Hashamomuck Cove
Southold, New York
Coastal Storm Risk Management
Integrated Feasibility Study/EA

Appendix A1
Essential Fish Habitat

Essential Fish Habitat Assessment Hashamomuck Cove

Coastal Storm Risk Management Project

Southold, New York

March 2018

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ABBREVIATIONS AND ACRONYMS

A	adults
°C	degrees Celsius
cm	centimeter
District	U.S. Army Corps of Engineers, New York District
DO	dissolved oxygen
E	eggs
EFH	Essential Fish Habitat
EJ	early juveniles
F	fall
ft	feet
J	juveniles
L	larvae
LJ	late juveniles
m	meters
MAB	Mid-Atlantic Bight
MLW	Mean Low Water Mark
mm	millimeters
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act of 1976
NEFMC	New England Fisheries Management Council
NGVD	National Geodetic Vertical
Datum NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Services
ppt	parts per thousand
S	summer
SNE	southern New England
Sp	spring
TL	total length
W	winter
YOY	young-of-the-year

1.0 Introduction

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act, this assessment identifies the potential impacts of the United States Army Corps of Engineers (USACE), New York District's (District), proposed Hashamomuck Cove coastal storm risk management (CSRM) project on essential fish habitat (EFH) in the Town of Southold, Suffolk County, New York. The Magnuson-Stevens Act as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267) set forth a number of new mandates for the National Marine Fisheries Service (NMFS), regional fishery management councils, and other federal agencies to identify and protect important marine and anadromous fish habitat.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 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; and, areas used for "spawning, breeding, feeding, and growth to maturity" to cover a species' full life cycle.

2.0 Project Description

The Hashamomuck Cove study area is in Southold, New York on the north fork of Long Island on Long Island Sound (LIS). The study area extends from Soundview Road near the Southold Town Beach west about 1.5 miles (Figure 1). The beach is narrow in width, ranging from about 20 to 100 feet. The majority of the properties within the Study Area are residential, with a restaurant and motel on the eastern end. There are a number of existing bulkheads and groins located within the Study Area. They were built mainly for the purpose of shoreline erosion management. The existing bulkheads, generally either wooden or vinyl sheeting driven into the ground, were installed by individual property owners. The bulkheads vary in height depending on the upland height and in many cases, the bulkheads are located seaward of mean high water.

The study area includes three coves separated by headlands: West Cove, Central Cove, and East Cove (Figure 2). There is a Town Beach within the West Cove. County Route 48 parallels the beach in most of the study area. The properties, utilities, and County Route 48 are most susceptible to damage within the concave portions of these three coves.

The preferred plan for Hashamomuck Cove includes the placement of fill material in the West, Central, and East Coves to rebuild the beaches with a 25-foot (ft) wide beach fill and berm (see Figures 3a, 3b, and 3c). Beach nourishment (sand placement) represents a near natural, soft solution for reducing damages on the open coast. After the initial placement of sand, renourishment will be required at periodic cycles to counteract long term and storm-induced erosion. Periodic renourishment is anticipated to occur approximately 9 times (every 5 years) over the 50 year period of analysis to maintain the project design profile.

The actual implementation of a renourishment event will be dependent on future storm events. From a beach management perspective, only areas that demonstrate significant erosion would be renourished. Historically, the area at the concave portions of the three coves have demonstrated the greatest degree of erosion. The beach berm will be evaluated periodically, and when a sufficient amount of berm loss is observed, a renourishment event would be scheduled. It should be noted that there would also be operational considerations of a minimum quantity required to trigger placement of additional sand at the project. It doesn't make economic sense to mobilize equipment for sand placement for small quantities of sand.

The source of the initial sand for the beach fill will be from an upland off-site source. The initial beach nourishment is estimated to include the placement of 94,400 cubic yards (cy) in the West Cove; 83,000 cy in the Central Cove; and 38,200 cy in the East Cove. Initial construction is estimated to take approximately one year to complete. Periodic renourishment is anticipated to occur approximately 9 times (every 5 years) over the 50 year period of analysis to maintain the project design profile. It is anticipated that renourishment sand will also be trucked in from a certified upland source. Each renourishment event is estimated to include the placement of 30,700 cy in the West Cove; 12,900 cy in the Central Cove; and 20,600 cy in the East Cove.

The proposed work in each cove involves the placement of a 25 ft berm beach fill with a top elevation of 6 ft NAVD88. Sand will be placed on the beach and graded seaward on a slope of 1 Vertical (V) to 10 Horizontal (H). Sand of a similar grain size to existing conditions shall be purchased from an upland sand source, trucked to the site, and spread to the Mean Low Water (MLW) line on the beach using earth moving equipment (sand will be redistributed during the tidal cycle). This construction sequence will continue until the authorized design profile is achieved.

The design profile of the beach berm is estimated to impact 164,000 square feet (sf) of intertidal habitat and 69,000 (sf) of subtidal habitat in the West Cove; 149,000 sf of intertidal habitat and 172,000 sf of subtidal habitat in the Central Cove; and 175,000 sf of intertidal habitat and 210,000 sf of subtidal habitat in the East Cove.

3.0 Existing Environment

The project study area encompasses a dynamic marine environment that includes characteristic north shore of Long Island features consisting of sand/cobble beaches and intertidal zones, and gently sloping near-shore littoral and sub-littoral areas. Upland vegetation within the study area is limited to maintained landscaped areas associated with residential and commercial buildings, stabilized areas landward of bulkheads, and narrow beach.

