FINAL Environmental Assessment, Finding of No Significant Impact, and Section 404(b)(1) Evaluation for Maintenance Dredging and Beneficial Use of Dredged Material for Beach Nourishment

# CAPE COD CANAL SANDWICH, MASSACHUSETTS

# AND TOWN NECK BEACH SANDWICH, MASSACHUSETTS



US ARMY CORPS OF ENGINEERS New England District

MAY 2015

# FINAL

# ENVIRONMENTAL ASSESSMENT FINDING OF NO SIGNIFICANT IMPACT AND SECTION 404(b)(1) EVALUATION

# CAPE COD CANAL AND TOWN NECK BEACH

# MAINTENANCE DREDGING AND BENEFICIAL USE OF DREDGED MATERIAL FOR BEACH NOURISHMENT

# SANDWICH, MASSACHUSETTS

Environmental Resources Section Engineering/Planning Division U.S. Army Corps of Engineers New England District Concord, Massachusetts

MAY 2015

# **TABLE OF CONTENTS**

1.0 INTRODUCTION	1
2.0 HISTORY AND NEED FOR THE PROJECT	1
3.0 PROPOSED WORK	3
3.1 Maintenance Dredging of the Cape Cod Canal	3
4.0 ALTERNATIVES	9
4.1 No Action	9
4.2 Alternative Dredging Methods	9
4.2.1 Hydraulic Dredge	9
4.2.2 Preferred Dredge Alternative	10
4.4 Alternative Disposal Areas	10
4.3.1 Previously Used Open Water Disposal Sites	10
4.3.2 Nearshore Placement	11
4.3.3 Beach Placement	11
4.3.4 Upland Placement	12
4.3.5 Preferred Disposal Alternative	12
5.0 AFFECTED ENVIRONMENT	14
5.1 Physical and Chemical Environment	14
5.1.1 Dredge Sites	14
5.1.2 Disposal/Placement Sites	14
5.2 Biological Environment	19
5.2.1 Dredging Sites - Maintenance Dredging of Cape Cod Canal	19
5.2.2 Cape Cod Canal Disposal Site	22
5.2.3 Beach Placement- Town Neck Beach	22
5.4 Threatened and Endangered Species and Species of Concern	27
5.5 Historical and Archaeological Resources	27
5.5.1 Ocean Areas	27
5.5.2 Land Areas	
5.6 Air Quality and Noise	
5.7 Socioecononmic Environment	
6.0 ENVIRONMENTAL CONSEQUENCES	31
6.1 Physical and Chemical Environment	
6.1.1 No Action Alternative	

6.1.2 Dredge Sites	31
6.1.3 Placement/Disposal Sites	33
6.2 Biological Environment	
6.2.1 No Action Alternative	
6.2.2 Dredge Sites	
6.2.3 Placement/Disposal Areas	40
6.3 Essential Fish Habitat	43
6.3.1 No Action Alternative	44
6.3.2 Dredge Areas and Placement/Disposal Sites	44
6.4 Threatened and Endangered Species and Species of Concern	44
6.4.1. Marine Mammals	44
6.4.2 Sea Turtles	47
6.4.3 Fish	50
6.4.4 Birds	51
6.5 Historical and Archaeological Resources	53
6.5.1 No Action Alternative	53
6.5.2 Dredge and Placement/Disposal Areas	53
6.6 Socioeconomic Environment	54
6.6.1 No Action Alternative	54
6.6.2 Dredge and Placement/Disposal Areas	54
7.0 AIR QUALITY STATEMENT OF CONFORMITY REQUIRMENTS	54
7.1 General Conformity	55
8.0 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN	55
9.0 CUMULATIVE IMPACTS	56
10.0 ACTIONS TAKEN TO MINIMIZE ADVERSE IMPACTS	57
11.0 COORDINATION	57
12.0 REFERENCES	59
13.0 COMPLIANCE WITH ENVIRONMENTAL FEDERAL STATUES AND EXECUTIVE ORDERS	65
13.1 Federal Statutes	65
13.2 Executive Orders	67
13.3 Executive Memorandum	68

FONSI 404(b)(1) Evaluation

Appendix A- Coordination

Appendix B- Grain size (Dredge Area, CCCDS, Town Neck Beach)

**Appendix C Suitability Determination** 

Appendix D - Benthic Data (Canal and CCCDS)

**Appendix E – Shellfish and Eelgrass Report** 

Appendix F – Essential Fish Habitat

# **1.0 INTRODUCTION**

This Environmental Assessment (EA) is written for the proposed maintenance dredging of the Cape Cod Canal in Sandwich and Bourne, Massachusetts. The proposed dredging involves the removal of approximately 150,000 cubic yards of clean sand from recurring sand waves in six of the eight to nine shoal areas of the canal. A hopper dredge will perform the work. The sand will either be placed on Town Neck Beach, Sandwich, Massachusetts or disposed of in open water at the Cape Cod Canal Disposal Site. The Town Neck Beach placement site is a candidate for beach nourishment under the United States Army Corps of Engineers (USACE) beneficial use of dredged material program (Section 204 of the Water Resources Development Act of 1992, as amended).

The purpose of this EA is to present information on the environmental features of the project area and to review construction information to determine the potential impacts of the proposed project. This EA describes project compliance with the National Environmental Policy Act of 1969 (NEPA) and all appropriate Federal and State environmental regulations, laws and Executive Orders. Methods used to evaluate the environmental resources of the area included biological sampling, sediment analysis, review of available information, and coordination with appropriate environmental agencies and knowledgeable persons. This report provides an assessment of environmental impacts and alternatives considered along with other data applicable to the Clean Water Act Section 404 (b) (1) Evaluation requirements.

# 2.0 HISTORY, PURPOSE AND NEED FOR THE PROJECT

The Cape Cod Canal is a sea level canal located about 50 miles south of Boston, Massachusetts. It intersects a narrow neck of land which joins Cape Cod to the mainland. The Canal extends from Cape Cod Bay on the east to the Buzzards Bay on the west. The towns of Bourne and Sandwich are located adjacent to the Canal. The Canal provides safe and efficient passage for commercial and recreational vessels wishing to transit between Cape Cod Bay and Buzzards Bay. The purpose of the proposed maintenance dredging is to restore the authorized depth of the Federal Navigation Project by removing shoals, and the following document addresses the impacts associated with the maintenance dredging of shoaled areas throughout the Canal.

On January 21, 1927, the Federal Government purchased the canal (described above) from Boston, Cape Cod and New York Canal Company for \$11,500,000.00. The purchase included a 600 foot stone jetty and a 3000 foot stone breakwater at the east end of the canal. The existing Cape Cod Canal project was authorized by Congress in the River and Harbor Acts of 1935, 1945, and 1958, and completed in April 1963. It provides for an open canal 32 feet deep mean lower low water (MLLW) for a width of 540 feet in the land cut, 500 feet in a straight channel in Buzzards Bay to Wings

Neck, and 700 feet wide beyond Wings Neck. The latter portion of the channel, shown on coastal charts as ending in the vicinity of Cleveland Ledge, actually continues about 3,000 feet beyond the lighthouse to deep water. There are two mooring basins: the west mooring basin on the south side near Hog Island about 3,300 feet long, about 350 feet wide and 32 feet deep, and the east mooring basin on the north side of the channel at Sandwich, about 2,500 feet long, about 350 feet wide and 25 feet deep, but has previously been maintained to 32 feet.

The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships, ferries as well as recreational vessels. The canal is an integral piece of the corridor for petroleum products being delivered to the northeast region and provides a more protected and direct route for vessels transiting between Buzzards Bay and Cape Cod Bay, to Massachusetts Bay and up to Portland.

The Cape Cod Canal is a highly dynamic area with extremely strong tidal currents and shifting shoals that form in various locations throughout the project. This combination of shifting shoals and strong tidal currents creates hazardous conditions and tidal delays for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Recent hydrographic surveys indicate that shoaling has occurred in several areas of the project and has reduced the controlling depth by as much as 2 feet (i.e. to 30' Mean Lower Low Water). This reduction has limited the passage of some of the deep draft commercial vessels through the canal, and shoaling in the east mooring basin limits the available space to moor vessels in emergencies (e.g. icing) while transiting the Canal. Further shoaling may cause some of the deep draft vessels to have to transit around Cape Cod thereby increasing the risk profile of these vessels especially during the winter months.

Maintenance dredging in the canal was last performed in 2010. At that time the East Mooring basin was dredged to -32 feet. Over the past 30 plus years the same areas within the channel tended to shoal. See Table 1 for summary of most recent dredging events. A recent hydrographic survey has revealed shoaling at a controlling depth of -30 feet below MLLW that requires that draft restrictions be placed on deep draft vessels transiting the Canal. The Cape Cod Canal operations center recommends that any vessels transiting with a draft greater than 22' contact and consult well in advance with the Marine Traffic Controller.

