly encountered throughout the Sound (65% occurrence).

Eggs generally inhabit shallow waters, <50 m deep and near shore. Larvae and juveniles are found in coastal and inshore waters, with eggs and larvae at the surface and juveniles in the upper 10 m of the water column. Adults may be found in shallow inshore waters up to 180 m deep from March to October. Adults are typically found over mud or sandy mud bottoms, and have been found at surface temperatures ranging from 9 – 21° C and bottom temperatures ranging from 8 – 16° C.

Project Area: Based on their range of habitat utilization, the longfin inshore squid may be expected to seasonally occur in the project area for all life stages, although EFH maps show only eggs and juveniles. Since the eggs float, and the other life stages are motile and occur in open water, no to minimal impact on longfin squid or EFH is anticipated as a result of the proposed CPF designs.

Ocean quahog (*Arctica islandica*)

Grid squares: 3, 5, 9
CPF Project Sites: 1, 2, 4, 5, 11, 12 (J, A)

Primary Source: Cargnelli et al. (1999c)

The ocean quahog species occurs on both sides of the North Atlantic. Ocean quahogs are extremely slow-growing and long-lived marine bivalves found buried in sandy and muddy sediments from the low intertidal zone down to 400 m in the Atlantic Ocean and saline portions of bays and estuaries. Distribution in the western Atlantic ranges generally from 10 – 250 m. 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, in the ocean, is protracted, lasting from spring to fall, and eggs are found in depths from 1 – 30 m. Juveniles are typically found offshore in sandy substrates but may survive in muddy intertidal waters of protected from predators.

Project Area: Due to the summer temperature ranges in the intertidal and shallow waters where project construction will occur, it is likely that few ocean quahogs will be found there. If present, however, most will be buried by the fill activities. Because of the lack of habitat due to the temperatures of the shallow shoreline waters where project activities will occur, no to minimal impact to ocean quahog and no impact to EFH is anticipated as a result of the proposed CPF designs.

4.0 IMPACTS

4.1 Introduction

Natural coastal vegetation communities are declining components of the regional shoreline and barrier island ecosystems. The CPF projects work within these communities to create and enhance some of those community and habitat types. The potential of project 10% designs to impact some other existing communities and habitats and potential impacts are quantified in this section. Some disturbance of intertidal wetlands may occur during construction only, which may last a few months. As the projects are further developed USACE will work with all stakeholders to avoid and minimize the potential impacts identified below. The USACE will work with NMFS to develop sampling plans that may be required to better inform CPF design during the Pre-Construction Engineering and Design (PED) phase of work

4.2 Impacts – General

The proposed CPF actions at each site are described in Section 2.3 Preferred Alternative. The dunes, beaches, estuarine, and nearshore marine ecosystems where the CPFs are located are described in Section 3.1 Existing Regional Environment. Most of the assessed 10% CPF project designs focus on enhancing and creating piping plover/shorebird habitat. The designs create unvegetated uplands for nesting, connected to gently sloping intertidal foraging areas. Where possible, devegetation is proposed as the primary or sole activity (CPF #3 Dunefield West of Field 4 and CPF #10 Great Gun). The other sites use some combination of devegetation, regrading, and fill to create the upland and altered intertidal habitats within the project footprints. Creation of intertidal habitat increases the elevations of existing intertidal and subtidal zones. This is a major component of CPF Site 10 Smith Point County Park. The Mastic Beach site designs (Mastic Beach 1, Mastic Beach 2 Area 1 and Mastic Beach 2 Area 2) focus on wetland restoration as their primary purpose.

Where possible, existing sand will be graded to provide material needed to create different elevations. Fill from offsite borrow areas, when employed, will have physical (grain size, color, etc.) characteristics similar to the existing beach sediments, typically with a low fines fraction. The USACE expects that most of the fine material that would be suspended by the construction activities in the Great South Bay and Moriches Bay water columns would rapidly settle out in nearby adjacent waters and would not adversely affect the designated habitat areas outside of the project footprints. We have therefore assumed no impacts based on the granulometric characteristics of imported sediments.

