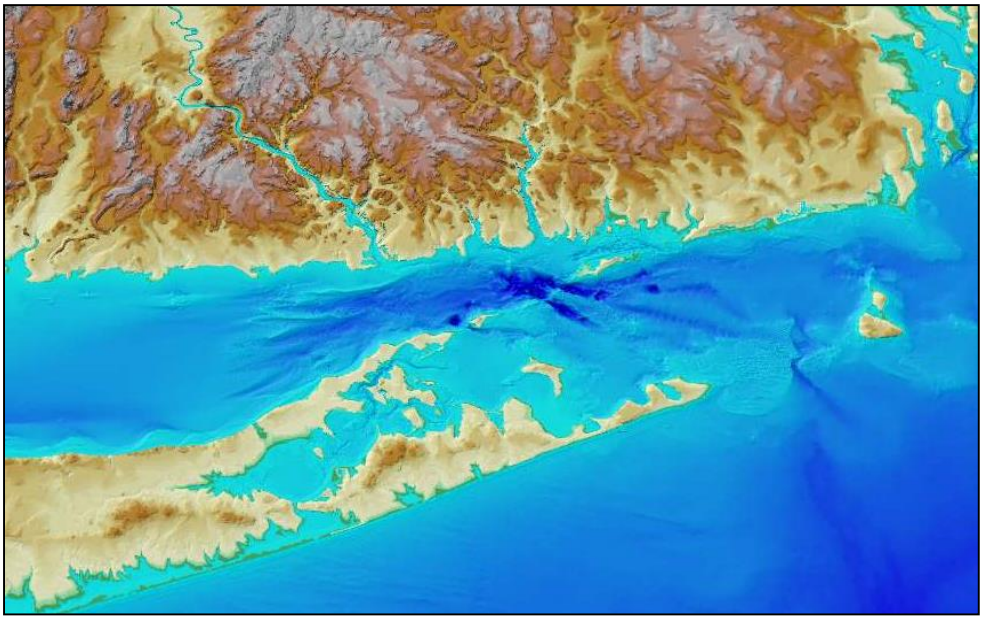
Supplemental Environmental Impact Statement for the Designation of Dredged Material Disposal Site(s) in Eastern Long Island Sound, Connecticut and New York

APPENDIX H

Essential Fish Habitat Assessment



Prepared for: **United States Environmental Protection Agency**

Sponsored by: **Connecticut Department of Transportation**

Prepared by: **Louis Berger**

December 2015

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Supplemental Environmental Impact Statement for the Designation of Dredged Material Disposal Sites in Eastern Long Island Sound, Connecticut and New York

APPENDIX H

ESSENTIAL FISH HABITAT ASSESSMENT

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Acronyms and Abbreviations

°C	degrees Centigrade
C.F.R.	Code of Federal Regulations
cm	centimeter
CS	Cornfield Shoals (alternative site)
CSDS	Cornfield Shoals Disposal Site
CTDEEP	Connecticut Department of Energy and Environmental Protection
DAMOS	Disposal Area Monitoring System
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
FMC	Fishery Management Councils
FMP	Fishery Management Plan
km	kilometer(s)
km^2	square kilometer(s)
m	meter(s)
mm	millimeter
MPRSA	Marine Protection, Research, and Sanctuaries Act
nmi	nautical mile(s)
nmi^2	square nautical mile(s)
N	North
NB	Niantic Bay (alternative site)
NBDS	Niantic Bay Disposal Site
NL	New London (alternative site)
NLDS	New London Disposal Site
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ODA	Ocean Dumping Act
ppm	parts per million
ppt	parts per thousand
SAV	Submerged Aquatic Vegetation

SEIS	Supplemental Environmental Impact Statement
SFA	Sustainable Fisheries Act
TL	Total Length
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
W	West
ZSF	Zone of Siting Feasibility

1.0 INTRODUCTION

In 2005, the U.S. Environmental Protection Agency (USEPA) designated the Western and Central Long Island Sound dredged material disposal sites, following the preparation of an EIS (USEPA and USACE, 2004). The two disposal sites in the eastern Long Island Sound, Cornfield Shoals and New London, are scheduled to close in December 2016. The USEPA is in the process of preparing a Supplemental EIS (SEIS) for the potential designation of one or more disposal sites needed to serve the eastern Long Island Sound region (Figures 1 and 2). The SEIS is being prepared in accordance with Section 102(c) of the Marine Protection Research and Sanctuaries Act (MPRSA; also referred to as Ocean Dumping Act [ODA]) of 1972. The USEPA has the responsibility of designating sites under Section 102(c) of the Act and 40 C.F.R. Part 228.4 of its regulations.