	Volume	Advanced		
Year	су	Maintenance	Disposal	
		Channel	Cape Cod Canal Disposal Site and Cleveland	
1975	125,620	East Mooring Basin	Ledge Disposal Site	
		Channel	Cape Cod Canal Disposal Site and Cleveland	
1977	73,054	East Mooring Basin	Ledge Disposal Site	
1979	100,000	No	Cape Cod Canal Disposal Site	
		Channel		
		East Mooring Basin		
1986	177,432		Cape Cod Canal Disposal Site	
		Channel	Cape Cod Canal Disposal Site and nearshore	
1990	121,952	East Mooring Basin	adjacent to Springhill Beach	
1998-		Channel		
2000	162,000	East Mooring Basin	Boston Harbor CAD cells cap material	
		Channel		
2002	117,000	East Mooring Basin	Cleveland (East) Ledge Disposal Site	
Jan.			Can CAD Cells in Boston Harbor	
2010 -			Contractor Over-dredged the Mooring Basin to 32 Feet	
March	20,837	Channel	at Own Expense to Yield Material for the Capping	
2010	85,163	East Mooring Basin	Project.	

Table 1. Dredge History of the Canal for the Past Thirty Years

# 3.0 PROPOSED WORK

# 3.1 Maintenance Dredging of the Cape Cod Canal

The proposed work involves maintenance dredging and advance maintenance dredging of up to 150,000 cubic yards (cy) of clean sand and gravel from portions of the 32 feet deep channel and the 25 feet deep East Mooring Basin (EMB)

Shoals in the project form as massive sand-wave formations. There are nine areas that typically shoal within the Cape Cod Canal and six of these areas currently have shoals that need to be dredged (see Figure 1). These areas include the South Breakwater shoal, East Mooring Basin-basin shoal, East Mooring Basin-channel shoal, East Sagamore shoal (east of the bridge), Sagamore shoal (west of the bridge), and the Onset shoal. The channel is authorized to a depth of -32 feet deep and the EMB is authorized to a depth of -25 feet. In order to extend the time between dredging events, advance maintenance is being proposed. Advance maintenance is dredging beyond the authorized project feature dimension(s) (i.e. typically, depth) and is allowed in fast-shoaling or critical areas. Within the Canal, the advance maintenance strategy is to reduce the sand wave shoals down to their base to a depth equal to the depth of the surrounding environment. See Table 2 for the proposed dredge depth for each shoal and Figures 2a-2c for survey of shoal areas. The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

A study is currently ongoing under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project as beach-fill on a 2,500 foot long eroded section of Town Neck Beach in Sandwich. Town Neck Beach is adjacent to the south breakwater at the eastern end of the Canal. The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and the potential beach nourishment. If the Section 204 study is completed in time to coincide with this maintenance dredging event and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay 100 percent of any additional costs over and above the Federal base plan (i.e. dredging and placement of the material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach. Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging.

Shoal Area	Required Depth	Allowable Over Depth	Total Depth
South Breakwater	38	2	40
East Mooring Basin - Channel	38	2	40
East Mooring Basin - Basin	32	2	34
East Sagamore	34	2	36
Sagamore	37	2	39
Onset	37	2	39

**Table 2.** Proposed Dredge Depths for Canal Shoal Areas.



Figure 1. Shoal areas with the Cape Cod Canal Federal Navigation Project.



**Figure 2a.** Shoals in the eastern end of the Cape Cod Canal (south breakwater, east mooring basin, and east mooring basin channel shoals).







Figure 2c. Shoal area in the western end of the Cape Cod Canal (Onset shoal).

# 4.0 ALTERNATIVES

# 4.1 No Action

The No Action Alternative is required to be evaluated as prescribed by NEPA and the Council on Environmental Quality (CEQ). The No Action Alternative serves as a baseline against which the proposed action and alternatives can be evaluated. Evaluation of the No Action Alternative involves assessing the environmental effects that would result if the proposed action did not take place. Under a No Action Alternative, the Cape Cod Canal Federal Navigation Project (FNP) in Cape Cod Bay and Buzzards Bay, Massachusetts would not be dredged. Without dredging, shoaling in the Canal would continue and worsen over time hindering the passage of vessels through the Canal. As navigation conditions become more dangerous, there is the potential for damages to vessels due to groundings, collisions and potential oil spills. Without dredging, shoaling could eventually limit passage of deeper draft vessels through the canal. As a result of these navigation hazards and the likelihood of further deterioration of these conditions within the Federal navigation channel, the No Action Alternative was not considered a viable alternative.

# 4.2 Alternative Dredging Methods

# 4.2.1 Hydraulic Dredge

## 4.2.1.1 Hydraulic Cutterhead Pipeline Dredge

A hydraulic dredge with a cutterhead on the end of an arm connected to a pump loosens the bottom sediments and entrains them in a water-slurry that is then pumped up from the bottom. The material is then discharged away from the channel (side cast) or pumped via a pipeline to a dewatering area or disposal site. A hydraulic dredge is generally used for sandy material that will be disposed of in an upland area or on a nearby beach, or for pumping any type of unconsolidated material in an upland confined (diked) disposal/dewatering area. In general, the length of the canal is too long and the proposed placement site is too far from the shoal areas of the canal for this dredge type to be used. Therefore, this type of hydraulic dredge would not be used for this project.

### 4.2.1.2 Hopper Dredge

A hopper dredge operates by hydraulically pumping a slurry of bottom sediments into a chamber (hopper) within the vessel. As dredged material settles in the hopper, excess water and fine sediments are discharged into surrounding waters. When the hoppers are full, the drag arms are raised and secured to the vessel, which then travels to the disposal site and then releases or pumps off the material from the hoppers. The dredge then returns to the dredging site to begin another cycle. Hopper dredges come in various sizes from a few hundred cubic yards bin capacity to several thousand yards bin capacity. In New England, hopper dredges are most often used to remove sandy material from harbor entrance channels. In order to fill the hopper bins, the water component of the suctioned slurry is allowed to overflow the bins back into the harbor at the dredging site. This type of dredge is ideally suited to perform maintenance dredging in the Cape Cod Canal given the strong currents and predominance of sand shoals. There is the potential for direct beach disposal using a hopper dredge with pump out capabilities.

# 4.2.1.3 Mechanical Dredge

A mechanical dredge consists of a clamshell bucket dredge mounted on a barge. A mechanical dredge operates by excavating sediments with a bucket attached to a crane. Excavated material is deposited into a scow, transported to the disposal site, and released. For open-water or ocean disposal, a split-hull scow is generally used for ease of disposal and to minimize the discharge plume. Although there may be some overflow of water from the scow to maintain efficiency during dredging, it is much less in comparison to hopper dredge operation. Although a mechanical dredge could be used to complete the work, due to the relatively small size of the shoals and their scattered locations throughout the project, the use of a mechanical dredge would not be the most efficient dredge alternative especially in the channel where there are strong currents. Additionally, if the material is placed on Town Neck Beach it would likely require that the dredged material be rehandled (taken out of one scow and placed into a pumpout scow) in order to be pumped out and onto the beach.

# 4.2.2 Preferred Dredge Alternative

Although there are a number of different dredging methods available, the most efficient methods to accomplish the maintenance dredging of the canal channel and east mooring basin would be a hopper dredge for the reasons stated above.

# 4.4 Alternative Disposal Areas

# 4.3.1 Previously Used Open Water Disposal Sites

# 4.3.1.1 Cape Cod Canal Disposal Site

The Cape Cod Canal Disposal Site (CCCDS) is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the Cape Cod Canal Buoy #1. The center is located at 41° 49'N, 70° 25'W (Figure 3). This disposal site has been used for previous canal maintenance dredging activities at least as far back as 1954 and was last used for disposal of maintenance material from the Canal in 1990. CCCDS is a viable disposal alternative for material from the Canal.

# 4.3.1.2 Cleveland Ledge Disposal Site

The Cleveland Ledge Disposal Site (CLDS) previously known as the Buzzards Bay Disposal Site at Cleveland East Ledge is located just north of the historic disposal area as depicted on the NOAA nautical charts. This site is a rectangular area approximately 2,000 feet long, bearing 106 degrees true and 1,400 feet wide, bearing 16 degrees true. The center of the area is a point 700 yards southeast of Cleveland East Ledge Light on bearing 304 degrees 30 minutes true. The coordinates of the center point are 41° 37' 40" N, 70° 41' 19" W. Depths in this site range from 33 to 43 feet (10-13 m). This disposal site is closer than the CCCDS to the Onset Shoal and others that regularly shoal and require dredging such as the Cleveland Ledge, Hog Island Channel, and the west mooring basin. This is a previously used site dating back to1954 and last used in 2002 for maintenance dredging of the canal. It has been the preferred disposal site for material dredged from the western end of the canal due to its proximity to these areas, but this alternative removes the sand from the littoral zone.