Subtidal areas within the project footprints will be converted to intertidal beach and uplands. In these CPFs, currently existing intertidal beach will be converted into uplands except for a small area along the shoreline at either end of the project boundary. In most cases, the proposed intertidal beach area will increase in size relative to the currently existing intertidal beach area. Likewise, the subtidal portions of the projects will decrease.

4.3 Impact Calculation Methods

We calculated potential impacts to intertidal and subtidal habitat areas for 10% designs. We identified potential impacts by elevation (intertidal and subtidal) and vegetation community (low marsh). The available data identified no hardbottom or mud flat habitat within the project footprints.

Intertidal and Subtidal Area Changes

For each project site, existing elevations for the HAT and LAT provided the data to calculate existing subtidal and intertidal areas. The locations of the proposed HAT and design LAT for each proposed CPF design (Section 2.3.3) allowed quantification of proposed intertidal and subtidal areas at each site. The differences between existing and proposed areas between HAT and LAT (intertidal) and below the existing and proposed LAT (subtidal) quantify changes in those habitat areas. For purposes of this assessment, intertidal area is equivalent to "Beach Habitat"

Wetland Habitat Area Changes

Proposed fill would also impact wetland habitat within some project sites. Wetland impact area calculations used the wetland GIS coverages available from NALCC (2013). Wetland impacts included intertidal wetlands.

Consideration of Other Community Types

With the exception of the Mastic Beach CPF sites, no tidal creeks, mud flats, or sandflats were identified in the available data of the immediate project areas (where direct or indirect impacts might be considered). The Mastic Beach CPF sites will include some restoration of sinuous channels from existing linear drainage ditch footprints, restoring the same open water in a natural tidal creek topography. Available SAV coverages were reviewed as part the analysis; the data were relatively old (data was based on 2002 imagery (Greenhorne and O'Mara 2003), 2004 imagery (Wang and Trager 2013)) and, on the recommendation of USACE, were not used as part of impact calculations. The USACE has a policy of wetland impact avoidance and will work closely with NMFS to obtain timely subtidal habitat data and refine project footprints based on that information as the project design efforts progress. The relatively ephemeral nature of discrete SAV patches and age of the data could lead to erroneous conclusions regarding potential impacts; USACE plans to work with NMFS to develop a multi-year baseline SAV survey program to accurately establish habitat baseline conditions at the CPF project sites.

4.4 Direct Impacts: Intertidal and Subtidal Habitats

Some intertidal beach and subtidal area will be converted to supratidal beach. The remaining subtidal area will be converted to intertidal beach elevations. Estimated impacts to intertidal and subtidal EFH were calculated for all sites (Table 4.1). The 10% project designs will, with a few exceptions, reduce existing area of subtidal habitat by filling those areas to intertidal or supratidal elevations. Most of the intertidal wetland impacts occur in one location, Smith Point County Park, where the current 10% design converts 119.69 acres of existing intertidal marsh is converted to upland habitat (Table 4.1 CPF #9). The proposed design at the Mastic Beach Sites (MB1, MB2-1 and and MB2-2) may result in some intertidal and subtidal temporary impacts as the drainage ditches and some areas of existing intertidal and subtidal are reshaped and regraded to optimize those habitat elevations. As the design efforts progress, USACE will work closely with NMFS to ensure that changes in the areas of subtidal and intertidal habitats will have an insignificant effect on the South Bay ecosystem. The impact of unvegetated subtidal conversion to intertidal habitat on local forage habitat area would be minor, as there is extensive similar habitat nearby this and all the CPF sites.

Table 4.1 Estimated Impacts to Intertidal and Subtidal Areas for 10% Coastal Process Feature Design Level