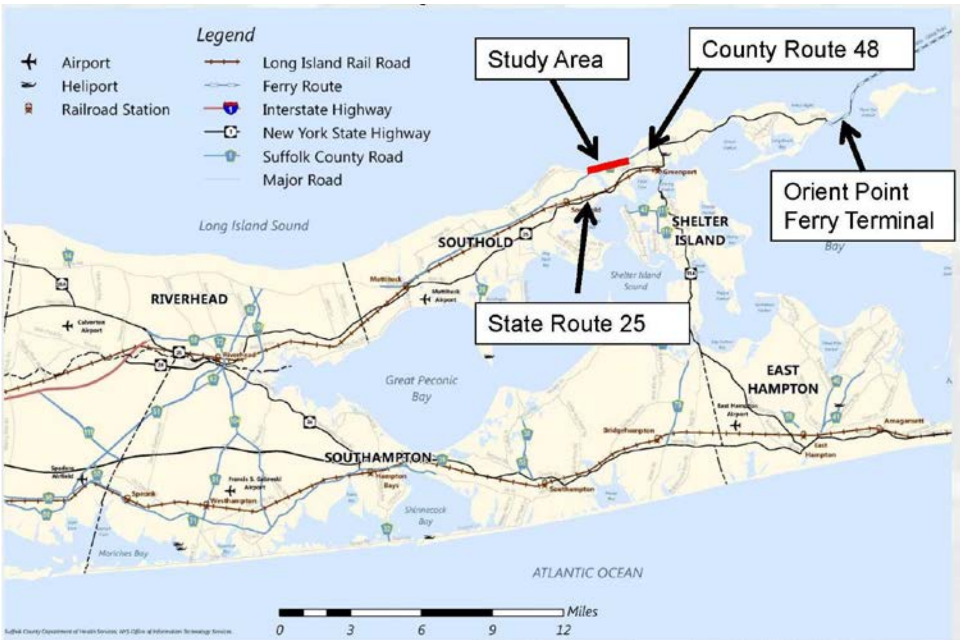

Figure 1 – Project Location Map

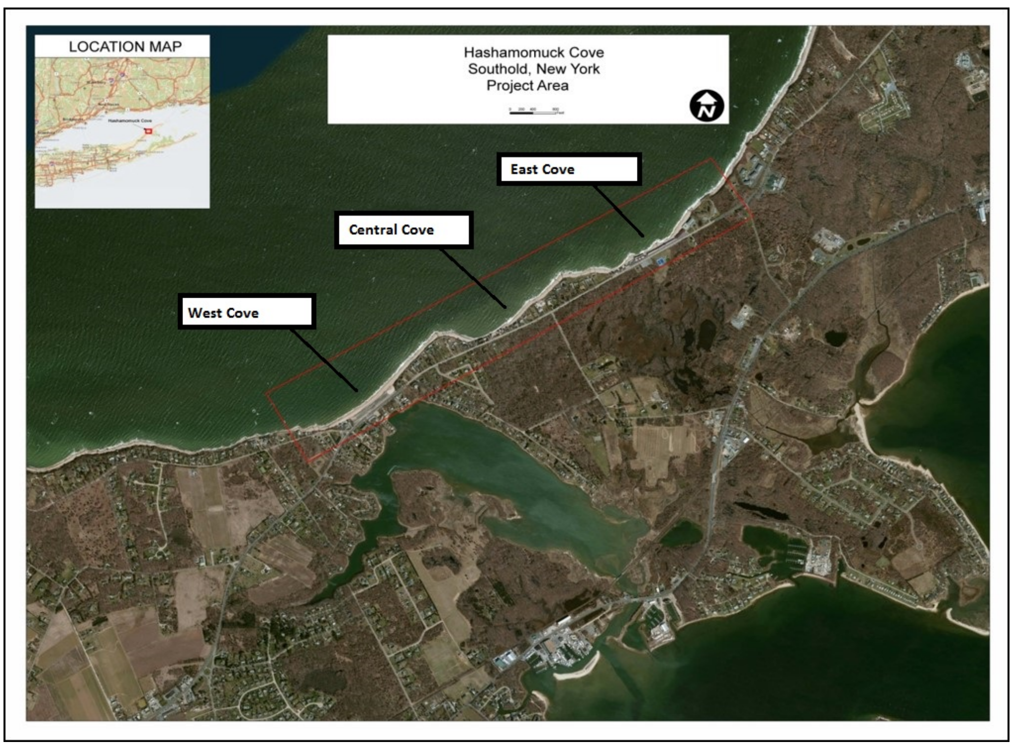

Figure 2 – Project Area

3.1 Physical Setting

The topography of the Hashamomuck Cove project area has undergone significant change over the last 50 years or more as a result of long-shore and cross-shore sediment transport resulting from both typical and storm induced wave conditions. In some cases, the storm-induced erosion component of beach change may be short-term in nature as the coastline tends to reshape itself into its former configuration, and some of sand displaced from the beach is returned by wave action. The beach shape then conforms to the prevailing wave climate and littoral processes. However, over time, portions of the beach may experience permanent land loss.

The Long Island Sound estuary is unique in that it is open to the ocean at both ends (through Block Island Sound to the east and the lower Hudson River estuary to the west) and most of its fresh water input is located at the higher salinity eastern end (through the Connecticut and Thames River). Salinity at the western boundary of the Sound ranges from around 22 parts per thousand (ppt) in the spring to 27 ppt in the fall, increasing eastward to 30 to 31 ppt at the western end of the Sound. The project area is located approximately at the mid-point of this western geographic range. Salinity in the project area and vicinity has been recorded at approximately 27.5 ppt in the spring. Thermal stratification in the Sound develops in the spring and breaks down in the fall. The surface temperatures in the open Sound range from 2 to 5°C in the winter and from 20 to 25°C in late summer.