## 4.3.2 Nearshore Placement

The nearshore placement alternative involves the placement of dredged material in a nearshore subtidal area from which it has the potential to be moved by littoral processes onto nearby beach areas thus providing an indirect source of beach nourishment. In 1990, clean sand dredged from the Canal was placed in a nearshore disposal area off of Springhill Beach in Sandwich, MA. In this case, the sandy dredged material was placed in a 1500 by 2000 square foot rectangular area in the 15 to 35 foot MLLW isobath east of Sandwich Harbor off of Springhill Beach (see Figure 3). Subsequent to the dredging and disposal operations in 1990, the Massachusetts Division of Marine Fisheries expressed concerns about potential impacts to shellfish and other marine resources in the nearshore region that may prevent any placement of dredge material in this area. The town of Sandwich recently requested that sand be placed on Town Neck Beach located east of the Canal entrance. A Beneficial Use of Dredged Material Section 204 study has been requested by the town of Sandwich for the USACE to further investigate direct beach nourishment alternatives; therefore, nearshore placement is not currently a preferred alternative.

### **4.3.3 Beach Placement**

The material to be dredged from the Cape Cod Canal is clean sand that is suitable for beneficial use purposes such as beach nourishment. The town of Sandwich has requested that a Section 204, Beneficial Use of Dredged Material Study be conducted to evaluate the nourishment of Town Neck Beach. Since 1909 erosion on Town Neck Beach has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. This beach is exposed to the full northern fetches of Cape Cod Bay. Generally it is the policy of the Corps of Engineers to keep sand within the littoral system by using beach or nearshore placement sites when practicable.

The town of Sandwich has developed a Dune and Beach Restoration Project for Town Neck Beach in order to reduce vulnerability to coastal storms, sea level rise, and flooding through mitigation of long-term erosion of Town Neck Beach. This restoration or re-nourishment area includes approximately 5,000 feet of shoreline which extends from just south of the Cape Cod Canal (at the end of Town Neck Road) to Sandwich Harbor Inlet. Most of the beach within the project site is owned by the town of Sandwich as part of Town Neck Beach. It is a public beach that extends from Sandwich Harbor northwest towards the Canal, and fronts the residential development known as Town Neck Hill. Beaches along this coastline of Sandwich, including the project area along Town Neck Beach, have a history of erosion since 1909 and this project will restore the historic beach profile to that which existed in 1952. The Town intends to restore the historic beach profile between Town Neck Beach and the Sandwich Harbor inlet separately from the dredging and placement project described in this EA. The entire restoration will require approximately 400,000 cy of sand. As the dredging of the Cape Cod Canal will not produce this quantity of sand, the project will require several dredging events or the town of Sandwich will need to supplement the dredged material from the canal with other sources to complete the project.

Approximately 150,000 cy of sand will be dredged from the canal with advance maintenance and placed on Town Neck Beach. The material will be placed along a length of 2,500 feet of beach seaward of the homes in Town Neck Hill. This would provide beach nourishment to help protect the homes and is similar to Alternative 3 in the town of Sandwich's restoration proposal (WHG, 2014).

This is the preferred placement alternative for dredged material from the Cape Cod Canal, provided the Section 204 study is completed or the town of Sandwich can finance the additional costs associated with the beach nourishment.

## 4.3.4 Upland Placement

No upland disposal sites have been identified for this project. Use of any upland placement site would involve dredging the material, offloading the hopper and dewatering the material, loading it into trucks, and then transporting the material to the placement site. This involves double or triple handling of the material and results in significantly greater costs than other available alternatives considered. Also, this alternative would remove the sand from the littoral system without providing any benefits. For these reasons, upland placement is neither a viable nor preferred alternative.

# 4.3.5 Preferred Disposal Alternative

The material to be removed from the shoal areas of the Cape Cod Canal consists predominantly of clean sand suitable for all methods of disposal/placement described herein. The beneficial use alternative discussed above (beach placement) is preferred over the previously used open water (at CCCDS) disposal site alternative providing that the Federal and non-Federal funds and/or approvals are in place for beach placement. If the Section 204 study is not completed or the town of Sandwich is unable to secure the additional funds needed, then the material will be placed at CCCDS.



Figure 3. Proposed placement areas for the Cape Cod Canal dredge material.

# **5.0 AFFECTED ENVIRONMENT**

# 5.1 Physical and Chemical Environment

## 5.1.1 Dredge Sites

The various shoals and sections of the Canal have been sampled and their sediments analyzed for grain size many times in recent years, specifically in 1972, 1977, 1988, 1989, 1996, 1999 and 2001. These analysis consistently show that sediments from these areas to be predominately medium to fine-grained sand with less than 1% silt.

A suitability determination (Appendix C) has indicated that all the maintenance material to be dredged for this project and noted in the above paragraph has been found to be suitable for beach placement and unconfined open-water disposal. Based upon grain size, it meets the exclusionary criteria as set forth in 40 CFR Part 230.60 of the Clean Water Act, and does not require further chemical testing.

# 5.1.2 Disposal/Placement Sites

# 5.1.2.1 Cape Cod Canal Disposal Site

The Cape Cod Canal Disposal Site (CCCDS) was last used for disposal of dredged materials from the Cape Cod Canal in 1990. This site was investigated by the Disposal Area Monitoring System (DAMOS) of the New England Division U.S. Army Corps of Engineers (report #84) in 1990 before and after the disposal of approximately 15,000 cy of material from the canal (SAIC, 1993). This site is not considered a regional disposal site, but has been used for disposal of Cape Cod Canal materials for more than 50 years and is an active open water disposal site for clean material from the canal. In 1981, a state sponsored survey of fisheries and dredged material disposal areas (Howe and Germano, 1982) found numerous topographical features such as rock piles and debris at this disposal site so they conducted bottom trawls in an area 1.4 nautical miles north of the disposal site. In 1984, a diver survey found a thin layer (5 cm) of brownish-gray mud overlying coarse sand in the center of the disposal site, brownish-gray mud at least 45 cm deep in the southeast edge and brownish-gray mud with no depth in the northwest edge of the disposal site (Terra Mar International, 1984). The northwest transect also contained a small patch of rock cobble, boulders and gravel.

The 1990 DAMOS monitoring survey (SAIC, 1993) performed at the disposal site showed that the dredged material disposed at the site from 1990 maintenance dredging of the canal was deposited within 300 meters of the disposal buoy with most of the material deposited within150 meters southwest of the buoy to a depth of 1 meter. A historic disposal mound was also identified in the 1990 survey (same area as Video site 3 from the Corps 2006 sampling discussed in Section V.B.2. a.). It was hypothesized to have most likely formed during the disposal of approximately 299,000 cubic yards (cy)

of dredged material deposited in 1980 and 6000 cy in 1986. This mound was found in the northeast corner of the site and was approximately 13 feet (4 m) in height. The difference between pre- and post-disposal surveys indicated that the majority of dredged material was deposited within a 984 foot (300 m) radius of the disposal buoy creating a mound 3.2 feet (1.0 m) in height.

Sediment-profile imaging of this mound did not reveal any clearly defined dredged material layer at the historic mound within the disposal site, but mapping of the dredged material was possible based on the changes in sand content and sediment grain size. The mound center and adjacent areas (150 to 200 meters west and east, respectively) showed increased grain size, shell and sand content compared to areas further away from the mound. Shell lag near the disposal mound was most likely due to erosion or winnowing of finer silt and sand away from the area.

Cape Cod Bay is found on the eastern end of the canal and in general is a shallow body of water with water depths generally less than about 147 ft (45 m). Within the Bay the sediments are composed mostly of sand at water depths shallower than 66 ft (20 m), while silty clayey sediments predominate in water depths greater than about 98 ft (30 m) (Battelle, 1990). The disposal site has an average depth of 75 ft (23 m) (the top of historic disposal mound had a depth of 62 ft (19 m) in 1990).

On 14 September 2006 grab samples were taken for grain size analysis from five sites within the disposal site. Three samples from a nearby reference site were also taken. See Appendix B for grain size curves and map of sample locations. The sediments taken in the grab samples from Site CCB1 (Figure B-2 in Appendix B) consisted of sand and gravel with less than 10% silt but all other disposal site samples and reference site samples consisted of 31-66% sand and 36-69% silt.

# 5.1.2.2 Beach Placement

Seaward of Town Neck Hill is a rocky headland feature that extends out beyond the exposed rocky intertidal area and the depth contours curve around this feature. Along the eastern end of Town Neck Beach the depth contours between the shoreline and -30 ft are generally shore parallel, with a gradual slope towards the offshore. Greater water depths are present around the entrance to Sandwich Harbor, created by higher current velocities and scouring in the vicinity of the inlet.

The shoreline mapping/erosion rate maps made available through the Massachusetts Coastal Zone Management office (MACZM) showed the erosion rates vary along each stretch of beach with Town Beach (West) eroding at an average rate of 3.8 ft/yr (1.15 m/yr) between 1978 and 1994 (USACE FID,2014). In addition to the MACZM shoreline maps, LIDAR mapping data collected in 2000 and 2007 was available for this stretch of shoreline. This data showed the recession rates to be lower in recent years in front of Town Beach (west) and higher along Town Beach (east) when compared to the MACZM historic rates. The rates were averaged in the two beach areas with the average erosion from the LIDAR data sets being 0.13 ft/yr (0.04 m/yr)

and 6.5 ft/yr (1.99 m/yr) respectively. This agrees with data analyzed by the town of Sandwich for the period of 2001-2012 (WHG, 2014).