CPF #	CPF Name	Intertidal Acres			Subtidal Acres		
		Existing	Proposed	Difference	Existing	Proposed	Difference
1	Democrat Point West	34.45	45.94	11.49	13.41	5.89	-7.52
2	Democrat Point East	2.12	5.38	3.26	0.41	0.44	0.03
3	Dunefield West of Field 4	3.90	3.90	0.00	0.61	0.61	0.00
4	Clam Pond	3.49	5.39	1.90	7.93	1.60	-6.33
5	Atlantique to Corneille	0.36	4.25	3.89	8.82	1.63	-7.19
6	Talisman’	0.63	6.95	6.32	14.76	2.03	-12.73
7	Pattersquash Reach’	15.02	19.83	4.81	5.81	1.00	-4.81
8	New Made Island Reach	8.30	26.32	18.02	26.03	7.91	-18.12
9	Smith Point County Park Marsh	269.04	149.35	-119.69	4.36	5.74	1.38
10	Great Gun	6.34	6.34	0.00	5.08	5.08	0.00
11	45, 47, and 51 Dune Road	4.30	3.45	-0.86	0.49	0.17	-0.32
12	Tiana Bayside Park	2.74	1.55	-1.19	6.78	6.11	-0.67
MB1	Mastic Beach 1	8.22	8.22	0	**	**	**
MB2 -1	Mastic Beach 2 Area 1	12.77	12.77	0	**	**	**
MB2-2	Mastic Beach 2 Area 2	2.41	2.41	0	**	**	**
	Totals	**374.09**	**302.05**	**-72.05**	**94.49**	**38.21**	**-56.28**

*Difference= Proposed-Existing

**Some subtidal areas may be in drainage ditches may be reshaped to tidal creek characteristics but no quantification of that potential effort has yet been performed.

4.5 Wetland Direct and Indirect Impacts

The project designs include potential direct and indirect wetland impacts to low marsh communities (Table 4.2). Direct wetland impacts will result from fill placement and regrading of the existing surface. Indirect impacts could occur outside the project footprint to those wetlands that could be cut off from the bay due to creation of upland elevations between the wetland and the adjacent intertidal zone. As discussed earlier, as the project designs are further refined USACE will work closely with NMFS to further minimize and avoid such impacts. Note that the 10% design for Smith Point County Park Marsh, which accounts for almost all wetland impacts, temporary impacts are associated with the grading of the marsh surface to optimize intertidal elevations across the entire project footprint, and indirect impacts are associated with small areas at the edges; (as at New Made island Reach). Similarly, as part of the Mastic Beach CPF sites, temporary impacts will occur in order to restore estuarine marsh wetland topography and a small wetland area of MB1 is cut off by the maritime forest footprint. As the designs are refined, USACE will work to eliminate such impacts, as they are primarily associated with the coarse level of detail developed at the 10% design level. At the Mastic Beach sites, redesign of existing drainage ditches to a more natural pattern will result in roughly the same open water area currently associated with the drainage ditches. This activity is not expected to significantly reduce wetland area. Grading to create appropriate marsh elevations may occur in some areas of each project footprint. Specific design of natural channel restoration and marsh grading would be developed during the PED phase. USACE will work closely with NMFS to reduce and eliminate the various impacts and increase the quality and quantity of marsh areas as they advance the designs.

Table 4.2 Potential Low Marsh Direct and Indirect Wetland Impacts of 10% Coastal Process Feature Designs

		Low Marsh Acres				
CPF #	**CPF Name**	**Existing***	**Proposed***	**Direct Impact***	**Indirect Impact****	**Temporary Impact**
4	Clam Pond	0.1	0	0.1	0	0
7	Pattersquash Reach	1.2	0	1.17	0	0
8	New Made Island Reach	2.38	0	2.4	0.3	0
9	Smith Point County Park Marsh	261.2	127.75	119.7	1.2	133.46
11	45, 47, and 51 Dune Road	0.86	0.02	0.84	0	0
12	Tiana Bayside Park	2.01	0	2.01		0
MB1	Mastic Beach 1	16.75	16.75	0	0.22	***
MB2 -1	Mastic Beach 2 Area 1	19.01	19.01	0	0	***
MB2-2	Mastic Beach 2 Area 2	3.76	3.76	0	0	***
	Totals	**307.22**	**167.29**	**126.22**	**1.72**	**133.46**

*Acres within design footprint
**Acres outside design footprint
***Temporary impact areas not yet defined

4.6 Direct Impacts - EFH-Designated Species

The project will result in direct impacts to some intertidal and subtidal habitat. However, since the total area of these impacts represent a small portion of these habitats in the region, the impact on the affected species would be minimal; the primary species-specific impact would occur to species with non-motile life stages that use habitats buried during construction.