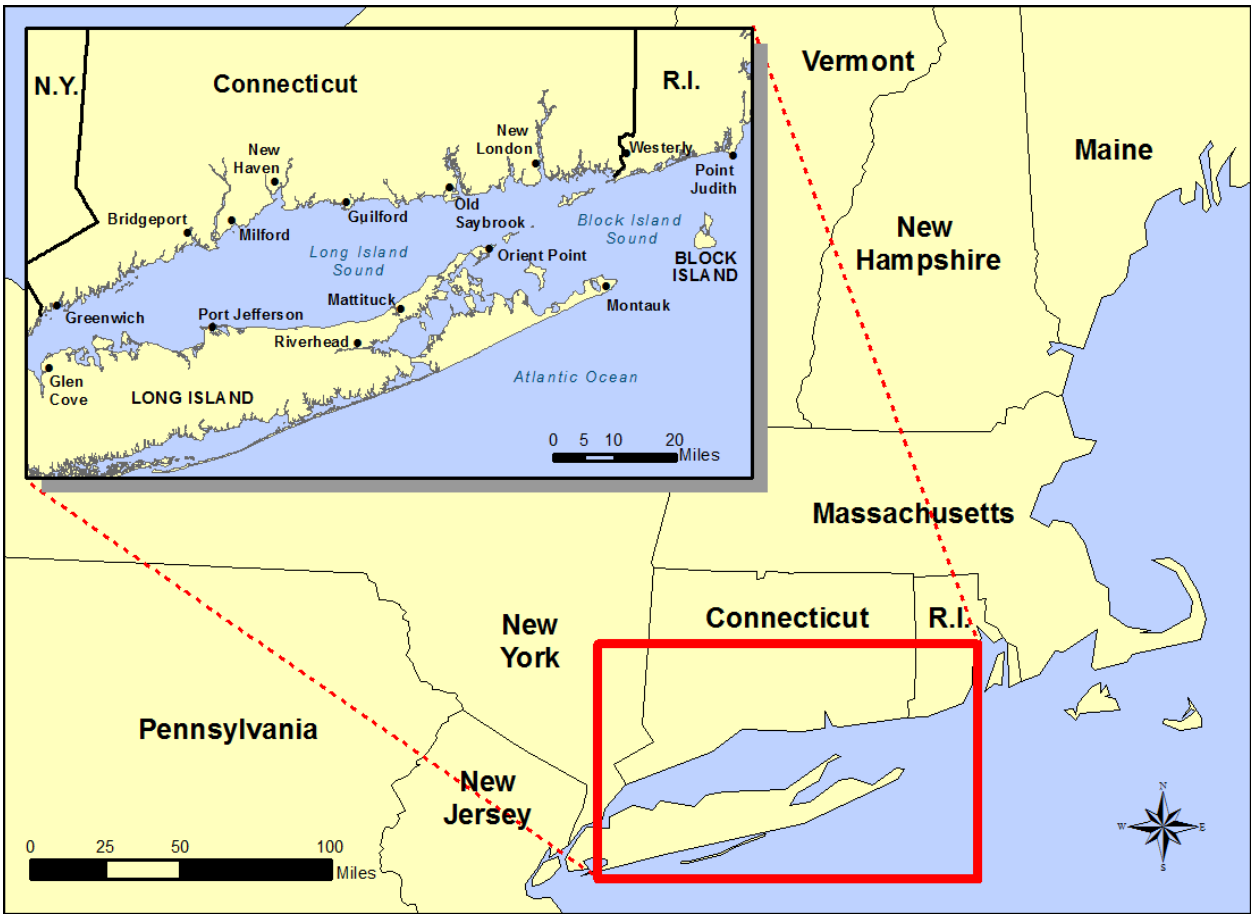

Figure 1. Location of Long Island Sound, an estuary along the Atlantic Ocean.

Many aquatic habitats are critical to the productivity and sustainability of marine fisheries. Essential Fish Habitat (EFH) is defined as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity (16 U.S.C. 1802(10)) (NOAA, 2004a). The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act (SFA) of 1996 (Public Law 104-267), set forth a

mandate for the National Marine Fisheries Service (NMFS), regional Fishery Management Councils (FMCs), and other Federal agencies to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan (FMP). EFH for various species within the affected area for the current project was designated by the New England FMC, Mid-Atlantic FMC, South Atlantic FMC, and the NMFS in the Northeastern United States (NOAA, 2014a).

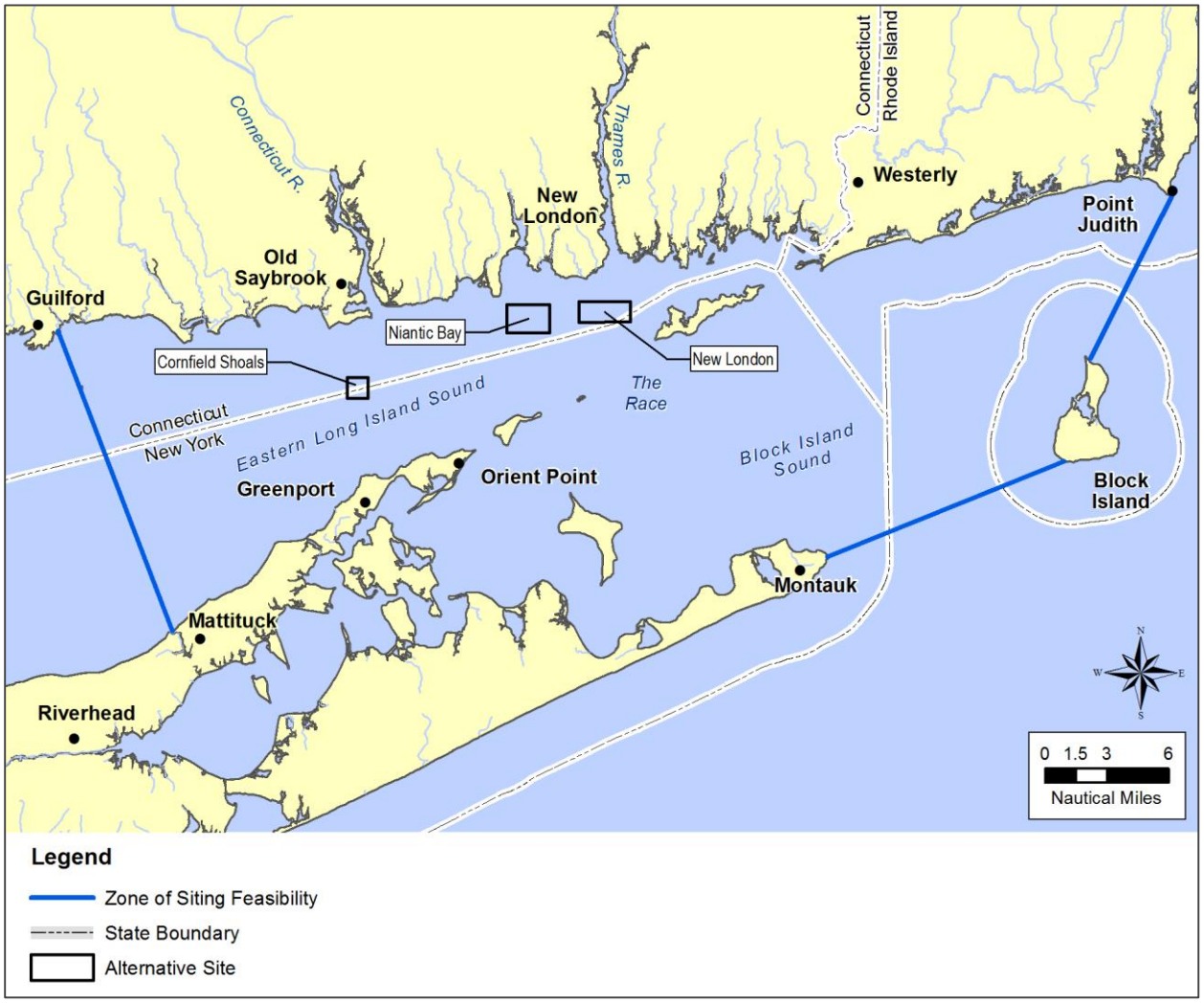

Figure 2. Zone of Siting Feasibility and the three alternative dredged material disposal sites.

While designating a site for dredged material disposal does not have any impacts on EFH, the SEIS must also look at possible impacts associated with this action such as subsequent disposal of dredged material. Such impacts, though short-term, may be possible for particular life stages of some species during and the disposal activity. Therefore, in compliance with Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (1996 amendments), the USEPA is providing this EFH report of the potential effects of designating one or more disposal sites for dredged material in eastern Long Island Sound on EFH. Further evaluation would be

conducted as part of the USACE permitting process for each specific dredged material disposal activity.

The Endangered Species Act of 1973, as amended, requires all federal agencies to consult with the Secretary of the Interior and/or Commerce on all projects and proposals with the potential to impact federally endangered or threatened plants and animals. A discussion of the threatened and endangered species that may be found in the project area is provided in the SEIS in Section 4.13 and the analysis of potential impacts is provided in Section 5.5.8.

Executive Order 13158, Marine Protected Areas requires federal agencies to avoid causing harm to marine protected areas administered by the National Oceanic and Atmospheric Administration's Marine Protected Areas Center. A discussion of the Marine Protected Areas in proximity to the project area is provided in the SEIS in Section 4.15.4 and the analysis of potential impacts is provided in Section 5.5.10.5.