The Sandwich region is influenced by locally generated seas, produced within Cape Cod Bay, and swell waves generated in the Atlantic Ocean. This combination of wave sources produces a wide range of wave conditions at the Sandwich shoreline that includes both high frequency seas and longer period waves. Given the orientation of the Sandwich shoreline, only winds from 295 degrees (west-northwest) clockwise to 115 degrees (east-southeast) were determined to affect the Sandwich shoreline; locally generated wind waves were described by the data between 25 degrees to 115 degrees, while ocean generated waves were described by 295 degrees to 25 degrees (WHG, 2014). In addition to the average conditions consisting of both local wind-generated and regional swell waves. In fact, it is likely that due to the smaller average waves that occur in the Sandwich region, storm events dominate both the wave climate and the sediment transport in the region. The primary storm events that impact the Sandwich beaches are nor'easters.

Sandwich beaches have been starved of sand arriving from updrift sources (e.g. White Cliffs in Plymouth) so the major source of longshore transport has been eliminated. Now a large portion of the Sandwich beaches are now composed of coarse grained sands, gravel, and cobble within the intertidal area. The western end of the project has a hooked land spit that is created by large gravel/small cobble. This gravel/cobble sediment is also found on the beach up to the current dune line between the two most western groins of the project. West of the spit the rocky intertidal habitat is a cobble/ boulder mix with sand and pebbles (see Figure 4). The beach berm and upper intertidal areas changes from large gravel to smaller gravel/pebbles as you move east.

Grain size analysis was completed by the town of Sandwich in 2001 and USACE in 2014. The 2001 beach samples collected between the toe of the dunes and mid-tide consisted of greater than 71.5% sand (mostly coarse and medium sand), with the remainder consisting of cobbles and gravel, and no silt or clay (see Appendix B). Six sediment samples were taken in September 2014 between the toe of the dunes and mid tide area of Town Neck Beach. The samples consisted mostly of fine gravel and medium grained sand with some coarse and fine sand with less than 1 percent fines (silt/clay) (see Appendix B).

Coastal dune resources are present along most of the project footprint. They include natural hills, mounds or ridges of sediment landward of the coastal beach, that have been deposited by wind action, storm overwash or man-made dune restoration projects. Coastal dunes along the western end of the project site are narrower and lower in elevation than those along the eastern end of the site. The dunes provide protection for private properties in the Town Neck Hill area and for the extensive salt marsh ecosystem associated with Sandwich Harbor Inlet. There are currently 5.8 acres

of dunes within the larger project area, approximately 0.6 acres within the currently preferred placement area.

Coastal bank resources include the seaward face or side of any elevated landform, other than a dune, which lies at the landward edge of a coastal beach. Although most of the beach within the project area is backed by coastal dune, there is one section of the beach along White Cap Path that is backed by a coastal bank. The bank is approximately 295 ft long, extending in an easterly direction from the large groin. Significant erosion in this area over the past decade has exposed more and more of the bank. Sediments in the bank are composed of clay, silt, and sand.

Rocky intertidal shores at Sandwich are naturally occurring rocky and boulderstrewn areas, between the mean high water line and the mean lower low water line. Although much of the intertidal zone within the project area is composed of coarse sand and cobble, MassDEP has delineated two patches of rocky intertidal shore towards the western end of the project area. USACE mapped the nearshore rocky headline and differentiated the intertidal and subtidal rock areas as the gravel/cobble from cobble/boulder areas (Figure 4). There were 5.57 acres of mapped rocky intertidal shore within the project area, but due to erosion caused by storms some of this area is now subtidal and there is additional exposed rocky intertidal habitat within the project area. Currently the project area has 7.3 acres of intertidal rocky habitat of which 5.01 acres will be directly impacted by the project. There are 8.33 acres of subtidal rocky habitat (Figure 4). There is also tidepool habitat within the gravel/small cobble spit area and some of the rocky intertidal area where all but the large boulders are always submerged (Figure 5).



**Figure 4**. Map of placement area on Town Neck Beach, Sandwich, MA and with rock and eelgrass habitats. Eelgrass plotted on eastern end were plotted to be seen on the map, but are center points of 2 sparse beds so mapped areas appear larger than actual eelgrass areas (see descriptions in text).



**Figure 5.** Rocky habitat on the western end of project within tide pool area, only large boulders are exposed, most of the rock is always covered by water.

# 5.2 Biological Environment

### 5.2.1 Dredging Sites - Maintenance Dredging of Cape Cod Canal

The Cape Cod Canal waterway bisects the town of Bourne, with the eastern end of the canal in Sandwich. The Canal property includes 982 acres of project land situated along the 7.4 mile land cut. Overall, about 20 percent of the project area has been developed, which is defined as roads, buildings, parking areas, turf (lawn) and other areas without natural self sustaining plant communities. The remaining 80 percent of the land (885 acres) is undeveloped and primarily forested. About 85 percent of the undeveloped land is upland and 15 percent wetland. The project includes about 575 acres of subtidal habitat within the land cut and about 750 acres within the Buzzards Bay channel reaches. Land adjacent to government property near the canal varies from undeveloped forestland to heavily developed residential and commercial areas

The Canal main channel was originally sampled in the late 1960s by the Massachusetts Division of Marine Fisheries to characterize the biological community which is described in the 1977 Cape Cod Canal EIS (USACE, 1977). Generally the biological community is a mixture representative of a transitioning between two biogeographic regions, Cape Cod Bay (a Boreal community) and Buzzards Bay (a Virginian community). As would be expected of the Canal environment, the areas of the main channel closest to each end would probably be most representative of that respective community, with the areas closest to the midway point of the land cut being the most mixed.

Given the overall consistent hydrological regime of the canal, substrate conditions and temperatures, a transitional community reflecting both Cape Cod Bay and Buzzards Bay environments is still present in the main channel. It should be mentioned that maintenance dredging at various times and locations within the channel has occurred during the last fifty years temporarily impacting benthic communities within these areas.

In March 1991 USACE surveyed the benthic habitat of the western end of the Canal in preparation for the realignment of the approach to the Cleveland Ledge channel that was completed in 1999-2000. Benthic and macrofaunal samples were taken in order to characterize the marine ecosystem. Appendix D, Figure D-1 outlines the station locations relative to the Cleveland Ledge Light. Divers observed no macrofauna at any of the stations. However, some minor epifaunal assemblages were observed on the rocks and boulders that occur sporadically within the area. Benthic samples were also collected by the divers. Dominant organisms included the polychaetes *Aricidea jefferysi, Amphitrite ornata*, and *Podarke obscura* as well as the amphipod crustaceans *Ampelisca abdita* and *Corophium acutum* (see Table D-1 of Appendix D).

Bournedale Herring Run's entrance, which is located about 1 mile west of the Sagamore Bridge, maintains access for Alewife and Blueback herring to travel up Herring River (formerly Monument River) to reach Great Herring Pond to spawn. Other fish species which may be found within or near the canal include: striped bass (*Morone saxatilis*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus altatrix*), mackerel (*Scomber scrombrus*), bonito (*Sarda sarda*), tautog (*Tautoga onitis*), scup (*Stenotomus chrysops*), cod (*Gadus morhua*), summer flounder (Paralichthys dentatus), and winter flounder (*Pseduopleuronectes americanus*). Juvenile cod young of year were collected west of the canal and east of Sandwich Harbor by Massachusetts DMF Inshore Trawl Surveys between 1978 and 1999 during the spring collection. There were much lower numbers of juvenile cod collected from deeper waters in the autumn collections (1978-1999) (Howe *et al.*, 2002). No sampling was completed in the waters adjacent to the project.

In general, the status of Atlantic horseshoe crab (*Limulus polyphemus*) populations along the Atlantic Seaboard is poorly understood due to the limited amount and inconsistency of information collected regarding stock levels. In late spring (May-June) adults migrate into warm and shallow waters to mate and lay eggs. Spawning adults prefer sandy beach areas within bays and coves that are protected from wave energy. The eggs are buried in sand or mud at the edge of the shore during the high spring tides and hatch within a few weeks at the next spring tide. There are recorded spawning sites within Buttermilk Bay, but none within the canal.

There is no eelgrass growing within the Cape Cod Canal Federal Navigation Project, but it may be found outside the channel near Hogs Island (Figure 6) on the western end of the canal.



Figure 6. State mapped eelgrass in the areas surrounding the Cape Cod Canal.

## 5.2.2 Cape Cod Canal Disposal Site

The CCCDS was last used for disposal of canal maintenance material in 1990. The disposal site and nearby areas have been investigated over the past thirty years. In 1981, Massachusetts Coastal Zone Management funded a study to examine fisheries and document environmental conditions relative to dredge material disposal in Cape Cod Bay (Howe and Germano, 1982).