Figure 3a – West Cove 25-foot Beach Berm

Figure 3b – Central Cove 25-foot Beach Berm

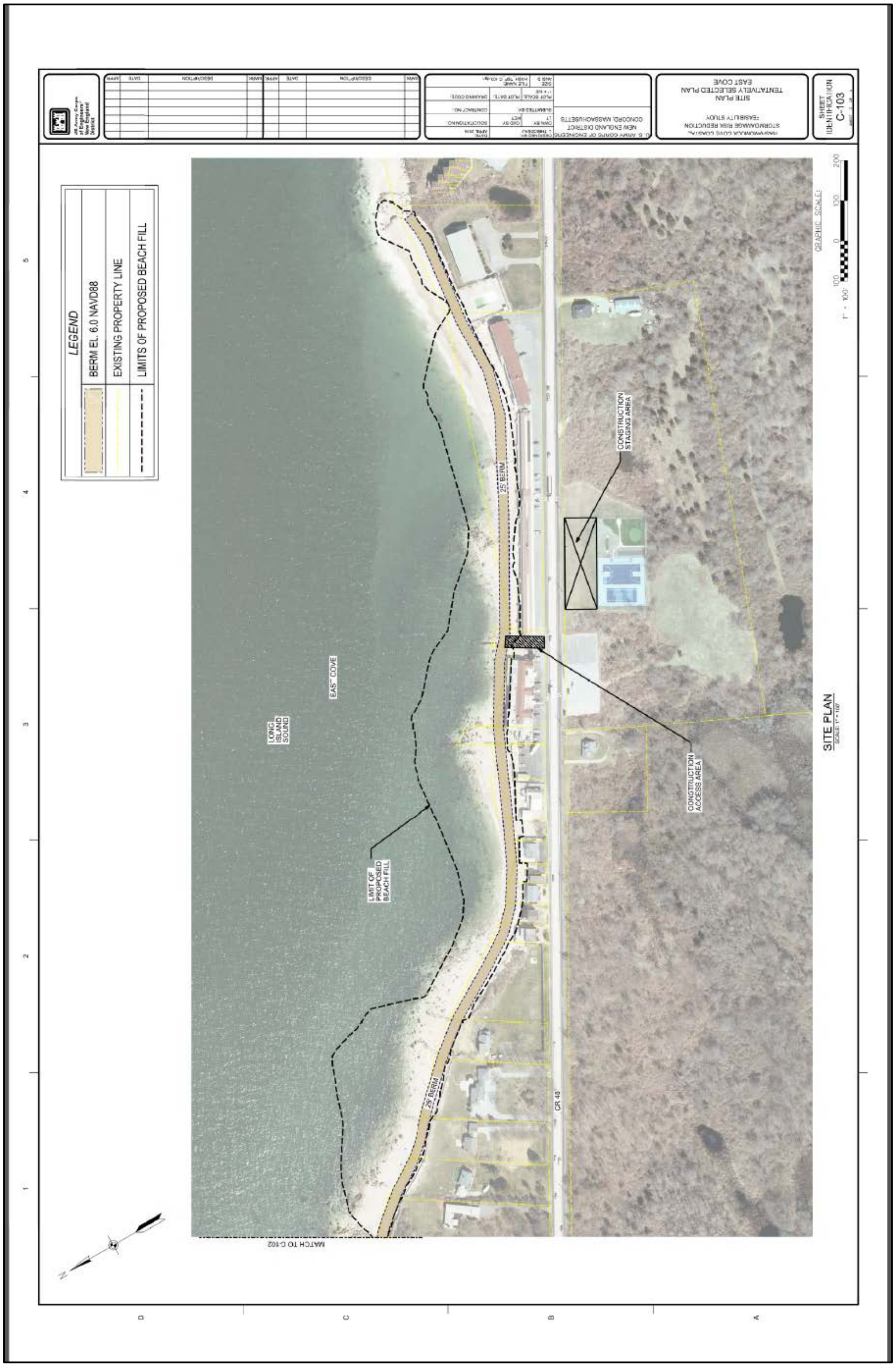

Figure 3c – East Cove

Tides along Hashamomuck Cove are semidiurnal (twice daily) with a spring tide range estimated at 4.81 feet and the mean tide range estimated at 4.21 feet. Table 1 provided below summarizes the estimated tidal datums at the Hashamomuck study area.

Table 1. Estimated Tidal Datums, Hashamomuck Cove Southold, NY

Southold, NY	
Condition	Elevation in feet, NAVD
Mean spring high water	2.16
Mean higher high water	2.12
Mean high water	1.86
NAVD88	0.00
Mean tide level	-0.25
Mean low water	-2.35
Mean lower low water	-2.61
Mean spring low water	-2.65

4.0 Essential Fish Habitat

4.1 Designated Species

Based on the NOAA Guide to EFH Designations in the Northeastern United States, designated EFH occurs in the greater Project Area as identified by a 10-minute by 10-minute areas of latitude and longitude bounded on the north, west, south, and east as follows: 41 degrees (°) 00 minutes (′) N latitude, 73° 20′ W longitude, 40° 50′ N latitude, and 73° 30′ W longitude.

EFH designations for the project area were based on information compiled by the NOAA/National Ocean Services (NOS) Estuarine Living Marine Resources (ELMR) Program (Stone *et al.* 1994), the New England Fisheries Management Council (NEFMC 1999), and the National Marine Fisheries Service (USDOC 1999b). A total of 14 finfish, one shark, and two skate are currently designated as EFH species in the area. See Table 2 for the list of EFH-designated fish, shark and skate species and their life history stages

4.2 Benthic, Eelgrass and Sediment Survey

In September 2015, field studies were conducted by the U.S. Army Corps of Engineers, New England District (on behalf of New York District) to provide baseline information on biological resources (e.g., benthos and eelgrass) of the study area as well as document the existing physical properties (grain size) of the beach sediments in the study area. The study area extends about 1.5 miles west from Soundview Road near the Southold Town Beach and includes three coves: Southold Town Beach Cove, Hashamomuck Cove, and Pebble Beach Cove separated by slightly protruding headlands.

Ten transects were established within the project area to collect samples for benthic community analysis and sediment grain size. Samples were collected on September 21, 2015 at low tide. A sample for benthic community analysis and a sediment sample for grain size analysis were taken at the high-intertidal level, the mid-intertidal level, and the low-intertidal tide level along all transects with the exception of Transect 5. No high-intertidal or mid-intertidal samples were collected on Transect 5 as the area was a bulkhead with large armor stone. Organisms identified during sampling were identified to the lowest taxon possible and enumerated.

Twenty-eight cores for benthic community analysis were processed at the New England District's Environmental Laboratory. A total of fifteen different taxa were observed in the 28 samples. Descriptions of the benthic communities in the High, Mid and Low-Intertidal stations are as follows:

High-intertidal Stations - The benthic communities in the high-intertidal area were generally azoic or consisted of typical opportunistic annelid species. Six of the nine stations sampled did not have species present. In the 3 stations where species were present, they were represented by a single polychaetes species, *Capitella capitata*, which is a known opportunistic annelid.

Mid-intertidal Stations - The benthic communities in the mid-intertidal areas were also dominated by typical opportunistic annelid species (*Capitella capitata* and *Scalibregma inflatum*) commonly found along Long Island Sound beaches. Of note at the mid-intertidal stations are blue mussels found at station T10-M (i.e., Transect 10 - mid-intertidal). These mussels were juvenile and were attached to large gravel-sized sediments.

Low-intertidal Stations - The low-intertidal communities were also dominated by typical opportunistic annelid species (*Capitella capitata* and oligochaetes), but also contained a varied mix of other typical sandy shore species. These species included various crustacean isopods, amphipods, and decapods as well some typical intertidal gastropods species (*Crepidula plana* and *Nassarius trivitatus*). A lone blue mussel was found at station T4-L (i.e., Transect 4 - low-intertidal).

A survey of field activities was also conducted on September 21, 2015 by the U.S. Army Corps of Engineers, New England District in the project area to document the presence or absence of eelgrass (*Zostera marina*) in the subtidal nearshore environment. Three transects paralleling the Hashamomuck Beach shoreline were established for the eelgrass survey prior to the start of field activities. Transect 1 was located 50' from the shoreline, Transect 2 was located 100' from the shoreline, and Transect 3 was located 200' from the shoreline.

Transects were traversed at low speeds by a boat operator while visual observations of the bottom were made by a marine ecologist through a viewing bucket. No eelgrass was observed in the survey area. Additionally, no eelgrass blades were observed within the beach wrack along the entire Hashamomuck Cove project area. The subtidal survey area was dominated by sandy expanses interspersed with areas of cobble and large boulders extending beyond the offshore transect. Sparse patches of various microalgae species typical of a nearshore environment were present on both bottom types.