2.0 PROJECT AREA

Three alternative sites have been proposed for the disposal of dredged materials from navigational dredging projects in the eastern Long Island Sound region: New London, Niantic Bay, and Cornfield Shoals (Figure 2). Each of the three alternative sites is described in more detail below (see Chapters 3 and 4 of the SEIS for additional details).

2.1 New London Alternative

The New London Alternative is a rectangular area with the dimensions 2.5 x 1 nautical miles (nmi), or 1.8 x 4.5 kilometer (km) (Figure 3; Table 1). Its boundary encompasses three areas: the active New London dredged material disposal site (NLDS) and two areas to the west of the NLDS (referred to hereafter as 'Site NL-Wa' and 'Site NL-Wb').

- ***NLDS:*** The site is located in the eastern part of the New London Alternative along the New York-Connecticut state boundary. This square site has an area of 1.0 square nautical miles (nmi^2), or 3.4 square kilometer (km^2), centered at 41°16.306' N, 72°04.571' W (NAD 83). Water depths at the NLDS range from 46 to 79 feet (14 to 24 m); the site is deepest at its southern boundary. Since 1982, approximately 3.5 million cubic yards (cy), or 2.6 million cubic meters (m^3), of dredged material have been disposed at the site. In addition, approximately 5.4 million cy (4.1 million m^3) were disposed at the NLDS between 1955 and 1976 (Oceanic Society, 1982). The site consists of predominantly fine sand (see Appendix G of the SEIS).

- ***Site NL-Wa:*** Site NL-Wa is located in the mid-section of the New London Alternative. This square site has an area of 1 nmi^2 (3.4 km^2). The site consists of mostly sandy areas, but also a shallow area of boulders and rocks in the north (WHG, 2014). Overall, water depths at the site range from approximately 45 feet (14 m) in the boulder area in the north to 100 feet (30 m) in the south.

- ***Site NL-Wb:*** Site NL-Wb is located in the western part of the New London Alternative. It is a rectangular area, 0.5 nmi (0.9 km) wide and 1.0 nmi (1.8 km) long; the total area is 0.5 nmi^2 (1.7 km^2). The site consists of an extension of the sandy area of Site NL-Wa. The southwestern corner of Site NL-Wb contains an area of bedrock and boulders, as well as some sand waves (WHG, 2014). Overall, water depths at the entire site range from approximately 59 feet (18 m) in the north to 95 feet (28 m) in the south.

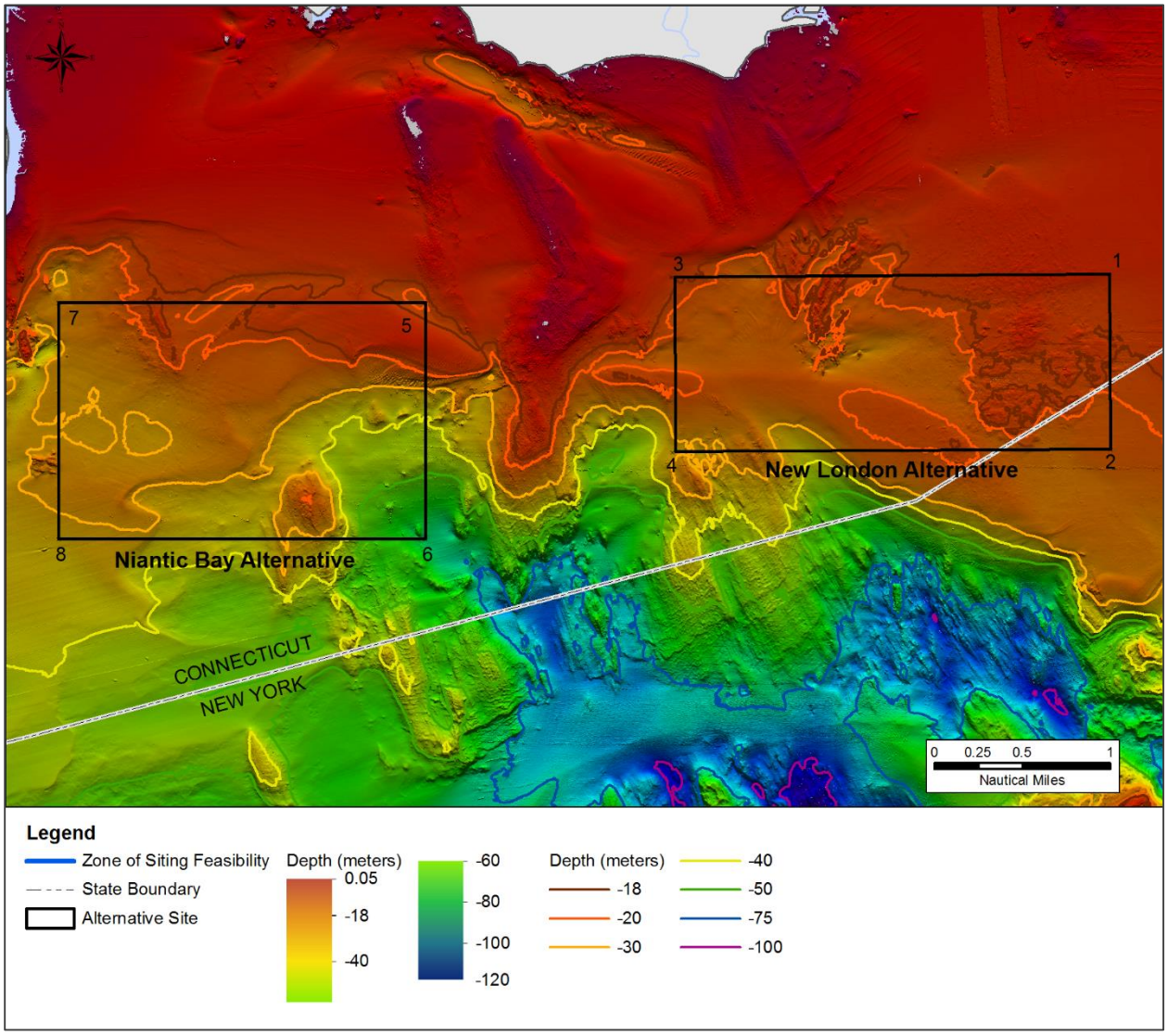

Figure 3. Location of the New London and Niantic Bay Alternatives. Coordinates of corner points are presented in Table 1. (Bathymetric data source: Poppe et al., 2011)

Table 1. Coordinates of Corner Points for the three Alternative Sites

Site	Corners Points	Latitude	Longitude
New London	1	41° 16.81’ N	72° 03.91‘ W
	2	41° 15.81‘ N	72° 03.91‘ W
	3	41° 16.81‘ N	72° 07.22‘ W
	4	41° 15.81‘ N	72° 07.22‘ W
Niantic Bay	5	41° 16.68‘ N	72° 09.08‘ W
	6	41° 15.33‘ N	72° 09.08‘ W
	7	41° 16.68‘ N	72° 11.87‘ W
	8	41° 15.33‘ N	72° 11.87‘ W
Cornfield Shoals	15	41° 13.19‘ N	72° 20.83‘ W
	16	41° 12.19‘ N	72° 20.83‘ W
	17	41° 13.19‘ N	72° 22.15‘ W
	18	41° 12.19‘ N	72° 22.15’ W