Site A of the Howe and Germano (1982) study was 1.4 nautical miles north of the CCCDS due to topographical features which impeded trawling within the CCCDS. A diver survey was conducted in 1984 (Terra Mar International Services, Inc., 1984) that described the site as being dominated by the starfish Asterias vulgaris and the sea anemone Cerianthus borealis. In addition, polychaetes Myxicola infundibulum; sea scallops, Placopectin magellanicus; jonah crabs, Cancer borealis; moon snails, Lunatia heros; and mysid shrimp, Mysis mixta were noted. Finfish that were observed during the diver survey included flounder, skate, pipefish, and hake. The 1984 (Terra Mar International Services, Inc) survey included fish caught by gill net. Species caught in the gill nets included: red hake, silver hake, butterfish, sea ravens, skates, grubby, cunner, pollock, cod, rock crabs and jonah crabs. In 1990 DAMOS monitoring (SAIC, 1993) conducted a sediment-profile imaging (SPI) survey in the region of a historic disposal mound at CCCDS created in 1980 with additional disposal in 1986. The center of the disposal mound only showed recolonization by Stage II infauna (deposit feeders). Ambient conditions were apparent at the western end of the survey transects with Stage III (head down, deep burrowing deposit feeders) assemblages at depth with Stage I (pioneering assemblages) infauna surface taxa (SAIC, 1993).

A more recent survey of the CCCDS was performed by USACE in September 2006 to characterize the benthic community with details of the analysis and maps of sampling locations presented in Appendix D of this report. Benthic analysis identified polychaetes as being the most prominent taxa followed by amphipods, bivalves, oligochaetes, cumaceans, nematodes, echinoderms, isopods, and nemerteans based on average abundance across the five stations. The number of individuals in the grabs ranged from 378 to 588 with species richness ranging from 27 to 40 species in a sample. Species evenness ranged from 0.74 to 0.85. Diversity indices were also generated for the data (see Appendix D, Tables D-2a & b). Underwater video transects of the disposal and reference site were also performed on 17 September 2006. Sea stars and various crab species were identified in all areas (see Appendix D for further details). A table of organisms identified in the 1984 diver survey (Terra Mar International Services, Inc., 1984) and 2006 underwater video survey can be found in Table D-1 (Appendix D).

# 5.2.3 Beach Placement- Town Neck Beach

Rocky intertidal shores on Sandwich beaches provide habitat for macroalgae (sea lettuce *Ulva lactuca,* rockweed *Fucus vesiculous,* red and green filamentous algae, encrusting algae) and marine invertebrates. These species are found in small scattered

patches within the rocky habitat. There are numerous common periwinkle (*Littorina littorea*) snails, common slipper shells (*Crepidula*), crabs, and barnacles (*Balanus* sp) inhabiting these areas. The rocky habitat also provides protection and food sources for larger marine organisms such as crabs, lobsters, fish species, and various bird species such as the purple sandpiper (*Calidris maritima*).

Historically, surf clams (*Spisula solida*) were commercially harvested in the deeper waters north of Town Neck Beach along the 20 foot depth contours (Town of Sandwich Shellfish Constable). However, this ended in the early 1980s and there has been no significant harvesting since that time. The State GIS shellfish suitability maps show some potential blue mussel (*Mytilus edulis*) and surf clam habitat adjacent to the project area (see Figure 7). However, a shellfish survey conducted by the town of Sandwich (September 30- October 10, 2014) found no shellfish in the proposed project area. A few small sets of blue mussels were found on the boulders along the groin areas, but overall it was concluded that most of the habitat within the project area was not conductive for shellfish settlement (letter to Town from WHG, 2014, Appendix E). There are a few mussel clusters found on the cobble/boulders within the intertidal area with but of the few sets observed, many of the individuals were dead (personal observation, Sept 2014).

Any horseshoe crabs that travel into the Cape Cod Canal to reach their spawning sites will not be impacted by the proposed project since no dredging activities will occur during the spawning season. Even if dredging did occur when the horseshoe crabs were present it is unlikely that they would be buried into the bottom sediments due to the strong currents within the Canal.

Fish species are the same as those found in the eastern end of the canal (see Section 5.2.1). Also see the essential fish habitat discussion in Section 5.3 and Appendix F for additional information on fish species that may in the area.

Eelgrass (Zostera marina) has been mapped adjacent to the south jetty of the Canal since 1995. Small patches of eelgrass have also been identified seaward of the placement area. Eelgrass provides an important habitat for marine organisms. Eelgrass beds are highly productive components of the marine/estuarine environment. It is a grass-like flowering plant that propagates both by vegetative growth (spreading rhizomes), and by seed germination. Primarily a perennial plant, eelgrass may grow as an annual in areas of high scour, freezing and other stressful conditions (Thayer et al., 1984). Eelgrass characteristics are as follows; a high rate of leaf growth; the leaves of which support large numbers of ephiphytes, which are grazed extensively upon and may be of comparable biomass to the leaves themselves; leaves which produce large quantities of organic material (detritus) for export and shoots that retard or slow currents which enhance sediment stability and increase the accumulation of organic and inorganic material; roots that bind sediment, reduce erosion and preserve sediment microflora; plants and detritus production that influence nutrient cycling between sediments and overlying waters which stabilize intertidal and subtidal habitat, thereby decreasing shoreline erosion and cycle essential nutrients (Thayer, et al., 1984).



**Figure 7.** Cape Cod Bay end of the Canal with state mapped potential shellfish habitat identified.

Eelgrass blades can die in the fall however, the roots and rhizomes remain dormant through the winter. The diversity of organisms and overall abundance of both species and individuals is higher in eelgrass meadows than in adjacent unvegetated areas (Thayer, *et al.*, 1984; Heck, *et al.*, 1989; Hughes, *et al.*, 2002). Eelgrass can successfully dominate areas that have sediments ranging from soft mud to coarse sand with average salinities of 10 to 30 parts per thousand (ppt) (Thayer, *et al.*, 1984). Light availability is a primary factor limiting both depth and upstream estuary penetration of eelgrass within its temperature and salinity ranges (Thayer, *et al.*, 1984).

Eelgrass beds are known to play a nursery role for several commercially important fish species, although the nursery function is less obvious than in previously studied mid-Atlantic eelgrass meadows (Heck, *et al.* 1989). In general they provide a refuge for fish and invertebrates that retreat from exposed intertidal flats and estuarine marshes at low tide, and serving as a spawning and nursery area for numerous species of aquatic animals. Female Atlantic silversides lay their eggs at the base of eelgrass blades. Male nine-spine sticklebacks construct their nests and rear young among eelgrass blades. Juvenile cod use eelgrass as a refuge from predators, the blades are useful when the stem density is great enough ( $\geq$ 720stems/m<sup>2</sup>) (Gotceitas *et al.*, 1997) or more often use rocks, shells and other debris within the bed as shelter (Tupper and Boutilier, 1995). Other juvenile fish, including herring, mummichogs and rainbow smelt, also seek refuge there. Large game fish like striped bass and blue fish swim through to feed on these small fish.

Eelgrass has been mapped in the water adjacent to Town Neck Beach near the Canal south jetty since 1995. The town of Sandwich conducted an eelgrass survey of the subtidal habitat (WHG, October 2014). A tidal pool area has formed near the western edge of the project area within the hooked spit. Within this tidal pool, which is protected from wave energy, an eelgrass bed (0.045 acres) extends approximately 100 feet along the western edge in water depths ranging from 2 to 4 feet (Figures 4 and 8A). Attached macroalgae (*Fucus*) is also found within the pool. Some small eelgrass patches were also identified on the eastern end of the project in subtidal waters seaward of the groin area. Eelgrass was also found growing in the sand patches between the rocks. Most of these patches were very sparse having only several blades over several inches of bottom. The center of the two larger patches (see Figure 8B), which are one to two feet in diameter, are plotted on Figure 4 (the areas marked do not show the extent of the eelgrass). All identified eelgrass is seaward of any sand placement and would not be directly impacted by the disposal of sandy dredged material.

Harbor seals (*Phoca vitulina*) may be found sitting on the large rocks seaward of mean lower low water at low tide.



**Figure 8.** A. Eelgrass in the tidepool created by the spit. B. The largest patch of eelgrass seaward of the most eastern groin of the project.

### 5.3 Essential Fish Habitat

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act and amended by the Sustainable Fisheries Act of 1996, an Essential Fish Habitat (EFH) consultation is necessary for this project. EFH is broadly defined as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." The Cape Cod Canal, Town Neck Beach, and Cape Cod Canal Disposal Site all fall into this category and thus have the potential to provide habitat for fish species in the area (see Appendix F).

As stated in NMFS EFH designations (http://www.nero.noaa.gov/ro/doc/ newefh.html), the dredge areas fall within two different 10' X 10' square areas bounded by coordinates, and 70° 20.0' W and 41° 40.0' N, and 70° 40.0' W, 41° 50.0' N. The placement/disposal sites are also within the same square as the most western end of the canal.