Table 3. EFH-Designated Fish, Shark and Skate Species and Life History Stages

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within the square within Long Island Sound affecting the following: northeast Long Island from east of Duck Pond Pt. to just east of Rocky Pt. on the north, north of Greenport, NY., and Southold, NY., including water affecting Horton Lane Beach, Goldsmith Inlet, Horton Pt., Horton Neck, Shelter I. Sound, northern Little Peconic Bay, and Noyack Bay. Also, these waters are within Gardiners Bay, and affect the following: northern Cutchogue Harbor, Hog Neck Bay, Great Hog Neck, Cedar Beach Pt., NY, Paradise Pt., NY, Southold Bay. In addition, these waters affect the western half of Shelter I. from Hay Beach Pt. to east of West Neck Harbor, around West Neck, Jennings Neck, NY., Shelter I. Heights, NY., Dering Harbor, Dering Harbor, NY., and Shelter I., NY., and Jessup Heck from the north half of Nassau Pt. to just east of Cleaves Pt., south of Greenport, NY.

Fish Species	**Life History Stage**			
	E	**L**	**J**	**A**
Atlantic Herring (*Clupea harengus)*			X	X
Atlantic Mackerel (*Scomber scombrus*)	X	X	X	X
Atlantic Salmon (*Salmo salar*)			X	X
Black Sea Bass (*Centropristis striata*)			X	
Bluefish (*Pomatomus saltatrix*)			X	X
Cobia (*Rachycentron canadum)*	X	X	X	X
King Mackerel (*Scomberomorus cavalla*)	X	X	X	X
Pollock (*Pollachius virens)*			X	X
Red Hake (*Urophycis chuss*)	X	X	X	X
Scup (*Stenotomus chrysops)*	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Summer Flounder (*Paralichthys dentatus)*			X	
Windowpane (*Scopthalmus aquosus)*	X	X	X	X
Winter flounder (*Pseudopleuronectes americanus)*	X	X	X	X
Shark Species				
Sand tiger shark (*Odontaspis taurus)*		X		
Skate Species			**J**	**A**
Little (*Leucoraja erinacea)*			X	X
Winter (*Leucoraja ocellata)*			X	X

E – Eggs **L**- Larvae **J**- Juveniles **A**- Adults

The grain size data showed that the sediments in the high-, mid-, and low-intertidal areas were predominately a mix of cobble-gravel-sand. The benthic communities in the high-intertidal area were generally azoic or consisted of typical opportunistic annelid species, while the communities in the mid-intertidal areas were dominated by typical opportunistic annelid species. The low-intertidal communities were also dominated by typical opportunistic annelid species, but also contained a varied mix of other typical sandy shore species such as isopod and decapod crustaceans and a few gastropod species.

4.3 Individual Species Assessments

Atlantic Herring (*Clupea harengus*): Juveniles and Adults

Life History Information: 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. Juveniles and young of the year are abundant in Long Island Sound (LIS) during the fall at depths of 30-60 meters (m) and preferred salinities of 30-32 ppt.

Occurrence in Project Area and Impacts: Juvenile and adult Atlantic herring are not expected to be within the project area in great numbers as their preferable depths are deeper than those found within the project areas and their preferred salinities area higher. Also these fish area highly mobile filter feeders and not closely associated with the benthos where potential impacts would be greatest. Constructing the proposed project is not expected to significantly impact this species.

Atlantic Mackerel (*Scomber scombrus*): All Life Stages

Life History Information: Atlantic mackerel overwinter in deep water on the continental shelf from Sable Island Bank (Canada) to Chesapeake Bay and in spring move inshore and northeast. This pattern is reversed in the fall. In spring, adults form two spawning aggregations; the southern group spawns off New Jersey and New York and in the Gulf of Maine from mid-April to June. Most spawning occurs in the shoreward half of the continental shelf. The eggs are pelagic, occurring at depths ranging from 10-325 m and at salinities greater than 34 ppt. Larvae inhabit open bays and estuaries at depths ranging from 5-10 m. Juvenile and adult Atlantic mackerel are reported to be common in the LIS during the months of April through November, with adults being more abundant in the spring into midsummer and the juveniles abundant primarily in September through October. Atlantic mackerel prefer salinities greater than 25 ppt, depths 10-70 m and are intolerant of temperatures below 5-6°C or above 15-16°C.

Occurrence in Project Area and Impacts: Given salinities that are at the lower threshold level for Atlantic mackerel, this species is not expected to be common at the project area. This species is highly mobile and not associated with the benthos of the near-shore area where impacts are potentially greatest. Also these fish area highly mobile and would be expected to avoid the area during construction. Constructing the proposed project is not expected to significantly impact this species.

Atlantic Salmon *(Salmo salar*): Juveniles and Adults

This species is not expected to occur within the project area as there are no known native spawning streams/rivers in the vicinity of Hashamomuck Cove. The presence of this species (any life stage) is considered extremely rare. Constructing the proposed project is not expected to significantly impact this species.

Black Sea Bass (*Centropristis striata*): Juveniles

Life History Information: This species is usually strongly associated with structured, sheltering habitats such as reefs and wrecks. Spawning occurs on the continental shelf, beginning in the spring off Cape Hatteras and progressing into the fall in the New York Bight and off southern New England. In general, juvenile black sea bass utilize various substrates such as rough bottom shellfish, sponge and eelgrass beds, and man-made objects found in depths ranging from 1-38 m, and can withstand a wide range of salinity levels (8-33 ppt) although they prefer 18-20 ppt. Within LIS, juveniles were uncommon until September and October where they were collected at bottom temperatures of 14-19 ^{o}C, depths of 5-50m, and salinities of 23-32 ppt. Black sea bass do not tolerate cold inshore winter conditions and as such were primarily collected along outer continental shelf south of Long Island during winter.

Occurrence in Project Area and Impacts: Juveniles may occur within the project area in the nearshore. However, because the nearshore area generally lacks significant benthic structure, the preference for this type of habitat in the Hashamomuck Cove project area by black sea bass juveniles is expected to be low. Temporary impacts to black sea bass from increased turbidity could include displacement and a reduction in visibility for feeding. However, these potential impacts would be localized and short term. Constructing the proposed project is not expected to significantly impact this species.

Bluefish (*Pomatomus saltatrix*): Juveniles and Adults

Life History Information: Adults and juvenile bluefish can occur in LIS from June until November. Their temperature preferences are 9-18 ^{o}C. Abundance is highest during mid-summer on the Connecticut side of the sound in depths less than 18 m. Peak abundance occurrs during September when they are found throughout the Sound. Abundance decreases rapidly after September and juveniles appear to depart before adults. Juvenile bluefish usually occur at salinities of 23 to 33 ppt, but can tolerate salinities as low as 3 ppt. Adults often occur near shore as well as offshore. Adults usually prefer warm water (at least 14-16°C).

Occurrence in Project Area and Impacts: Juvenile bluefish would be common in the nearshore especially around structures such as jetties or groins in the project area from July through September. Adults would be expected to occur in the project area in the nearshore area. Both juvenile and adult bluefish are highly mobile fast swimming fish and are not generally associated with the bottom. Turbidity may affect visual predation in the near shore and bluefish may be displaced. Only short-term insignificant negative impacts to adult or juvenile bluefish are expected. Constructing the proposed project is not expected significantly impact this species.