For non-motile individuals, particularly benthic infauna, we assume that burial, the primary source of impact to the benthos, is permanent. Some species (particularly bivalves) may be able to move upward through the new sediment fast enough to regain the necessary position at the sediment water interface before lack of oxygen is fatal. However, most individuals likely will die. The reproductive mechanisms of most of the smaller invertebrates is such that recolonization is typically rapid and relatively complete within a few months to years. Some larger species, such as some of the bivalves that may occur in the area, are most often slower growing and will have longer recovery periods. Species for which the project sites are considered marginal habitat may recover over longer periods of time, as few recruits arrive and survive to adulthood. Eggs and demersal larvae of all species present in an area being filled to create intertidal habitat may also be buried.

Table 4.3 Potential Impacts for EFH-Designated Species and Life History Stages at the Project Sites

EFH-Designated Species	Life Stage	Potential Impacts
		Bony Fish Species
Atlantic butterfish	E, L, J	Eggs buoyant; No impact. Larvae nektonic, other life stages fully mobile. Minimal impact to Atlantic butterfish and EFH.
Atlantic sea herring	J, A	Pelagic oceanic species occasional near inlets, mobile life stages. No impact on Atlantic sea herring or EFH.
Atlantic mackerel	E, L, J, A	All life stages are pelagic. No impact to Atlantic mackerel or EFH.
Black sea bass	L, J, A	Fish feed primarily on more mobile benthic epifaunal species and small fish available in adjacent areas of habitat. No or minimal impact to black sea bass and EFH.
Bluefin tuna	J	Not likely to occur in the project area. No impact to bluefin tuna or EFH.
Bluefish	J, A	Temporary displacement of fish and their prey (forage fish). No impact to bluefish or EFH.
Cobia	E, L, J, A (summer only)	Present during summer in some subtidal areas. No impact to cobia, minimal impact to EFH.
Haddock	L	Pelagic species that may occur in the general project area. No impact to haddock or EFH.
Monkfish	E, L	Not likely to occur in the project area. No impact to monkfish or EFH.
Ocean pout	E, L, A	Eggs and larvae are demersal. Potential to be impacted by filling operations. No to minimal impact on ocean pout and EFH.
Pollock	J	No to minimal impact for pollock or pollock EFH.
Red hake	E, L, J	Eggs buoyant, pelagic; juveniles demersal. Bottom burial may impact juveniles, EFH. Minimal impact to red hake and EFH.
Scup	J, A	No to minimal impact on scup or scup EFH
Skipjack tuna	J, A	Pelagic species probably rare in the project area. No impact to skipjack tuna or EFH.
Summer flounder	E, L, J, A	All life stages abundant in the project area; Impacts to summer flounder and EFH.
Whiting	E, L, J	Eggs are buoyant, larvae and juveniles motile. Adjacent areas provide alternative EFH locations. No to minimal impact to whiting; impact to EFH.

EFH-Designated Species	Life Stage	Potential Impacts
Windowpane flounder	E, L, J, A	Eggs, larvae have potential to be buried during fill activities. Later life stages motile and can avoid the activities. Minimal impact to windowpane flounder and EFH.
Winter flounder	E, L, J, A	Project may impact spawning, and foraging habitat for eggs, larvae and YOY juveniles. Minimal impacts to winter flounder and EFH.
Witch flounder	E, L	No preferred habitat. Not likely found in project waters. No impact to witch flounder or EFH.
Yellowtail flounder	E, L, J, A	No preferred habitat, some eggs and larvae buoyant and pelagic, other life stages motile. No impact to yellowtail flounder or EFH.
Cartilaginous Fish Species		
Blue shark	J, A	Oceanic–epipelagic, fringe–littoral, cosmopolitan species not likely to occur in project area. No impact to blue shark or EFH.
Common thresher shark	L, J, A	Highly mobile, pelagic species. No impact to thresher shark or EFH.
Dusky shark	N	Neonates may occur at sites near inlets but are highly mobile. No impact to dusky shark or EFH.
Little skate	A	Eggs may be buried, juveniles motile. No to minimal impact on little skate and EFH.
Sand tiger shark	N	Neonates are motile and able to avoid construction. Extensive EFH next to project sites. No impact to sand tiger shark or EFH.
Sandbar shark	J, A	Juveniles and adults are mobile; extensive EFH adjacent to project sites. No impact to sandbar shark or EFH.
Scalloped hammerhead shark	A	Pelagic feeder able to avoid construction. No impact to scalloped hammerhead shark or EFH.
Spiny dogfish	A (male), Sub-A (female)	Highly mobile, pelagic. No impact to spiny dogfish or EFH.
Tiger shark	J	Motile species mostly near inlets. No to minimal impact on tiger shark and EFH.
White shark	L, J, A	Possible but not likely presence; pelagic feeder. No impact to white shark and EFH.
Winter skate	J	Spring summer resident in shallow waters. Motile species able to avoid construction. No to minimal impact on winter skate and EFH.
Invertebrate Species		
Atlantic surf clam	J, A	Uncommon in project area; those present may be buried. No to minimal impact on Atlantic surf clam and EFH.
Longfin inshore squid	E, J	Seasonal occupant, eggs buoyant and juveniles motile. No to minimal impact on longfin inshore squid and EFH.
Ocean quahog	J, A	Limited environmental suitability, but if present may be buried. No to minimal impact to ocean quahog; no impact to EFH.
Key: E = eggs, L = larvae, J = juveniles, N = neonates, A = adults, Sub-A = subadults		