2.2 Niantic Bay Alternative

The Niantic Bay Alternative is located south of Niantic Bay, Connecticut, between the Connecticut and Thames Rivers. The Alternative is a rectangular area with the dimensions 2.1 x 1.33 nmi (3.9 x 2.5 km) (Figure 3; Table 1). The boundary of the Niantic Bay Alternative encompasses two areas, as follows:

- ***NBDS:*** The NBDS is located in the western part of the Niantic Bay Alternative. The 1.33 x 1.33 nmi (2.5 x 2.5 km) square site has an area of 1.8 nmi^2 (6.2 km^2). This site was used historically for the disposal of dredged materials between 1969 and 1972 when a total of 176,000 cy (135,000 m^3) of dredged material was disposed at this location (Oceanic Society, 1982), but the site is currently not an active disposal site (USACE, 2014). Water depths at the site range from approximately 60 to 130 feet (18 to 40 m). Sediments at the site consist of sand to the north and northwest and mostly gravelly sediment with patches of gravel in the remainder of the area. The dominant size fraction in the sediments at the site is sand. The site contains a boulder area in the north-central part of the site (Poppe et al., 1998) and scour depressions in the south.

- ***Site NB-E:*** Site NB-E is located in the eastern part of the Niantic Bay Alternative. It is a rectangular area, 0.75 nmi wide and 1.35 nmi long; the total area is 1 nmi^2 (3.4 km^2). Water depths at Site NB-E range from 43 feet (13 m) in the north to 230 feet (70 m) in the southeast. Surface sediments at the site are generally similar to sediments at the NBDS. The southwestern corner of Site NB-E contains a bedrock area, which is an extension of an exposed area of bedrock to the south of the site.

2.3 Cornfield Shoal Alternative Site

The boundary of the Cornfield Shoals Alternative (Figure 4; Table 1) is identical to the active Cornfield Shoals dredged material disposal site (CSDS). The CSDS is located 3.3 nm (6.1 km) south of Cornfield Point in Old Saybrook, Connecticut. It is a square 1.0 nmi^2 (3.4 km^2) site centered at 41° 12.6858' N, 72° 21.4914' W (NAD 83). An estimated 1.2 million cy (0.95 million m3) were disposed at the site between 1960 and 1976 (Oceanic Society, 1982), and additional 1.7 million cy (1.3 million m3) between 1982 and 2013 (USEPA, 2015). The water depth is approximately 150 feet (46 m) and the predominant topographic features are a sandy bottom and bedforms oriented in an east-west direction.

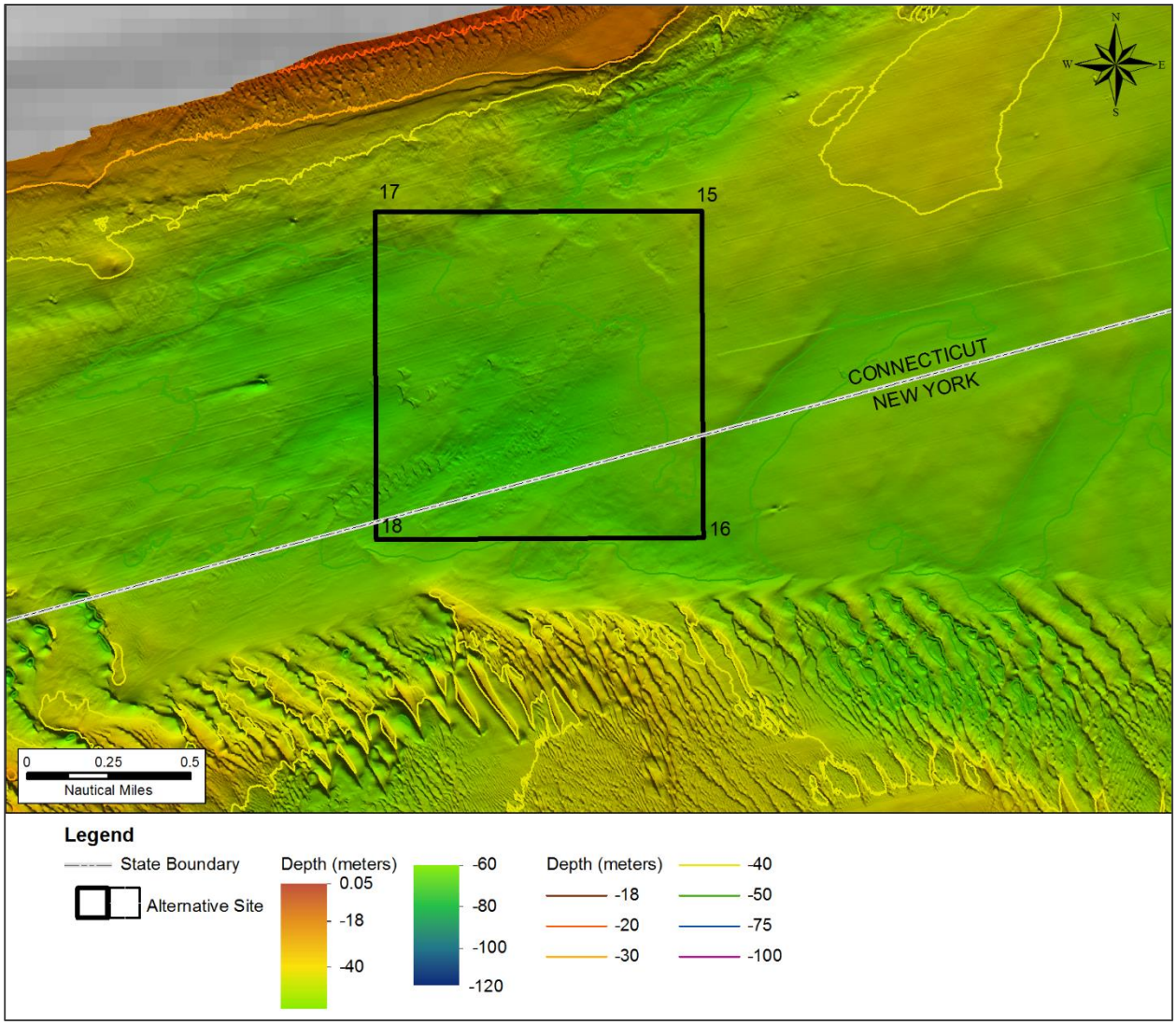

Figure 4. Location of the Cornfield Shoals Alternative. Coordinates of corner points are presented in Table 1. (Bathymetric data source: Poppe et al., 2011)

3.0 ESSENTIAL FISH HABITAT

In eastern Long Island Sound, EFH has been designated for 38 managed species (species with active FMPs). Fifteen of these species have designated EFH within the vicinity of one or more of the alternative sites (Figure 5). These species are summarized in Table 2 and are further described in this section. The data were compiled from the National Oceanic and Atmospheric Administration's Guide to Essential Fish Habitat Designations in the Northeastern United States (NOAA, 2014a). This guide summarizes EFH designated by species and life stage for that species (*i.e.*, eggs, larvae, juveniles, and adults) in 10-minute by 10-minute squares[1] of latitude and longitude (hereafter referred to as just "squares"). Therefore, EFH occurring in any of the 10-minute by 10-minute squares containing the three alternative sites (Figure 5) was included in Table 2 and described by life stage. The Cornfield Shoals alternative site is wholly contained within square 41107220. The Niantic Bay alternative site straddles two squares, 41107210 and 41107200. The New London alternative site is wholly contained in square 41107200.