Cobia (*Rachycentron canadum*): All Life Stages.

Life History Information: This 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, and their presence in LIS is also considered very rare.

Occurrence in Project Area and Impacts: Long Island Sound is near the northern extent of their range, Cobia (any life stage) are not likely to occur in the project area in significant numbers, if at all. No significant impacts are expected to Cobia.

King Mackerel (*Scomberomorus cavalla*): All Stages

Life History Information: These highly migratory species 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 southern Atlantic coast. Adults are usually found in waters associated with oceanic salinities ranging from 32-35 ppt. King Mackerel are highly mobile fast swimming fish and are not generally associated with the bottom. If any individuals were in the vicinity of the project, they would be expected to move away from any disturbance.

Occurrence in Project Area and Impacts: Since Long Island Sound is near the northern extent of King Mackerel's range and the salinity of the Sound is lower than preferred, no life history stages this species are likely to be common in the project area. Therefore the project is not expected to have any significant impacts to the King Mackerel.

Pollock (*Pollachius virens*): Juveniles and Adults

Pollock are not commonly caught in the surveys of Long Island Sound. In surveys conducted by the Connecticut Fisheries Division from 1984-2014 throughout the Sound, only 68 adults were caught. Generally, juvenile Pollock have been reported over a wide variety of substrates including sand, mud, or rocky bottom and vegetation and prefer salinities of 29-32 ppt, temperatures from 0-16 ^{o}C and depths of ranging from 5-150 m. Inshore subtidal and intertidal zones serve as an important nursery area for age 0 - 1 juveniles while juveniles aged 2+ move offshore, inhabiting depths of 130-150 m.

Adults exhibited little preference for bottom types and were found at salinities 31-34 ppt, temperatures of 0-14 ^{o}C and depths ranging from 35-36 m. Adults tend to inhabit deeper waters in spring and summer than in winter and are found further offshore than juveniles.

Occurrence in Project Area and Impacts: The possibility exists that the juvenile life stage of this species may occur within the project area but would not be expected to occur in significant numbers within the project area due to preferred higher salinities. However, because Pollock is a benthic species, juveniles might be susceptible to nearshore project impacts such as turbidity and burial of prey species during project construction.

Because of the Pollock's mobility, impacts are not expected to be common and juvenile Pollock can feed at other nearby off-shore areas. Pollock are not expected to be common in the project area and therefore, significant short term or long term adverse impacts to this species are not expected from project implementation.

Red Hake (*Urophycis chuss*): All Life Stages

Life History Information: This species spawns along the continental shelf off southern New England and eastern Long Island. Larvae dominate the summer ichthyoplankton in the Mid Atlantic Bight and are most abundant on the mid-and outer continental shelf. Eggs and larvae are pelagic with demersal settlement beginning in the juvenile stage generally occurring in the fall. Juveniles seek shelter and commonly associate with scallops, surf clam shells, and seabed depressions. Juveniles were found in LIS in the spring although they were most abundant during the summer. Their preferred substrate was mud, water depths ranged between 5- 50 m, salinities were between 24-32 ppt, and temperatures 2-22 ^{o}C.

Adults were generally found in abundance within the Sound from spring to fall in water depths greater than 25 m, salinities between 20-33 ppt, and on mud substrates. Both juveniles and adults make offshore migrations during the winter months.

Occurrence in Project Area and Impacts: Juvenile and adult Red Hake could be in the project area but would not be expected to be present in significant numbers. The depth and structure of benthic habitat in the project is not preferred by Red Hake, a demersal fish which spends most of its time on or very close to the bottom with scallops, surf clam shells, or seabed depressions. There would be temporary increases in turbidity at the project site which would be expected to displace individuals of this species at the project sites. Insignificant short term impacts may occur. Relative long term (minimal) impacts would include a loss of habitat with the conversion of part of the intertidal zone to an area above high tide. This impact is expected to be minor since new intertidal area will develop rapidly and the area affected is small in comparison to similar available intertidal/nearshore habitat.

Sand Tiger Shark (*Odontaspis taurus): Larvae*

The sand tiger shark is found in sandy coastal waters, shallow bays, estuaries and rocky or tropical reefs. The sand tiger shark (adults) can occur from Gulf of Maine to Argentina. This species is somewhat benthic in its habits and preys on small fish, crabs and squid.

Occurrence in Project Area and Impacts: EFH is designated within the project area grid for sand tiger shark larvae. EFH for neonates/early juveniles (≤ 125-cm total length) is shallow coastal waters from Barnegat Inlet, NJ to Cape Canaveral, FL out to the 25-meterisobath, outside of the project area. Due to this species known distribution and little data suggesting that it may be present in the project area, no more than minimal impact on sand tiger shark EFH is anticipated with the proposed project.

<u>Scup (*Stenotomus chrysops*): All Life Stages</u>

<u>Life History Information</u>: Scup spawn along the inner continental shelf from Delaware Bay to Southern New England between May and August, mainly in bays and sounds in and near Southern New England. Spawning occurs in May and June during the morning over weedy or sandy areas. Scup eggs are commonly found in the water column less than 30 m deep in larger coastal bays and sounds in and near Southern New England during spring and summer. Larval scup are pelagic and occur in coastal waters during the warmer months and have been collected in the more saline parts of Long Island Sound eastern Long Island bays from May through September at water temperatures of 14-22 ^{o}C. Young of the year 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. In general, 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 eel grass beds. A review of Long Island Sound 1984-2014 fishery data indicate that juvenile scup were more abundant in the fall. Their preferred bottom temperatures range 7-18 ^{o}C in spring to 15-22 ^{o}C in fall with salinities of 25-31 ppt.

<u>Occurrence in Project Area and Impacts</u>: Scup juveniles or adults may occupy the project area spring through fall. Scup are a benthic feeding species but juvenile and adult life stages are highly mobile. Impacts other than temporary displacement are not expected. No significant impact to scup are expected due to the construction of this project.

<u>Spanish Mackerel *(Scomberomorus maculatas):* All Life Stages</u>

Spanish mackerel spawn as far north as Sandy Hook and off of Long Island in late August to late September. All life stages of this species usually inhabit fully saline waters (32+), although juvenile Spanish mackerel have been collected in lower salinities.

A review of Long Island Sound 1984-2014 fishery data reveals that Spanish mackerel eggs, larvae, juveniles, or adults have not been captured in the vicinity of the project area. Because the salinity of the Sound is lower than preferred, no life history stages this species are likely to be common in the project area. Therefore the project is not expected to have any significant impacts to the Spanish Mackerel.