4.7 Indirect Impacts – EFH Designated Species

For all motile individuals, construction-related impacts below the HAT during construction would be temporary. These individuals can move away from the temporary disturbances. No long-lasting impacts to the water quality in or adjacent to the project area are expected. Turbidity plumes generated by filling and regrading are temporary and the sediment used for fill is expected to have low levels of fines, which constitute the large majority of turbidity plumes. When settled (which will occur relatively quickly in and outside the project footprint), the fines should be insufficient in volume to impact adjacent vegetation or sessile benthic infauna. Additionally, the fill will be primarily sand (with some shells), without any significant amount of organic matter. Therefore, the project anticipates no significant release of nutrients or lowering of oxygen concentrations (through increased biological oxygen demand).

One of the common impacts of the CPFs on EFH in the project area would be the trophic effects caused by the temporary elimination of infaunal prey organisms and some epifaunal prey organisms for bottom-feeding, EFH-designated species. Infauna and smaller, less motile epifauna would be buried as a result of fill placement or regrading to achieve the desired additional intertidal habitat. Most of these organisms would be invertebrates. Some would be able to reestablish themselves, but we would expect most individuals to die. Rapid reproduction and recolonization from immediately adjacent undisturbed habitat are characteristic features of many invertebrate epi- and infauna that will contribute to the temporary nature of these impacts. The impact of unvegetated subtidal conversion to intertidal habitat on local forage habitat area would be minor, as there is extensive similar habitat nearby all the CPF sites

Species that feed primarily on intertidal infauna organisms are most likely to be affected during the site construction period and a short-time thereafter. The negative effects of infauna prey removal would be temporary, lasting 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 1999). Greene (2002) cited literature and literature reviews of recolonization studies on a wide latitudinal range of east coast beaches, reporting recovery between 2 and 7 months and "quick" recovery times. USACE (2013) indicated that recovery in a borrow area near New York Harbor takes 1-5 years. Intertidal habitat recovery is particularly rapid (perhaps one to two growing seasons), as this community is disturbance regulated and the species there have high reproductive and growth rates to compensate for a continually disturbed environment. Re-colonization of infaunal species will be stimulated by adult populations that inhabit similar environments adjacent to the project area. Construction duration at most sites is short (a few months at most) and recolonization can begin as soon as the project is completed. Both benthic and pelagic foragers would likely expand their forage area until a sufficient prey patch is located. Additionally, mobile foragers could resume feeding in the same location as soon as the construction activities cease. Finally, project area represents a very small percentage of the extensive foraging grounds within the bay, thus the overall indirect impacts to EFH species and EFH will be minimal.

The temporary loss of benthic prey resources caused by burial during fill and grading activities would not have 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 motile organisms could move to avoid fill activities and could re-occupy the filled area very soon after sand placement and grading is completed.

The 4-year average nourishment cycle for the CPF sites is well beyond the expected recolonization rates for the intertidal habitats, and site-specific erosion rate estimates (reported elsewhere) suggest that a longer management interval may be appropriate at many of the CPF sites, Therefore, no cumulative impacts to intertidal EFH are expected as a result of long-term site management activities.