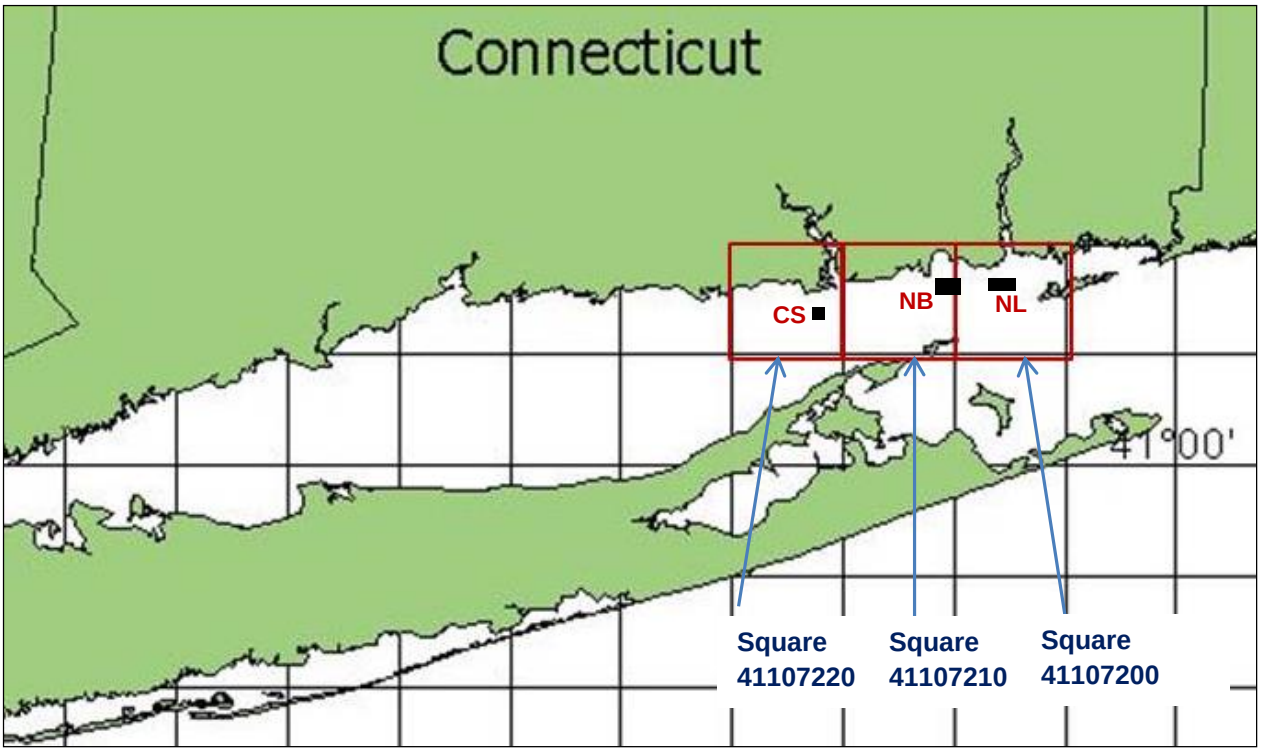

Figure 5. NOAA Fisheries 10 x 10 minute EFH squares (NOAA, 2014a). Included are the three alternative sites: Cornfield Shoals (CS), Niantic Bay (NB), and New London (NL).

[1] Squares are named by their south latitude and east longitude i.e. 41107220 is the 10-minute square bounded along its southern edge by the 41 degree 10 minute latitude line and along its eastern edge by the 72 degree 20 minute longitude line.

Table 2. Designated Essential Fish Habitat by Life Stage occurring at one or more of the Alternative Sites

Species	Eggs	Larvae	Juvenile	Adult
Atlantic salmon (*Salmo salar*)			●	●
Atlantic sea herring (*Clupea harengus*)			●	●
Bluefin tuna (*Thunnus thynnus*)				●
Bluefish (*Pomatomus saltatrix*)			●	●
Cobia (*Rachycentron canadum*)	●	●	●	●
Dusky shark (*Carcharhinus obscurus*)			●	
King mackerel (*Scomberomorus cavalla*)	●	●	●	●
Little skate (*Leucoraja erinacea*)			●	●
Pollock (*Pollachius virens*)			●	●
Red hake (*Urophycis chuss*)	●	●	●	●
Sand tiger shark (*Carcharias taurus*)		●		
Spanish mackerel (*Scomberomorus maculatus*)	●	●	●	●
Windowpane flounder (*Scophthalmus aquosus*)	●	●	●	●
Winter flounder (*Pseudopleuronectes americanus*)	●	●	●	●
Winter skate (*Leucoraja ocellata*)			●	●

Source: NOAA, 2014a

In 2014, a biological characterization of dredged material disposal sites in eastern Long Island Sound was completed (Tetra Tech, 2014). This report compiled data from various sources including fish species abundance data from finfish trawl surveys in Long Island Sound conducted annually by the Connecticut Department of Energy and Environmental Protection (CTDEEP). Of the 15 species with EFH designated in one or more of the alternative sites, Tetra Tech (2014) identified the presence of five species within the alternative sites: bluefish (*Pomatomus saltatrix*), little skate (*Leucoraja erinacea*), windowpane flounder (*Scophthalmus aquosus*), winter flounder (*Pseudopleuonectes americanus*), and winter skate (*Leucoraja ocellata*). However, many of the species, as well as the early life stages (*i.e.*, eggs and larvae) of all species, are not susceptible to being captured by the bottom otter trawl gear type used in the surveys; therefore, the absence of a species or life stage during the surveys does not necessarily indicate that it does not occur at the alternative sites.

Atlantic salmon (*Salmo salar*)

Juveniles: EFH for juvenile Atlantic salmon includes all rivers where Atlantic salmon are currently present along with those bays and estuaries identified by NOAA as supporting Atlantic salmon. Juvenile Atlantic salmon prefer bottom habitats of shallow gravel/cobble riffles

interspersed with deeper riffles and pools in rivers and estuaries. Generally, the following conditions exist where Atlantic salmon parr are found: clean, well-oxygenated fresh water, water temperatures below 25 degrees Celsius (°C), water depths between 10 centimeters (cm) and 61 cm, and water velocities between 30 and 92 cm per second. As they grow, parr transform into smolts. Atlantic salmon smolts require access downstream to make their way to the ocean. Upon entering the sea, "post-smolts" become pelagic and range from Long Island Sound north to the Labrador Sea (NEFMC, 1998a).