<u>Summer Flounder (*Paralichthys dentatus*): Juveniles</u>

<u>Life History Information</u>: Summer flounder spawn offshore in fall and winter migrating 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, whereas 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. Some studies indicate that juveniles prefer mixed or sandy substrates, whereas others show that mud and vegetated habitats are used.

Adult summer flounder inhabit shallow, inshore, coastal and estuarine waters during warmer months and migrate offshore in the fall. Adults are reported to prefer sandy habitats, but can be found in a variety of benthic habitats.

Occurrence in Project Area and Impacts: According to the EFH quadrant only juveniles are expected to occur within the project area. Construction activities would result in a temporary increase in turbidity near the fill zone. It is likely that some displacement away from construction activities would occur. Construction activities that result in a temporary increase in turbidity may have an adverse impact on the summer flounder because of this species' dependence on sight for foraging. However, high turbidity is expected to be very localized and short lived due to the nature of the fill sand. Summer flounder juveniles are highly mobile and under disturbance conditions juveniles are expected to temporarily relocate. Small juveniles will be found in the nearshore shallow and may be susceptible to burial or other high suspended sediment impacts.

Relative long term impacts would include a loss of existing intertidal foraging habitat with the conversion of part of the intertidal zone to an area above high tide. This impact is expected to be minor since new intertidal area will develop rapidly and the area affected is small in comparison to similar available intertidal/nearshore habitat. No significant impact to summer flounder are expected due to the construction of this project.

Windowpane (*Scophthalmus aquosus*): All Stages

Life History Information: This is a mid and inner-shelf species found primarily between Georges Bank and Cape Hatteras on fine sandy sediment. Spawning begins in February and March in inner shelf waters, and peaks in spring and autumn within Long Island Sound. Spawning occurs in inner shelf waters, including many coastal bays and sounds, and on Georges Bank. In the Mid Atlantic Blight, eggs and larvae are planktonic, found in waters less than 70 m deep from February - July and again in September - November.

Juveniles and adults are similarly distributed. They are found in most bays and estuaries south of Cape Cod throughout the year at a wide range of depths (1-110 m), bottom temperatures (3-12°C in the spring and 9-12°C in the fall), and salinities 15-33ppt. Juveniles that settle in shallow inshore waters move to deeper offshore waters as they grow. Adults occur primarily on sand substrates off Southern New England and Mid Atlantic Bight.

Bottom trawl surveys during the period 1992-1997 in Long Island Sound found that juvenile and adult windowpane were most abundant in spring (April-June). In spring, they were caught at bottom temperatures of 3-18 ^{o}C and at salinities 21-31 ppt and depths less than 60 m. The distribution pattern in autumn (September-November) was similar to the pattern in the spring, but abundance was reduced. In autumn, windowpane adults were caught at bottom temperatures of 8-23 ^{o}C, salinities of 18-32 ppt and depths less than 50m.

Occurrence in Project Area and Impacts: All life history stages may occur within the immediate project area. If spawning does occur around the project area there is a low potential for adverse impacts to early life history stages because both larvae and eggs tend to occur closer to the surface than to the bottom. Construction activities that result in a temporary increase in turbidity may have an adverse impact on the windowpane because of this species' dependence on sight for foraging. This adverse effect is expected to be short term and localized. It is expected that juvenile and adults will avoid highly turbid conditions. Relative long term (minimal) impacts would include a loss of habitat with the conversion of part of the intertidal zone to an area above high tide. This impact is expected to be insignificant since the project area is small relative to the availability of common similar intertidal/nearshore habitat and new intertidal habitat will develop. No significant impact to windowpane are expected due to the construction of this project.

Winter Flounder (*Pseudopleuronectes americanus*): All Stages

Life History Information: Winter flounder spawning occurs from mid-winter through early spring, peaking south of Cape Cod in February and March at depths of less than 5 m - 45 m. Eggs are found inshore in depths of 0.3-4.5 m and salinities ranging from 10-30 ppt. 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. Larvae are negatively buoyant and non-dispersive; they sink when they stop swimming. Thus, recently settled Young of Year (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 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 utilize a variety of substrates and prefer temperatures of 12-15 ^oC, 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.

Occurrence in Project Area and Impacts: All life history stages may occur within the immediate project area. If spawning does occur around the project area there is the potential for adverse impacts to eggs due to burial at the project site because they are demersal. This same situation is true for newly settled juveniles which may settle in deeper areas. Eventually early juveniles will move into shallow water. Construction activities that result in a temporary increase in turbidity may have a small adverse impact on the winter flounder's foraging ability. The winter flounder is not as dependent on visual cues during foraging as other flounders. It is expected that more mobile juveniles and adults will avoid highly turbid conditions.

Temporary EFH impacts would include a loss of habitat with the conversion of part of the intertidal zone to an area above high tide. This impact is expected to be insignificant since the project area is small relative to the availability of common similar intertidal/nearshore habitat and new intertidal habitat will develop rapidly. No significant impact to winter flounder is expected during or after construction of this project.

Little Skate (*Leucoraja erinacea*): Juveniles and Adults

Life History Information: This species ranges from Nova Scotia, Canada to Cape Hatteras. It is most abundant in the northern section of the Mid-Atlantic Bight and on the northeastern part of Georges Bank. Little skate exhibit seasonal movements. Adult and juvenile little skate move inshore during spring and autumn, and offshore in mid to late summer, and midwinter. They also move north and south with seasonal temperature changes along the southern fringe of their range. They may leave some estuaries for deeper water during warmer months. Little skates are common on sandy or gravelly substrates, but may occur on mud as well. They tend to bury themselves in depressions during the day and become active at night. Data is unavailable about the specific spawning habits of little skate along the New Jersey and New York shoreline, but it is known that they spawn biannually; typically in October and May.

Trawl surveys conducted from 1984-1994 in Long Island Sound found both adults and juveniles in spring and fall on transitional and sand bottoms at depths less than 9 m. Their preferred summer and fall depths were less than 27 m.

Occurrence in Project Area and Impacts: Both juveniles and adult skates may occur within the project area during those periods in which they are expected to move inshore. As both life stages of this species are motile, during construction they can avoid the area during periods of disturbance. Therefore, no significant impact to little skate is expected due to the construction of this project.

Winter Skate (*Leucoraja ocellata*): Juveniles and Adults

Life History Information: Winter skates are found over a wide range extending from southern New England and the Mid-Atlantic Bight to North Carolina. They exhibit seasonal movements by moving offshore in the summer and nearshore in the autumn. Egg deposition of winter skate occurs during the summer and fall off Nova Scotia and the Gulf of Maine. It continues into the winter (December and January) off southern New England. The preferred substrate of this species is sand and gravel bottoms although they have been documented in areas with mud bottoms. Winter skates are most active at nights and remain buried in depressions during the day. General depths at which they are found range from the shoreline to 111 m. Adults are typically found in most abundance on sand bottoms of Long Island Sound during the spring. Trawl surveys conducted from 1984-1994 report juveniles most abundant during the spring on sand bottom in Long Island Sound. Abundance increased again in for both juveniles and adults in October and November in depths ranging from 0-9 m and then in depths greater than 18 m in April-May.