Twenty-seven federally managed species have the potential to occur within the project areas. These include: Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), pollock, (*Pollachius virens*), whiting (*Merluccius bilinearis*), red hake (*Urophycis chuss*), white hake (*Urophycis tenuis*), winter flounder (*Pseudopleuronectes americanus*), yellowtail flounder (*Pleuronectes ferruginea*), windowpane flounder (Scopthalmus aquosus), American plaice (*Hippoglossoides platessoides*), ocean pout (Macrozoarces americanus), Atlantic halibut (*Hippoglossus hippoglossus*), Atlantic sea scallop (Placopecten magellanicus), Atlantic sea herring (*Clupea harengus*), monkfish (*Lophius americanus*), bluefish (*Pomatomus saltatrix*), long finned squid (*Loligo pealei*), short finned squid (*Illex illecebrosus*), Atlantic butterfish (*Peprilus triacanthus*), Atlantic mackerel (*Scomber scombrus*), summer flounder (*Peprilus triacanthus*), scup (*Stenotomus chrysops*), black sea bass (*Centropristus striata*), spiny dogfish (*Squalus*)

acanthias), bluefin tuna (*Thunnus thynnus*), little skate (*Leucoraja erinacea*), and winter skate (*Leucoraja ocellata*).

## 5.4 Threatened and Endangered Species and Species of Concern

The National Marine Fisheries Service has indicated seasonal movements of the endangered right whale, *Balaena glacialis*; the endangered Kemp's ridley turtle, *Lepidochelys kempi* and the threatened loggerhead turtle, *Caretta caretta* occur within Cape Cod Bay and as result may be present in the project area at certain times of the year. Also critical habitat for the right whale includes Cape Cod Bay. Previous coordination with the National Marine Fisheries Service has indicated that the migratory routes of these species can include areas in Buzzards Bay as well. In addition, other threatened and endangered whale and turtle species have been observed in these areas, i.e. humpback whales (*Megaptera novaeangliae*), finback whales, (*Balaenoptera physalus*), sei whale, (*Balaenoptera borealis*), leatherback sea turtles (*Dermochelys coriacea*), and green sea turtles (*Chelonia mydas*). Also the threatened/endangered Atlantic sturgeon (*Acipenser oxyrinchus*) may be in the project areas.

The US Fish and Wildlife Service (USFWS) indicated that Bird Island is an important nesting location for the Federally-endangered roseate tern (*Sterna dougallii*). Bird Island is located approximately 1 nautical mile west of the Cleveland Ledge Channel. Piping plovers (*Charadrius melodus*) are a federally listed threatened species that nests in open, sandy beaches close to the dunes and are recorded as nested on Sandwich, MA beaches. The red knot (*Calidris canutus rufa*) is listed as threatened and migrating birds may stop in nearby areas during migrations.

Also the USFWS website (<u>http://www.fws.gov/newengland/pdfs/</u>MA%20species %20by%20town.pdf) lists the sandplain gerardia (*Agalinis acuta*) plant found in open areas with sandy soils of the town of Sandwich. The plant is typically found in cemeteries with dry grasslands, so it would not be found in the project areas.

The State of Massachusetts lists the least tern as a species of special concern. It breeds along coastal and freshwater habitats of North America from Maine to Florida on dry, exposed unvegetated areas on sandbars, or beaches in areas between the drift line and upland. It is recorded as nesting on beaches in Sandwich, MA.

### 5.5 Historical and Archaeological Resources

### 5.5.1 Ocean Areas

Shipwreck files at New England District were reviewed for the existence of potentially significant cultural resources within the study area. Approximately twenty-three (23) wrecks of various types, sizes, and time periods were noted for the Cape Cod Canal, Cape Cod Bay, and Buzzards Bay vicinity. These shipwrecks are listed below:

1. Escort - Oil Screw - Lost 1945 cause unknown- Buzzards Bay, Dumpling Rock Light

2. Gov. Prence - Oil Screw - Built 1917 - Burned 1929 Cape Cod Canal

- 3. Helen G. King Schooner Built 1867 Stranded 1916 Cape Cod Canal
- 4. Lawrence Murdock Schooner Built 1882 Foundered 1924 Buzzards Bay, MA
- 5. Lizzie W. Hannum Schooner Lost 1895 Great Ledge, Buzzards Bay
- 6. Mathew S. Greer Schooner Built 1910 Stranded 1929 Buzzards Bay
- 7. Miss Pt. Judith Oil Screw Built 1959 Collided 1961 Buzzards Bay entrance
- 8. Nahant Barge Burned 1952 Cape Cod Canal
- 9. Oakwoods Schooner Built 1880 Collided 1919 w/American sub Cape Cod Canal
- 10. O'Keefe V Oil Screw Built 1953 Burned 1966 Buzzards Bay Light Tower
- 11. Peter Howard Barge Built 1918 Stranded 1922 Scusset Breakwater, Sandwich
- 12. Potomac Barge Lost 1909 cause unknown, South of Cape Cod Canal, MA
- 13. Pottstown Barge Built 1917 Foundered 1944 Cape Cod Canal breakwater
- 14. Radnor Schooner Built 1895 Stranded 1921 Entrance to Cape Cod Canal
- 15. Ruth and Margaret Built 1915 Foundered 1948, Middle Ground, Buzzards Bay
- 16. S.S. Seranbon Schooner Lost 1894 cause unknown, Mishaum Point, Buzzards Bay
- 17. Seven-Oh-Two Schooner Lost 1932 cause unknown, Scusset Breakwater, MA
- 18. Sherwood Barge Built 1919 Stranded 1947, Wilkes Ledge, Buzzards Bay
- 19. Stephen R. Jones Steam screw Built 1915 Stranded 1942, Cape Cod Canal
- 20. Tohickon Schooner Barge Built 1913 Stranded 1932, Buzzards Bay
- 21. USS Yankee Cruiser Lost 1908 cause unknown, Phinney Rock, Buzzards Bay
- 22. Vale Riyal Barge Built 1914 Stranded 1942, Cape Cod Canal, Sandwich, MA
- 23. William Chisholm Steam screw Built 1884 Stranded 1916, Cape Cod Canal

#### 5.5.2 Land Areas

The archaeological record for the upper Cape region comes from a number of sources. Avocational collectors identified many of the known sites in the area, some during the first half of the twentieth century. Cultural resource management (CRM) surveys have added to the information available on pre-contact land use patterns in the region, and have provided data on sites in diverse environmental settings. Within the vicinity of the Cape Cod Canal, Town Neck, and Spring Hill beaches, surveys have been conducted along road and utility easements, residential and commercial developments, and at the former Camp Edwards (now Joint Base Cape Cod).

The database for the mid Cape and especially the upper Cape, however, is much less complete than that for the lower Cape. The upper Cape continues to be the least studied portion of the Cape, although the extant information indicates that it was intensively utilized by pre-contact peoples.

The earliest pre-contact sites from the PaleoIndian Period (12,000 - 10,000 B.P.) have not been positively identified on Cape Cod. This can be partially explained by the loss of the early Holocene (post glacial) shoreline and associated sites due to rising sea levels. Many coastal sites dating to the early pre-contact period may be submerged or eroded by marine inundation and wave activity. Evidence of *in situ* Early Archaic Period (10,000 - 7,500 B.P.) sites are also relatively rare as the environmental landscapes continued to change and the sea levels continued to rise. Sites from the Middle Archaic Period (7,500 - 5,000 B.P.) to the Contact Period (1500 - 1650 A.D.) are much more apparent in the pre-contact record. This is no doubt due to the stabilization of erosion

and inundation, as well as the recognition of particular landscapes as being archaeologically sensitive for certain sites.

Pre-contact sites have been identified in the vicinity of the eastern end of the canal, but are located further north (Buttermilk Bay area) and south (Pocasset/Cataumet area). The distribution of known sites should not be considered representative of precontact activity in the area, as most were identified by collectors and CRM surveys. It is likely that the entire Manomet River area could have been used by pre-contact populations. Sites identified in the area include a rockshelter, shell middens, lithic workshops, the Canal Village Site of Manomet, the Great Herring Pond Site, several burials and an ossuary. Any unidentified pre-contact sites present on or near Town Neck and Spring Hill beaches would likely be shell middens. Shell middens usually contain dense deposits of shell, usually quahog, but also, lithic debitage, projectile debitage, remnants of cooking vessels made of steatite or ceramics and sometimes burials.

The historic site potential in the general area of the Canal was considered to have been high prior to canal construction due to the presence of known Native American settlements and early European explorers and settlers. It is highly likely that most of the Native American and early European settlements were situated in close proximity to the shores of the Manomet and Scusset rivers. Impacts associated with the different phases of construction are likely to have destroyed most of these historic or post-contact sites.

Cape Cod was one of the first areas to be explored and settled by Europeans and as a result contemporary accounts record Native American settlements as well as interactions with European traders, explorers and settlers. In western Cape Cod, in proximity to the Canal, there was the reported Manomet Indian village of Comassakumkit, with other settlements near the Herring River and Pond, along the coast at Sandy Neck, and along the Manomet River. Europeans observed Native Americans in their seasonal moves to exploit available resources, including portage over the narrow isthmus between the Manomet and Scusset Rivers. The importance of trade prompted the building of the Aptuxcet Trading Post in Bourne in 1627. Native Americans and European settlers also shared resources such as a log weir along the Herring River. It is likely that many if not all of the fragile seventeenth to eighteenth century sites in this vicinity have been damaged or destroyed by canal, commercial, or residential development.