4.8 Indirect Impacts – Marsh

Low estuarine marshes are an important habitat for many invertebrates that form the bottom of the heterotrophic food web. Impacts to this wetland type would be significant due to the importance of this habitat to much of the ecosystem food web and energy system. Loss of this habitat and other coastal marsh habitat types is ongoing throughout the region (Narragansett Bay Estuary Program 2017). The enhancement and creation of intertidal wetlands at Smith Point County Park, Mastic Beach 1 and Mastic Beach 2 project areas are valuable enhancement locally and regionally.

5.0 MITIGATION

The CPF project designs assessed here focus on enhancing and creating critical habitat for federally listed avian species, in part by creating nesting and foraging habitat from intertidal and subtidal elevations. The cooperative efforts of all stakeholders will help develop final designs that provide the necessary level of benefits to the listed avian species while avoiding impacts, minimizing unavoidable impacts, and if necessary, by identifying appropriate mitigations for unavoidable impacts to EFH.

6.0 CONCLUSION

This EFH evaluation of 10% conceptual designs of CPF projects has identified no to minimal potential adverse impacts to EFH-designated species and EFH in the project area. EFH-designated species that feed on more motile epifaunal organisms or on small forage fish would not be seriously affected. For any bottom-feeding EFH species, the impact of unvegetated subtidal conversion to intertidal habitat on local forage habitat area would be minor, as there is extensive similar habitat nearby all the CPF sites. The New York District will continue coordination with NOAA and other stakeholders to develop practicable solutions acceptable to the stakeholder and protective of the environment.

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ATTACHMENT 1

EFH-Designated Species and Life Stages for the 15 Coastal Process Features Locations

Species	Life Stage*	Democrat Point West	Democrat Point East	Dunefield West of Field 4	Clam Pond	Atlantique to Corneille	Talisman	Pattersquash Reach	New Made Island Reach	Smith Point County Park Marsh	Great Gun	45, 47, and 51 Dune Road	Tiana Bayside Park	Mastic Beach 1	Mastic Beach 2 Area 1	Mastic Beach 2 Area 2
Atlantic Herring	A	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Atlantic Mackerel	A	-	-	-	X	X	X	X	X	X	-	X	X	X	X	-
Black Sea Bass	A	X	X	-	X	X	-	X	X	X	-	X	X	X	X	X
Bluefish	A	X	-	-	X	X	X	X	X	X	-	X	X	X	X	-
Cobia	A	X	X	-	X	X	X	X	X	X	-	X	X	-	-	-
Ocean Pout	A	X	X	-	X	X	-	X	X	X	-	X	X	-	-	-
Scup	A	X	X	-	X	X	-	X	X	X	-	X	X	X	X	X
Skipjack Tuna	A	-	-	-	-	-	-	-	X	X	-	X	X	X	X	-
Summer Flounder	A	X	X	-	X	X	X	X	X	X	-	X	X	X	X	X
Window Pane Flounder	A	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Winter Flounder	A	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Yellowtail Flounder	A	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-
Common Thresher Shark	A	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Little Skate	A	X	-	-	X	X	-	X	X	X	-	X	X	X	X	-
Sandbar Shark	A	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Scalloped Hammerhead	A	X	X	-	X	X	X	-	-	-	-	-	-	-	-	-
Spiny Dogfish	A (Male)	-	-	-	-	-	-	X	-	-	-	-	-	X	X	-
White Shark	A	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atlantic Surf Clam	A	X	X	-	X	X	-	-	-	-	-	X	X	-	-	-
Ocean Quahog	A	X	X	-	X	X	-	-	-	-	-	X	X	-	-	-
Atlantic Butterfish	E	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atlantic Mackerel	E	-	-	-	X	X	X	X	X	X	-	X	X	X	X	-
Cobia	E	X	X	-	X	X	X	X	X	X	-	X	X	-	-	-
Monkfish	E	X	X	-	X	X	-	X	X	X	-	X	X	-	-	-
Ocean Pout	E	X	X	-	X	X	-	X	X	X	-	X	X	-	-	-
Red Hake	E	X	X	-	X	X	-	X	X	X	-	X	X	X	X	-
Summer Flounder	E	-	-	-	-	-	-	X	X	X	-	X	X	-	-	X
Whiting	E	X	X	-	X	X	-	X	X	X	-	X	X	X	X	-
Window Pane Flounder	E	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Winter Flounder	E	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Witch Flounder	E	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-
Yellowtail Flounder	E	X	X	-	X	X	-	X	X	X	-	X	X	-	-	-
Longfin Inshore Squid	E	X	-	-	X	X	-	X	X	X	-	X	X	X	X	-
Atlantic Butterfish	J	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atlantic Herring	J	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Atlantic Mackerel	J	-	-	-	X	X	X	X	X	X	-	X	X	X	X	-
Black Sea Bass	J	X	X	-	X	X	-	X	-	-	-	X	X	X	X	-
Bluefin Tuna	J	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Bluefish	J	X	-	-	X	X	X	X	X	X	-	X	X	X	X	-
Cobia	J	X	X	-	X	X	X	X	X	X	-	X	X	-	-	-