Occurrence in Project Area and Impacts: Both juveniles and adult skates may occur within the project area during those periods in which they are expected to move inshore. As both life stages of this species are motile, they can avoid the area during periods of disturbance due to construction by moving to adjacent non-disturbed areas. Temporary EFH impacts would include a loss of habitat with the conversion of part of the intertidal zone to an area above high tide. This impact is expected to be insignificant since the project area is small relative to the availability of common similar intertidal/nearshore habitat and new intertidal habitat will develop rapidly. No significant impact to winter skate is expected during or after construction of this project.

4.3 Prey Species

The abundance and/or distribution of prey species for fish, for which EFH has been designated, may be impacted from placement activities. Many of these fish feed on organisms that live in or on the sediment and have the potential to be buried by the direct placement and/or movement of placed sand on the beach. However, following project completion, the substrate type at the beach will be similar to what is currently on the beach, thus promoting rapid recolonization by organisms from adjacent areas. Therefore, any impacts to fish species using these areas for forage, would be expected to be temporary.

5.0 Impact Assessments

Placement of sand along the Hashamomuck Cove shoreline is not expected to have any significant or long-term lasting effects on the "spawning, breeding, feeding, or growth to maturity" of the designated EFH species that occupy the nearshore area. However, proposed activities would have immediate, short-term, direct and indirect impacts on EFH for some of the designated fish species and life history stages that occur in the immediate project area and vicinity. This section identifies direct and indirect effects that could result from beach nourishment as well as potential species-specific impacts and recommendations for minimizing these impacts.

5.1 Direct Impacts

Sand (of similar grain size to the existing beach) shall be purchased from an upland sand source, trucked to the site, and spread on the beach using earth moving equipment to the mean low water line. The material to be placed is of similar physical characteristics and grain size to the existing and therefore, will not result in changes to the existing habitat type. The sand will be redistributed during the tidal cycle until the authorized design profile is achieved. Direct placement of sand into the water does not generally occur. Thus, mortalities of small flounder and other juveniles will be minimize as the accumulation of material distributed by the tidal cycle will be gradual allowing time for less mobile individuals to leave the area. Highly mobile juveniles and adults of other designated species can easily avoid any direct impacts caused by placement activity.

Placement of large amounts of sand will temporarily increase turbidity in the intertidal and nearshore zones on the order of 100's of meters. This increase in turbidity is not expected to cause significant impacts do to its localized nature and the mobility of species of concern and the fact that nearshore environments are often very turbid because of storms or wind events. Species that utilize these areas are adapted to these conditions and have the ability to survive such events. Impacts to dissolved oxygen are also not expected to be of concern because of the naturally low organic content of the placement sand and the shallow nature of the Long Island Sound nearshore which is well oxygenated from wind mixing and wave action.

Beach restoration at the Hashamomuck Cove shoreline would result in the placement of large quantities of sand on the beach causing portions of intertidal and subtidal zones and their associated benthic communities to be initially buried. Re-colonization is expected to be rapid but duration of recovery will be dependent on the time of placement. Diversity and abundance is expected to be similar to preconstruction conditions since the new substrate will be of similar grain size to the existing conditions.

5.2 Indirect Impacts

Beach nourishment will have a temporary indirect effect on EFH by burying infauna and epi-fauna prey organisms underneath new sand in the intertidal and the nearshore subtidal zone. Mortality and/or burial of benthic prey organisms is not expected to have a significant impact on the feeding success of EFH species since they will re-locate to nearby undisturbed areas.

Benthic communities in the construction site will recover, probably within a year's time, depending on the season of completion. If beach nourishment occurs prior to the spring recruitment of benthic organisms to intertidal and adjacent sub-tidal habitats, recovery would be quicker. Species composition is expected to be similar to existing conditions since the sand to be used will be of similar grain size to existing conditions. A temporal reduction in abundance of the benthic community is not likely to significantly affect the quality of EFH in the Long Island Sound nearshore zone since common bottom-feeding species like winter flounder, summer flounder, windowpane, and scup are opportunistic predators and will switch from less abundant to more abundant species. Pelagic-feeding species will not be affected.

In addition, due to the increased slope of the new beach front, the intertidal zone will become significantly narrower. This is not likely to affect bottom-feeding EFH species since they feed on a wide variety of intertidal and sub-tidal prey species and the amount of area changed by the project is only a fraction of the available forage habitat. Eventually, this slope will level out under the influence of tidal action, waves and storms. Similarly, offshore displacement of the subtidal zone will not affect EFH since fish that utilize the sub-tidal habitat for feeding or spawning will move seaward following beach nourishment.

Impacts related to renourishment cycles, estimated to be approximately every 5 years, will be similar to those resulting from the initial fill but will occur to lesser degree in terms of both changes in diversity and scale. It is anticipated that sand will be trucked in so there will be no dredging impacts. For all proposed Hashamomuck Cove beach protection projects each renourishment cycle consists of a significantly smaller volume of fill than the initial fill, thus a smaller zone of the intertidal and littoral benthos will be affected.

5.3 Cumulative Impacts

Cumulative impacts are those resulting from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions. Past actions include the construction of bulkheads, rock revetments and groins within the project area by private landowners primarily for the purpose of shoreline erosion management. Bulkheads are located along approximately 40% of beach front properties and small rock revetments are located along approximately 15% of the beach front properties. There are also numerous groins observed in the project area, most in relatively poor condition. In addition, there was a project in 2011 which involved the placement and grading of 6,400 cy of sand on the Southold Public Beach (Hashamomuck West Cove) following a damaging storm in December 2010.

There are no concurrent Federal or State projects being constructed in the project area or projects slated to occur in the near future. Reasonably foreseeable future actions include the continuation of maintenance if needed and public use activities. The effects of these previous and existing actions are generally limited to infrequent disturbances of the benthic communities in the sand from mean high water and below. Water quality, air quality, hydrology, and other biological resources are generally not significantly affected by these actions. The direct effects of this project are not anticipated to add to impacts from other actions in the area. Therefore, no significant cumulative impacts to EFH or EFH species are expected as a result of implementing the proposed action.

6.0 ATLANTIC HORSESHOE CRAB (*Limulus polyphemus*)

The Atlantic Horseshoe Crab (*Limulus polyphemus)* is an ancient species, evolving more than 200 million years ago, more closely related to spiders than other crabs. It is an important species for many shorebirds including the red knot, ruddy turnstones and sandpipers, which forage on the energy-rich eggs of horseshoe crab during spring migration. The eggs and larvae of horseshoe crabs are also an important food source for many fish and horseshoe crabs are also harvested for bait by fisherman. In addition, horseshoe crab blood proteins, which are very sensitive to bacteria, are used by humans for a variety of diagnostic procedures in the biomedical industry. Non-lethal methods of harvesting are used for biomedical purposes with the crabs being taken to a laboratory for blood collection and then released back into the environment.