Later potential eighteenth and nineteenth sites are likely to reflect the development of the villages located in Bourne and Sandwich and the economic pursuits of the settlers. Likely historic period sites at Town Neck and Spring Hill beaches would be salt and bog iron works, earlier homesteads or farmsteads, and/or a small village center.
#### 5.6 Air Quality and Noise

Ambient air quality is protected by Federal and state regulations. The U.S. Environmental Protection Agency (EPA) has developed National Ambient Air Quality Standards (NAAQS) for certain air pollutants, with the NAAQS setting concentration limits that determine the attainment status for each criteria pollutant. The six criteria air pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead.

The Commonwealth of Massachusetts used to be designated as a nonattainment area for ozone as part of the Northeast Ozone Transport Region which extended northeast from Maryland and includes all six New England states. The EPA currently designates only Duke County in Massachusetts as moderate non-attainment area for the 8-hour ozone standard. Barnstable County where the project is located is an attainment area for ozone (U.S. EPA, 2014).

#### 5.7 Socioecononmic Environment

The Cape Cod Canal provides a safe and cost effective route for commercial ships serving New England. Economic resources of New England would more likely be negatively impacted by not maintaining adequate depths within the Canal in order to provide safe vessel passage rather than from maintenance dredging activities. Over 20,000 vessels of all types use the Canal annually. In addition to being a preeminent navigation project, the Cape Cod Canal offers a wide variety of recreational opportunities. Recreation facilities and programs operated by the Corps of Engineers include: a visitors center, interpretive services, parking areas and comfort stations at various access points to facilitate public use of the Canal for fishing, hiking, bicycling, picnicking, ship-watching, and other recreational pursuits such as camping.

The town of Bourne, MA is on the western end of the canal and Sandwich, MA on the eastern end. Since the proposed work involves the maintenance dredging of an existing channel, these towns are not likely to be affected by the dredging activities. The towns adjacent to the canal are essentially communities along a "highway" where there are no "exits".

The town of Sandwich contains primarily suburban residential development, with clusters of commercial and retail development as well as areas of open space. The dredged material will potentially be placed on Town Neck Beach, a public beach in the Town. According to the US Census, in 2010 Sandwich had a population of 20,675, contained 9,476 housing units, and had a median household income of \$82,917 (http://factfinder.census.gov). Based on information from the Massachusetts Division of Career Services, for August 2014 Sandwich had a labor force of 13,761 with 5.4 % unemployment (data not seasonally adjusted) while the state of Massachusetts had an unemployment rate of 6.0 (http://Imi2.detma.org/Imi/Imi\_lur\_b.asp?A=05&GA= 000043&TF=2&Y=&Sopt=&Dopt=TEXT). The sandy sediments are to be used to build

up the dunes and beach berm on Town Neck Beach in front of the homes where there has been a large amount of erosion.

The town of Bourne is a medium-sized rural community at the gateway to Cape Cod. Bourne has numerous quiet harbors and inlets for boating and bathing. Shellfishing is popular in this area. Bourne is a quiet community that does not experience the significant fluctuations in populations during the summer months as found at other Cape communities. According to the US Census, in 2010 Bourne had a population of 19,754, contained 10,805 housing units, and had a median household income of \$61,312. Based on data from the Massachusetts Division of Career Services for August 2014 Bourne had a labor force of 12,633 with 6.3 % unemployment (data not seasonally adjusted) while the state of Massachusetts had an unemployment rate of 6.0 (http://lmi2.detma.org/lmi/lmi\_lur\_b.asp?A=05&GA=000032&TF=2&Y=&Sopt=&Dopt=T EXT).

# **6.0 ENVIRONMENTAL CONSEQUENCES**

## 6.1 Physical and Chemical Environment

#### 6.1.1 No Action Alternative

Under the No Action Alternative the Cape Cod Canal Federal channel would continue to shoal resulting in decreasing water depths. As a result, the channel would become increasingly hazardous to navigate and would eventually prevent safe vessel passage. Also under the No Action Alternative, the town of Sandwich will need to find an alternative sand source for needed nourishment and protection of Town Neck Beach adjacent to the residential areas.

#### 6.1.2 Dredge Sites

The material proposed to be dredged from the Cape Cod Canal shoal areas has been found to be suitable for beach placement and unconfined open water disposal, based upon grain size and lack of spills or known sources of contamination within the canal (see Appendix C). Chemical data generated from the analysis of sediment samples taken from the Cleveland Ledge area of the channel for the previous dredging (2002) event indicated that all the sediments tested were suitable for open water disposal. Therefore, it is expected that no significant impacts to water quality would occur as a result of dredging activities.

Dredging operations have the potential to temporarily increase turbidity in the project area. The extent and duration of these impacts are a function of the type of material to be dredged, the type of equipment used and the hydrologic regime of the dredging and disposal area. Turbidity impacts primarily affect the performance of visual predators such as fish and birds, the primary production of phytoplankton, growth and survival of benthic organisms (Karel, 1999), and impact other sensitive receptors (e.g. gill abrasion) on the organisms (Kurland *et al.*, 1994). Turbidity can alter light regimes (reduce light) which has the potential to impact primary production, species distribution,

behavior, feeding ability and movements of fish especially larval fish (Berry *et al.*, 2003). However, areas with increased turbidity are not always detrimental. The distribution of several species of juvenile marine fish common in estuaries was influenced by water turbidity (Cyrus and Blader, 1987). Some species prefer more turbid waters, possibly as protection from predators. In terms of dredging, the increases in turbidity over background are short-term (hours, days to months), but are usually not continuous due to project scheduling, dredge type or tidal regimes (based on data from water quality monitoring of dredging fine (silty/clayey) sediments from the Boston Harbor Navigation Improvement Project (ENSR, 2002) and Providence River and Harbor Maintenance Dredging Project (USACE, 2003)).

Coastal and estuarine organisms are exposed to suspended sediments from tidal flows, currents and naturally occurring storm events; therefore they have adaptive behavioral and physiological mechanisms for dealing with this feature of the habitat. Dredging related suspended sediments or turbidity plumes may differ in scope, timing, duration, and intensity from natural conditions (Clarke and Wilber, 2000). Major storms can displace larger amounts of sediments than dredging operations, and tend to occur one to three times a year. This is more frequent than most dredging operations at a particular area and dredging affects much smaller regions (i.e. a localization of impacts) than these major storms (Wilber and Clarke, 2001). The duration and concentration gradients of suspended sediment plumes from dredging are dependent on numerous factors, such as specific dredge plant, sediment characteristics, and environmental conditions (Collins, 1995).

However, the turbidity effects for this project are anticipated to be short-term and localized around the dredging area due to the sandy nature of the material to be removed from the Canal. Re-suspension of fine–grained material is usually restricted to the vicinity of the operation and decreases rapidly with increasing distance from the operation. The majority of resuspended sediments from a hopper dredge are due to overflow of the hoppers into surrounding waters. A hopper dredge without overflow could suspend 25-200 mg/l of silty sediments within 100 to 400 feet downcurrent of the dredge (Hayes, 1986). With overflow, these amounts increase to 250-700 mg/l within 100 to 400 feet downcurrent of the dredge (Hayes, 1986). Since the dredged material from the canal is sand, with low silt content, very little turbidity is expected. Although a much smaller hopper dredge than proposed for this project, when dredging sandy sediments with the dredge *Currituck*, suspended sediments levels above 150mg/l were only found within small volumes of the central portions of the plumes and concentrations above 50 mg/l were generally confined to within 300 feet of the active overflow (draft report Clarke *et al*).

The shoal areas of the canal typically involve high energy environments that are subject to wind and wave action, tidal influence, coastal storm events and heavy vessel traffic to which the benthic community has had to adapt. Organisms inhabiting these types of areas are highly capable of adapting to frequent disruptions (Miller *et al.*, 2002). Also, sandy material is generally not associated with high levels organic carbon, and dredging the sandy material from the canal is not likely to result in the release of nutrients or decreases in dissolved oxygen.

#### 6.1.3 Placement/Disposal Sites

#### 6.1.3.1 Cape Cod Canal Disposal Site

The Cape Cod Canal Disposal Site (Figure 3) is a previously used open water disposal site. The material proposed to be dredged from the canal and disposed at the CCCDS is clean sand and similar to that of previous canal maintenance operations. Turbidity impacts to the water column should be short-term and of limited impact given the sandy nature of the material. There are three distinct phases when dredged material is released from a hopper or scow and descends through the water column as a dense fluid-like jet (Truitt, 1986). The three physical phases are 1) convective descent, 2) dynamic collapse, and 3) long-term or passive diffusion. Truitt (1986) concluded from an analysis of several studies concluding that the short-term impacts resulting from suspended sediment are confined to a well-defined layer near the bottom.

#### 6.1.3.2 Town Neck Beach Placement

The clean sand to be placed on Town Neck Beach is compatible with the existing beach substrates of the gravel and sand. There are no fines (silt/clay) in the Canal sediments so runoff from any of the material placed on the beach should have minimal impacts on nearshore water quality given the sandy nature of the material. Any suspended sandy sediment would rapidly settle out of the water column. Any increase in turbidity as a result of these processes would be expected to be of relatively short duration and limited to the surf zone and adjacent nearshore areas. Given the nature of these clean sandy sediments which are not associated with high levels of organic carbon, there will be no release of nutrients or decreases in dissolved oxygen levels.