Species	Life Stage*	Democrat Point West	Democrat Point East	Dunefield West of Field 4	Clam Pond	Atlantique to Corneille	Talisman	Pattersquash Reach	New Made Island Reach	Smith Point County Park Marsh	Great Gun	45, 47, and 51 Dune Road	Tiana Bayside Park	Mastic Beach 1	Mastic Beach 2 Area 1	Mastic Beach 2 Area 2
Pollock	J	-	-	-	-	-	X	X	-	-	-	-	-	X	X	-
Red Hake	J	X	X	-	X	X	-	X	X	X	-	X	X	X	X	-
Scup	J	X	X	-	X	X	-	X	X	X	-	X	X	X	X	X
Skipjack Tuna	J	X	X	-	X	X	X	X	-	-	-	-	-	-	-	-
Summer Flounder	J	X	X	-	X	X	X	X	X	X	-	X	X	X	X	X
Whiting	J	X	X	-	X	X	-	X	X	X	-	X	X	X	X	-
Window Pane Flounder	J	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Winter Flounder	J	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Yellowtail Flounder	J	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-
Common Thresher Shark	J	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Sandbar Shark	J	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Tiger Shark	J	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
White Shark	J	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Winter Skate	J	X	-	-	X	X	-	X	X	X	-	X	X	X	X	-
Atlantic Surf Clam	J	X	X	-	X	X	-	-	-	-	-	-	-	-	-	-
Longfin Inshore Squid	J	X	-	-	X	X	-	X	X	X	-	X	X	X	X	-
Ocean Quahog	J	X	X	-	X	X	-	-	-	-	-	X	X	-	-	-
Atlantic Butterfish	L	X	-	-	X	X	-	-	-	-	-	X	X	-	-	-
Atlantic Mackerel	L	X	-	-	X	X	X	X	X	X	-	X	X	X	X	-
Black Sea Bass	L	X	-	-	X	X	-	-	-	-	-	-	-	-	-	-
Cobia	L	X	X	-	X	X	X	X	X	X	-	X	X	-	-	-
Haddock	L	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-
Monkfish	L	X	X	-	X	X	-	X	X	X	-	X	X	-	-	-
Ocean Pout	L	X	X	-	X	X	-	X	X	X	-	X	X	-	-	-
Red Hake	L	X	X	-	X	X	-	X	X	X	-	X	X	X	X	-
Summer Flounder	L	-	-	-	-	X	-	X	X	X	-	X	X	-	-	X
Whiting	L	X	X	-	X	X	-	X	X	X	-	X	X	X	X	-
Window Pane Flounder	L	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Winter Flounder	L	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
Witch Flounder	L	-	-	-	-	-	-	X	X	X	-	X	X	-	-	-
Yellowtail Flounder	L	-	-	-	-	X	-	X	X	X	-	X	X	-	-	-
Common Thresher Shark	L	X	X	-	X	X	X	X	X	X	-	X	X	X	X	-
White Shark	L	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dusky Shark	N	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Tiger Shark	N	-	-	-	-	-	-	-	-	X	-	X	X	-	-	-
Spiny Dogfish	Sub-A (Female)	-	-	-	-	-	-	X	-	-	-	-	-	X	X	-

*A – Adult; E – Egg; J – Juvenile; L – Larva; N – Neonate; Sub-A – Sub-Adult