Horseshoe crabs are found from Nova Scotia to Mexico and are year-round residents in Long Island Sound. Adult horseshoe crabs live in deeper water and come to shore to mate and lay eggs. They rely on beaches and the shallow intertidal environment for spawning, coming to shore to spawn in May and June. Juvenile crabs stay close to shore for about 2 years before they move into deeper water. As larvae and hatchlings, juveniles and subadults, they will shed their shells (molt) as they grow.

The abundance of crabs utilizing the shallow intertidal environment is an ecological indicator of the health and productivity of the estuarine environment. There is considerable concern as populations of American horseshoe crab declined in the eastern Long Island Sound and Peconic Bay in the1990’s through the 2000’s. While values remain low, they seem to have stabilized or improved slightly over the last couple of years. Due to the importance of this species as discussed previously, consideration for the direct and indirect impacts on the American horseshoe crab was included in this EFH Assessment.

The ACOE New England District conducted a benthic/eelgrass survey in September 2015 and did not observe horseshoe crabs in the project area at that time (although this timeframe is not indicative of spawning season). The project area is sandy, gravelly, cobble mix (a high erosion environment) not typically considered optimal horseshoe crab spawning habitat. The Center for Environmental Research and Coastal Oceans Monitoring (CERCOM) Molloy College conducts horseshoe crab monitoring on Long Island annually. In 2014, the site closest to the Hashamomuck Cove project area surveyed by the CERCOM (on Long Island Sound) was approximately 15,000 feet west (Site 27 - Leeton Drive). No horseshoe crabs were observed at that site during the 2014 survey. In 2015, CERCOM surveyed another site (on the Long Island Sound) located 13,500 feet west of the project area (Site 25 - Kenney's Road Beach). No horseshoe crabs were observed at that side during the 2015 survey. South Harbor Park, on Little Peconic Bay in Southold, was also monitored in 2014 and 2015 and no horseshoe crabs were observed at that location in either year.

Based on the recent sampling and monitoring results cited in the previous paragraph, it is unlikely that horseshoe crabs will be present during the Hashamomuck Cove project initial beach nourishment due to sub-optimal habitat conditions in the project area. However, to assure that there will be no direct impact to horseshoe crab, the USACE will provide a horseshoe crab monitor during the initial placement of sand to relocate any horseshoe crabs found to another location outside of the project area. In the years following the initial placement of sand, the beach will be wider and therefore, more suitable for horseshoe crab spawning. As such, due to this increased likelihood of horseshoe crab presence in the project area in subsequent years, the ACOE will incorporate a no-construction window during crab spawning season (April 15 to July 15, of any year) during nourishment events.

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Appendix A: Essential Fish Habitat Worksheet

Action: Hashamomuck Cove Storm Protection Project

1. INITIAL CONSIDERATIONS			
EFH Designations	Y	N	Species
Is it located in or adjacent to EFH	X		Study area experiences transient EFH designated species along with forage species of EFH designated species.
Is EFH designated for eggs?	X		Red hake, winter flounder, windowpane, Atlantic mackerel, scup, king mackerel, Spanish mackerel and cobia
Is EFH designated for larvae?	X		Red hake, winter flounder, windowpane, Atlantic mackerel, scup, king mackerel, Spanish mackerel, cobia and sand tiger shark
Is EFH designated for juveniles?	X		Atlantic salmon, pollock, red hake, winter flounder, windowpane, Atlantic sea herring, bluefish, Atlantic mackerel, summer flounder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, winter skate and little skate
Is EFH designated for adults?	X		Atlantic salmon, pollock, red hake, winter flounder, windowpane, Atlantic sea herring, bluefish, Atlantic mackerel, scup, king mackerel, Spanish mackerel, cobia, winter skate and little skate
Is there HAPC at or near project site?		X	
Does action have the potential to adversely affect EFH of species or life stages checked above to any degree?		X	

2. SITE CHARACTERISTICS	
Site Characteristics	Description
Is the site intertidal/sub-tidal/water column?	Site is intertidal;
What are the sediment characteristics?	The sediment characteristics are primarily sand, cobble and gravel.
Is there HAPC at the site, if so what type, size, characteristics?	No HAPC at the site.
What is typical salinity and temperature regime?	Salinity is approximately 27-28 ppt in the project site. Temperature ranges from 2 to 5°C in the winter and from 20 to 25°C in late summer
What is the normal frequency of site disturbance?	Irregular - shoreline erosion through storm events and tidal action.
What is the area of impact (work footprint & far afield)?	1.5 mi. of shoreline

3. ASSESSMENT OF IMPACTS			
Impacts	Y	N	Description
Nature and duration of activity (s)			Beach nourishment. Action 5 months
Will benthic community be disturbed?	X		Benthic community immediately along the shoreline will be buried during fill activities. Recolonization of species will occur following construction completion. Similar grain size will be used so recolonization is expected to be similar in structure to the existing benthic community.
Will SAV be impacted?		X	No SAV in project area.
Will sediments be altered and/or sediment rates changed?	X		Similar sized material will be used to nourish the beach. Coastal geomorphological process will not be altered.
Will turbidity increase?	X		Localized increased turbidity during construction.
Will water depth change?	X		Intertidal zone will initially be pushed seaward into the subtidal zone (i.e., subtidal will become shallower). However, the beach will continue to change overtime due to dynamic processes and renourishment activities.
Will contaminants be released into sediments or water column?		X	Most of the material is inorganic. Contaminants have not been found in the area.
Will tidal flow, currents or wave patterns be altered?		X	MHW tide will be extended seaward. Wave patterns may change.

Will ambient salinity or temperature regime change?		X	
Will water quality be altered?		X	
Will functions of EFH be impacted for:			If yes, list species, Life State and Habitat to be Impacted
Spawning		X	
Nursery		X	
Forage		X	
Shelter		X	
Will impacts be temporary or permanent?			Adverse impacts from placing fill will be temporary, lasting for period of construction and benthic recolonization.
Will compensatory mitigation be used?		X	

4. DETERMINATION OF IMPACT		
		EFH Determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: (check the appropriate statement)		No more than minimal adverse effect on EFH- there is no need for further assessment. This worksheet is sufficient for consultation.
	X	Adverse effect on EFH is not substantial-use contents of this form to develop written assessment
		Adverse effect on EFH substantial-a written assessment and methods to avoid or minimize impacts must be provided expanding upon the impacts revealed in this form. Typically, this degree of impact will require an expanded consultation