Adults: EFH for adult Atlantic salmon includes all rivers where Atlantic salmon are currently present along with those bays and estuaries identified by NOAA as supporting Atlantic salmon adults. For adult Atlantic salmon returning to spawn, EFH consists of habitats with resting and holding pools in rivers and estuaries. Returning Atlantic salmon require access to their natal streams and access to the spawning grounds. Generally, the following conditions exist where returning Atlantic salmon adults are found migrating to the spawning grounds: water temperatures below 22.8°C, and dissolved oxygen above 5 parts per million (ppm). Oceanic adult Atlantic salmon are primarily pelagic and range from the waters of the continental shelf off southern New England north throughout the Gulf of Maine. Adult salmon may be found throughout Long Island Sound during their spawning migration (NEFMC, 1998a).

Designated EFH for juvenile and adult Atlantic salmon includes all three alternative sites. Atlantic salmon would potentially be present at the alternative sites only during migration. Juveniles and adults are mobile nekton species and would likely avoid short-term pulse impacts to habitat. Additionally, any impacts from dredged material disposal activities would be minimized due to imposed restrictions when dredging, and hence disposal, can occur. Generally, dredging is usually prohibited from June 1 through September 30 of any year to protect shellfish populations during their spawning season (CTDEEP, 2013). Additional site-specific restrictions on dredging outside of the June 1 to September 30 timeframe may also apply depending on what fish or shellfish species are present at the dredging site. As a result, disturbance to the migrating Atlantic salmon at the disposal sites during these time periods would be avoided.

Atlantic sea herring (*Clupea harengus*)

Juveniles: EFH for juvenile Atlantic herring includes pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 10°C, water depths from 49 to 442 feet (15 to 135 m), and a salinity range from 26 to 32 parts per thousand (ppt) (NEFMC, 1998b).

Adults: EFH for adult Atlantic herring includes pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras, North Carolina. Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 10°C, water depths from 66 to 426 feet (20 to 130 m), and salinities above 28 ppt (NEFMC, 1998b).

Designated EFH for adult Atlantic sea herring includes all three alternative sites, while EFH for juvenile Atlantic sea herring includes the Cornfield Shoals and Niantic Bay alternative sites, but not the New London alternative site. Atlantic sea herring are a mobile, pelagic schooling species which would likely avoid short-term impacts to habitat.

Bluefin tuna (*Thunnus thynnus*)

Adults: EFH for adult bluefin tuna (>145 cm total length [TL]) includes pelagic waters of the Gulf of Maine in waters exceeding 164 feet (50 m) in depth to the exclusive economic zone (EEZ)[2] boundary, including the Great South Channel, then south of Georges Bank to the EEZ boundary. EFH for adult bluefin tuna also includes waters ranging from 164 to 6,560 feet (50 to 2,000 m) in depth offshore from Cape Lookout, North Carolina and pelagic waters from offshore Daytona Beach, Florida, south to Key West from depths of 328 feet (100 m) to the EEZ boundary. Adult bluefin tuna EFH in the Gulf of Mexico extends from offshore Terrebonne Parish, Louisiana, to offshore Galveston, Texas, out to the EEZ boundary in waters exceeding 656 feet (200 m) in depth (NOAA, 2014b).

EFH is designated for the 10-minute by 10-minute square containing the New London alternative site and the Niantic Bay alternative site. Though designated within the 10-minute by 10-minute square, there is no actual EFH within the boundary of New London alternative site as water depths at this site are less than 164 feet (50 m) (NLDS ranges from 46 to 79 feet [14 to 24 m]). For the Niantic Bay alternative site, EFH only exists in the eastern portion of the site where depths range to 230 feet (70 m). Bluefin tuna are a highly migratory pelagic species and could transit the area but would likely avoid or leave the area during disturbance events.

Bluefish (*Pomatomus saltatrix*)

Juveniles: EFH for juvenile bluefish includes pelagic waters over the continental shelf (from the coast out to the limits of the EEZ) from Nantucket Island, Massachusetts, south to Cape Hatteras, North Carolina. South of Cape Hatteras, EFH consists of all pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida. Inshore, EFH includes all major estuaries between Penobscot Bay, Maine, and St. Johns River, Florida. Generally, juvenile bluefish occur in North Atlantic estuaries from June through October, in mid-Atlantic estuaries from May through October, and in South Atlantic estuaries from March through December (NOAA, 2014c).

Adults: EFH for adult bluefish covers the same area described for juveniles. Adult bluefish are found in North Atlantic estuaries from June through October, in mid-Atlantic estuaries from April through October, and in South Atlantic estuaries from May through January. Bluefish adults are highly migratory, and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish generally prefer salinities greater than 25 ppt (NOAA, 2014c).

Designated EFH for juvenile and adult bluefish includes all three alternative sites. However, bluefish are a highly migratory coastal species and would likely avoid or leave the area during disturbance events.

[2] The EEZ is zone where the U.S. and other coastal nations have jurisdiction over natural resources. For the U.S. it extends no further than 200 nmi from the territorial sea baseline. Under the Magnuson-Stevens Fishery Conservation and Management Act, the term "exclusive economic zone"(EEZ) is defined as having an inner boundary that is coincident with the coastal states' boundary at 3 nmi (except Texas, western Florida and Puerto Rico which claim 9 nmi) and an outer limit that is the same as the EEZ as shown on NOAA charts.

Cobia (*Rachycentron canadum*)

All life stages: Cobia is a coastal migratory pelagic species. EFH for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, and from the Gulf Stream shoreward, including *Sargassum*. For cobia, EFH also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae (NOAA, 2014d).

EFH for cobia occurs for all life stages at all three alternative sites. Cobia is a highly migratory species. 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. Cobia eggs and larvae have greater potential to be impacted by the disposal of dredged materials at the three alternative sites due to their inability to avoid or leave the area. However, cobia spawn offshore and eggs and larvae are transported by surface currents. The presence of cobia eggs or larvae in any of the alternative sites would be highly seasonal.

Dusky shark (*Carcharhinus obscurus*)

Juveniles: EFH for neonate/early juvenile dusky sharks (up to 115 cm total length [TL]) includes shallow coastal waters, inlets, and estuaries up to the 82 feet (25 m) in depth, from the eastern end of Long Island, New York, south to Cape Lookout, North Carolina. From Cape Lookout south to West Palm Beach, Florida, EFH for neonate/early juvenile dusky sharks extends to water depths of 328 feet (100 m). EFH for late juvenile/subadult dusky sharks (116 to 300 cm TL) includes pelagic waters off the coast of southern New England at depths of 82 to 328 feet (25 to 100 m) as well as shallow coastal waters, inlets and estuaries. EFH for late juvenile/subadult dusky sharks extends as far south as the Dry Tortugas, Florida, to depths of up to 1,640 feet (500 m) (NOAA, 2014e).

Within the project area, designated EFH for juvenile dusky sharks occurs only at the New London alternative site and the eastern portion of the Niantic Bay alternative site. However, dusky sharks are a highly mobile migratory pelagic species. If present, this species would likely avoid or leave the area during disturbance events.

King mackerel (*Scomberomorus cavalla*)

All life stages: King mackerel are a coastal migratory pelagic species. EFH for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, and from the Gulf Stream shoreward, including *Sargassum* (NOAA, 2014d).

EFH for king mackerel occurs for all life stages at all three alternative sites. King mackerel are a highly migratory species. If present, juveniles and adults would likely avoid or leave the area during disturbance events. Eggs and larvae have greater potential to be impacted by the disposal of dredged materials at the alternative sites due to their inability to avoid or leave the area. However, the presence of eggs or larvae in eastern Long Island Sound is highly seasonal and eggs and larvae are transported by surface currents, making short-term impacts due to the disposal of dredged materials unlikely.

Little skate (*Leucoraja erinacea*)

Juveniles: EFH for juvenile little skates (93 to 102 mm TL) ranges from Maine, south to North Carolina and occurs throughout most of Long Island Sound. EFH for little skates only includes habitats with sandy, gravelly, or mud substrates. Little skates are present in the northwest Atlantic year-round and across the entire range of temperatures for the area (GARFO, 2015; NOAA, 2003a).

Adults: EFH for adult little skates (32 to 62 cm TL) ranges from Maine, south to Chesapeake Bay. Adult little skate EFH occurs throughout most of Long Island Sound, but only includes habitats with sandy, gravelly, or mud substrates (GARFO, 2015; NOAA, 2003a).

EFH for juvenile and adult little skate includes habitats with sandy, gravelly, or mud substrates at the Cornfield Shoals and Niantic Bay alternative sites, but not the New London alternative site. Little skates are a demersal species that feed primarily on benthic invertebrates such as crustaceans, polychaetes, and bivalves (NOAA, 2003a). Direct impacts to little skates are not likely because most juveniles and adults would likely avoid or leave the area during disturbance events for other adjacent, undisturbed suitable habitats. Juveniles and adults could be indirectly impacted due to mortality of benthic prey items. However, this impact would have a short duration and would be followed by a period of increased prey abundance once the placed sediment mound stabilizes and high settlement densities of surface epifauna recolonize the area (Lopez et al., 2014). Additionally, monitoring under the DAMOS program has consistently demonstrated that the benthic communities readily recover after disposal events (*e.g.*, AECOM, 2009). Increased turbidity immediately following dredged material disposal events could also temporarily reduce foraging ability due to decreased visibility in the water column.

Pollock (*Pollachius virens*)

Juveniles: EFH for juvenile pollock includes bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks in the Gulf of Maine and Georges Bank. Generally, juvenile pollock occur in waters with temperatures below 18°C, depths less than 820 feet (250 m), and salinities between 29 and 32 ppt (NEFMC, 1998c).

Adults: Bottom habitats in the Gulf of Maine and Georges Bank and hard bottom habitats (including artificial reefs) off southern New England and the middle Atlantic south to New Jersey. Generally, juvenile pollock occur in waters with temperatures below 14°C, depths from 49 to 1,200 feet (15 to 365 m), and salinities greater than 30 ppt (NEFMC, 1998c).

EFH for juvenile and adult pollock has been designated at the Cornfield Shoals and Niantic Bay alternative sites, but not the New London alternative site. Pollock are a mobile species which may be present throughout the water column. If present, this species would likely avoid or leave the area during disturbance events.

Red hake (*Urophycis chuss*)

Eggs: EFH for red hake eggs includes surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina. Preferred conditions for red hake eggs include sea surface temperatures below

10°C along the inner continental shelf with salinities less than 25 ppt. Hake eggs are most often observed from May through November, with peaks in June and July (NEFMC, 1998d).

Larvae: EFH for larval red hake includes surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina. Preferred conditions for larval red hake include sea surface temperatures below 19°C, water depths less than 656 feet (200 m), and salinity greater than 0.5 ppt. Red hake larvae are most often observed from May through December, with peaks in September and October (NEFMC, 1998d).

Juveniles: EFH for juvenile red hake includes bottom habitats with a substrate of shell fragments, including areas with an abundance of live scallops, in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina. Preferred conditions for juvenile red hake include water temperatures below 16°C, depths less than 328 feet (100 m) and salinities from 31 to 33 ppt (NEFMC, 1998d).

Adults: EFH for adult red hake includes bottom habitats in depressions with a substrate of sand and mud in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina. Preferred conditions for adult red hake include water temperatures below 12°C, depths from 33 to 426 feet (10 to 130 m), and salinities from 33 to 34 ppt (NEFMC, 1998d).

EFH for red hake has been designated for all life stages at the Cornfield Shoals and Niantic Bay alternative sites. At the New London alternative site, EFH has been designated for adult red hake only. Red hake are a demersal species and often forage on benthic infauna and epifauna. There is some potential for red hake mortality due to burial as a result of the proposed action. However, most juveniles and adults would likely avoid or leave the area during disturbance events for other adjacent, undisturbed suitable habitats and therefore, would not be directly impacted by the proposed activities. Juveniles and adults could be indirectly impacted due to mortality of benthic prey items. However, this impact would have a short duration and would be followed by a period of increased prey abundance once the placed sediment mound stabilizes and high settlement densities of surface epifauna recolonize the area (Lopez et al., 2014). Additionally, monitoring under the DAMOS program has consistently demonstrated that the benthic communities readily recover after disposal events (*e.g.*, AECOM, 2009). Increased turbidity immediately following dredged material disposal events could also temporarily reduce foraging ability due to decreased visibility in the water column. Eggs and larvae have greater potential to be impacted by the disposal of dredged materials at the alternative sites due to their inability to avoid or leave the area. However, the presence of eggs or larvae in eastern Long Island Sound is highly seasonal and eggs and larvae are transported by surface currents, making short-term impacts due to the disposal of dredged materials unlikely.

Sand tiger shark (*Carcharias taurus*)

Larvae: EFH for neonate/early juvenile sand tiger sharks (up to 125 cm TL) includes shallow coastal waters from Barnegat Inlet, New Jersey, south to Cape Canaveral, Florida, at depths up to 82 feet (25 m) (NOAA, 2014f).

Within the project area, designated EFH larval sand tiger sharks occurs only at the New London alternative site and at eastern portion of the Niantic Bay alternative site. However, sharks are highly mobile. If present, this species would likely avoid or leave the area during disturbance events.

Spanish mackerel (*Scomberomorus maculatus*)

All life stages: Spanish mackerel are a coastal migratory pelagic species. EFH for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, and from the Gulf Stream shoreward, including *Sargassum* (NOAA, 2014d).

EFH for Spanish mackerel occurs for all life stages at all three alternative sites. Spanish mackerel are a highly migratory species. If present, juveniles and adults would likely avoid or leave the area during disturbance events. Eggs and larvae have greater potential to be impacted by the disposal of dredged materials at the alternative sites due to their inability to avoid or leave the area. However, the presence of eggs or larvae in eastern Long Island Sound is highly seasonal and eggs and larvae are transported by surface currents, making short-term impacts due to the disposal of dredged materials unlikely.

Windowpane flounder (*Scophthalmus aquosus*)

Eggs: EFH designated for windowpane flounder eggs includes surface waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina, with temperatures less than 20°C and depths less than 230 feet (70 m). Windowpane flounder eggs are often observed from February to November with peaks in May and October in the middle Atlantic and July through August on Georges Bank (NEFMC, 1998e).

Larvae: EFH for windowpane flounder larvae includes pelagic waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina, with temperatures less than 20°C and depths less than 230 feet (70 m). Windowpane flounder larvae are often observed from February to November with peaks in May and October in the middle Atlantic and July through August on Georges Bank (NEFMC, 1998e).

Juveniles: EFH for juvenile windowpane flounder includes bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina, with temperatures below 25°C, depths from 3 to 328 feet (1 to 100 m), and salinities greater than 5.5 ppt (NEFMC, 1998e).

Adults: EFH for adult windowpane flounder includes bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to the Virginia-North Carolina border with water temperatures below 26.8°C, depths from 3 to 246 feet (1 to 75 m), and salinities greater than 5.5 ppt (NEFMC, 1998e).

EFH for windowpane flounder has been designated for all life stages at the Cornfield Shoals and Niantic Bay alternative sites, but no windowpane flounder EFH occurs for any life stage at the New London alternative site. Windowpane flounder is a demersal predator species. Therefore, there is some potential for mortality due to burial as a result of the proposed action. However, most juveniles and adults would likely avoid or leave the area during disturbance events. Eggs and larvae have greater potential to be impacted by the disposal of dredged materials at the alternative sites due to their inability to avoid or leave the area. Juveniles and adults could be indirectly impacted due to mortality of benthic prey items. However, this impact would have a short duration and would be followed by a period of increased prey abundance once the placed sediment mound stabilizes and high settlement densities of surface epifauna recolonize the area (Lopez et al., 2014). Additionally, monitoring under the DAMOS program has consistently demonstrated that the benthic communities readily recover after disposal events (*e.g.*, AECOM, 2009). Increased turbidity immediately following dredged material disposal events could also temporarily reduce foraging ability due to decreased visibility in the water column. However, conditions would quickly return to baseline.

Winter flounder (*Pseudopleuronectes americanus*)

Eggs: EFH designated for winter flounder eggs includes bottom habitats with a substrate of sand, muddy sand, mud, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay with water temperatures below 10°C, salinities between 10 and 30 ppt, and depths less than 16 feet (5 m). Winter flounder eggs are often observed from February to June with a peak in April on Georges Bank (NEFMC, 1998f).

Larvae: EFH for larval winter flounder includes pelagic and bottom waters of Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay with temperatures less than 15°C, salinities between 4 and 30 ppt, and water depths less than 19 feet (6 m). Winter flounder larvae are often observed from March to July with peaks in April and May on Georges Bank (NEFMC, 1998f).

Juveniles: EFH for juvenile winter flounder includes bottom habitats with a substrate of mud or fine-grained sand on Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay with water temperatures below 28°C, depths from 0.3 to 33 feet (0.1 to 10 m), and salinities between 5 and 33 ppt. After their first year, juvenile winter flounder typically move to slightly cooler deeper waters (NEFMC, 1998f).

Adults: EFH for adult winter flounder includes estuaries with a substrate of mud, sand, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay with temperatures below 25°C, depths from 3 to 328 feet (1 to 100 m), and salinities between 15 and 33 ppt (NEFMC, 1998f).

EFH for winter flounder has been designated for all life stages at the Niantic Bay alternative site only. Winter flounder EFH has not been designated for any life stage at the Cornfield Shoals or New London alternative sites. Winter flounder are a demersal predator species. Therefore, there is some potential mortality due to burial as a result of the proposed action. However, most juveniles and adults would likely avoid or leave the area during disturbance events. Larvae have greater potential to be impacted by the disposal of dredged materials at the alternative sites due to

their inability to avoid or leave the area. Winter flounder have demersal eggs, which could be susceptible to sedimentation or burial. However, impacts to winter flounder eggs would be minimized or avoided by restrictions on when dredging (and hence disposal activities) can occur. Generally, dredging is usually prohibited from June 1 through September 30 of any year to protect shellfish populations during their spawning season (CTDEEP, 2013). Additional site specific restrictions outside of the June 1 to September 30 timeframe may also apply depending on what species are present at the dredging site, including restrictions from February 1 to April 15 if winter flounder are present at the dredging site. Juveniles and adults could be indirectly impacted due to mortality of benthic prey items. However, this impact would have a short duration and would be followed by a period of increased prey abundance once the placed sediment mound stabilizes and the surface epifauna recolonizes the area at high densities (Lopez et al., 2014). Additionally, monitoring under the DAMOS program has consistently demonstrated that the benthic communities readily recover after disposal events (*e.g.*, AECOM, 2009). Increased turbidity immediately following dredged material disposal events could also temporarily reduce foraging ability due to decreased visibility in the water column; however, these conditions would be of short duration and would quickly return to baseline.

Winter skate (*Leucoraja ocellata*)

Juveniles: EFH for juvenile little skates (112 to 127 mm TL) ranges from Maine, south to Cape Hatteras, North Carolina and includes most of Long Island Sound. EFH for winter skates only includes habitats with sandy, gravelly, or mud substrates. Winter skates are present in the northwest Atlantic year-round and across the entire range of temperatures for the area (GARFO, 2015; NOAA, 2003b).

Adults: EFH for adult winter skates (greater than 70 cm TL) ranges from Maine, south to Chesapeake Bay. Adult winter skate EFH occurs throughout most of Long Island Sound, but only includes habitats with sandy, gravelly, or mud substrates (GARFO, 2015; NOAA, 2003b).

EFH for juvenile and adult winter skate includes habitats with sandy, gravelly, or mud substrates at the Cornfield Shoals and Niantic Bay alternative sites, but not the New London alternative site, and is almost identical to EFH designated for the little skate. Like little skates, winter skates are a demersal species which feed primarily on benthic invertebrates including crustaceans, polychaetes, and bivalves (NOAA, 2003b). Direct impacts to winter skates are not likely because most juveniles and adults would likely avoid or leave the area during disturbance events for other adjacent, undisturbed suitable habitats. Juveniles and adults could be indirectly impacted due to mortality of benthic prey items. However, this impact would have a short duration and would be followed by a period of increased prey abundance once the placed sediment mound stabilizes and the surface epifauna recolonizes the area at high densities (Lopez et al., 2014). Additionally, monitoring under the DAMOS program has consistently demonstrated that the benthic communities readily recover after disposal events (*e.g.*, AECOM, 2009). Increased turbidity immediately following dredged material disposal events could also temporarily reduce foraging ability due to decreased visibility in the water column.

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