The project will place approximately 150,000 cy of material over about 15.49 acres on Town Neck Beach (see Figures 9A and B). In order to protect the homes and maintain the newly placed sand on the beach, the dune system will be built up to an elevation of 21.3 to 26.3 feet high and 20 feet wide with a slope of 5 horizontal to 1 vertical to the beach berm. The dunes will grow from an area of 0.56 acres to 5.27 acres by placing approximately 62,300 cy of material to renourish the dunes. The footprint of the beach berm between the toe of the dunes and mean high water (MHW) will increase by 0.66 acres and the MHW line will be moved seaward about 50 feet at the western end of the project to about 150 feet at the eastern end of the project covering approximately 5.36 acres of intertidal habitat. The mean lower low water (MLLW) line will only move in two sections of the project. It moves seaward approximately 100 ft for about 200 ft west of the fourth groin from the western end (1300-1500 ft into the project) and about 150 ft for the last 500 ft of the eastern end of the project. This will convert approximately 1.82 acres of subtidal habitat to intertidal habitat. The intertidal area will initially decrease from 7.88 acres to 4.34 acres, but this area is expected to increase as the beach equalizes and erodes. See Table 3 for a summary of the volumes and areas of the various habitats that are anticipated to be impacted by the project. The proposed project will create a beach similar to that previously existing in 1952.

Habitat	Current Conditions	After Project Conditions		Habitat Changes	Area
	(Acres)	(Acres)	(cy)		(Acres)
Dunes	0.564	5.27	65,600	Berm to dunes	4.706
Toe of Dunes to MHW	4.84	5.5	57,760	Intertidal to beach supratidal)	5.36
Intertidal	7.88	4.34	27,820	Subtidal to Intertidal	1.82
Subtidal	2.21	0.382	670		

**Table 3**: Changes to Town Neck Beach habitats due to sand placement.

The gravel/small cobble beach berm (0.668 acres) on the western end of the project will be covered by sand, and approximately 5 % (0.374 acres) of intertidal gravel/small cobble will also be covered by sand placement. Currently there are 7.11 acres of gravel/small cobble habitat in the intertidal habitat some of which is forming the spit and 5.32 acres in the subtidal habitat.

On and adjacent to the placement site on Town Neck Beach there is intertidal rock habitat. Many of the cobbles within the rocky intertidal area have been exposed due to erosion of the sand that originally covered the material. A small area of boulders (0.219 acre) is found on the gravel beach on the westernmost end of the placement site. Within the previously mapped intertidal rock area, only 3.47 acres of the 5.28 acres mapped from the center of the project was found to be intertidal rocky habitat. Previous mapping showed 0.292 acre of intertidal rock habitat on the eastern side of the project but erosion now has exposed 3.28 acres of intertidal rock. Placement of 150,000 cy of material on Town Neck Beach will directly impact most of the newly exposed rock (2.947 acres) on the eastern end, but not the small area previously mapped. Approximately 40% of the boulder area on the western end will be directly impacted (0.219 acres). In the central area about 53% of the intertidal rock (1.845 acres) will be directly impacted. As the beach equalizes sediments will move into the adjacent rocky areas by natural wave motion and as erosion occurs due to storm events additional movement will occur. Any sand placed directly into the intertidal zone should stay within the nearshore environment and any transport from the area should follow that of the local sand transport regime. Due to headland features identified by Lidar and historical aerial images of the area adjacent to the beach, best professional judgment by USACE coastal engineer predicts that only a thin layer of sand would impact the adjacent nearshore rocky habitat and that it would erode rapidly.



Figure 9A. Plan of western half proposed placement on Town Neck Beach, Sandwich, MA, with resources mapped.



Figure 9B. Plan of eastern half of proposed placement on Town Neck Beach, Sandwich, MA with resources mapped.

The gravel/small cobble beach berm (0.668 acres) on the western end of the project will be covered by sand, and approximately 5 % (0.374 acres) of intertidal gravel/small cobble will also be covered by sand placement. Currently there are 7.11 acres of gravel/small cobble habitat in the intertidal habitat some of which is forming the spit and 5.32 acres in the subtidal habitat.

On and adjacent to the placement site on Town Neck Beach there is intertidal rock habitat. Many of the cobbles within the rocky intertidal area have been exposed due to erosion of the sand that originally covered the material. A small area of boulders (0.219 acre) is found on the gravel beach on the westernmost end of the placement site. Within the previously mapped intertidal rock area, only 3.47 acres of the 5.28 acres mapped from the center of the project was found to be intertidal rocky habitat. Previous mapping showed 0.292 acre of intertidal rock habitat on the eastern side of the project but erosion now has exposed 3.28 acres of intertidal rock. Placement of 150,000 cy of material on Town Neck Beach will directly impact most of the newly exposed rock (2.947 acres) on the eastern end, but not the small area previously mapped. Approximately 40% of the boulder area on the western end will be directly impacted (0.219 acres). In the central area about 53% of the intertidal rock (1.845 acres) will be directly impacted. As the beach equalizes sediments will move into the adjacent rocky areas by natural wave motion and as erosion occurs due to storm events additional movement will occur. Any sand placed directly into the intertidal zone should stay within the nearshore environment and any transport from the area should follow that of the local sand transport regime. Due to headland features identified by Lidar and historical aerial images of the area adjacent to the beach, best professional judgment by USACE coastal engineer predicts that only a thin layer of sand would impact the adjacent nearshore rocky habitat and that it would erode rapidly.

Also, after the initial disposal the coloration of the sand may not match the sand that is currently on the beach but it is expected that the material will bleach out and assume a similar appearance over time.

The Atlantic States Marine Fisheries Commission (2002) report on beach nourishment summarized physical changes to nourished beaches, these changes include: more compacted sand, increased shear resistance, altered dry density, change in moisture content, different grain size and shape, silt/clay composition changes, and altered placement of sand grains through the nourished area. Other physical changes can occur from beach bulldozing. Beach nourishment has the potential to alter sedimentology, compaction, and the nature of sands along the primary dunes, since wind typically forms the dunes by transporting the finer faction of beach sediments to build the dune system. Artificially created dunes by mechanical means such as bulldozer may contain sediment that is more poorly sorted and has a higher percentage of coarse sands and gravel-sized particles than naturally formed dunes (Lindquist and Manning, 2001). The dunes on Town Neck Beach have been eroded so they will be mechanically recreated and then planted with dune grass the following growing season. The sand will be pumped onto the beach and then distributed throughout the beach and dunes by a bulldozer. The beach profile will not be steepened as often happens on bulldozed beaches (ASMFC, 2002), but will be designed to a specific profile (1:10) to mean lower low water and then will be graded by natural processes to obtain equilibrium.

#### 6.2 Biological Environment

#### 6.2.1 No Action Alternative

The No Action Alternative would allow the sediments to continue to build up in shoaled areas within the Cape Cod Canal Federal channel. These shoals form as sand waves and organisms inhabiting the shoal areas would have to cope with disturbances such as sediment resuspension caused by boat traffic and storm event impacts on a regular basis. Also under the No Action Alternative, the town of Sandwich beaches will continue to erode creating additional rocky habitat at the expense of sandy habitat, thereby eliminating the organisms that live in the sandy sediments while attracting those better suited for the rocky environments.

#### 6.2.2 Dredge Sites

Dredging operations from the proposed maintenance dredging are not likely to have a significant impact on the biological resources of the area. Dredging would impact the existing benthic invertebrate community in dredged areas resulting in most sedentary organisms being killed. Most motile organisms, such as crabs and finfish, would likely have the ability to avoid the dredge and move from the area of impact. Recolonization of the dredged areas should take place within a short period of time by organisms in the surrounding areas and from seasonal recruitment. The post-dredging community should closely resemble the existing community since there will be no change in sediment structure. Newell et al. (2004) provided a time sequence of recovery of macrofauna in coastal marine deposits in an area of high energy after cessation of dredging activities. Initial colonization of small mobile species and larval recolonization was seen in as little as 7 days, but it took about 100 days for species diversity to be restored within 70-80% of that occurring in surrounding areas. At about 175 days, population density is restored to 60-80% of that in surrounding area. Restoration by growth of individuals or biomass takes about 2 to 3 years. The level of recolonization in the shoal areas of the canal will be dependent on how often dredging activities occur in the area. Frequent periodic dredging may prevent the development of stable long term communities found in the surrounding environments. However, these areas by their very nature are high energy unstable environments and as a result do not promote stable long-term benthic communities regardless of project activities, but a return to current pre-dredging conditions is expected for the canal.

Because the material to be dredged is sand, with extremely low silt content, only a localized area in the vicinity of the dredge site is likely to be impacted by elevated concentrations of suspended sediments, or sedimentation. The effects of increased suspended sediments on fish has been studied for more than 30 years, but currently most of the data concerning fish responses to suspended sediment doses is based on salmonoid fish and less is known about estuarine fish. In general the concerns with increased suspended sediments include reduced egg and larval survival due to physical damage to the eggs through abrasion or adherence of silt, altered breeding behavior, reduced feeding efficiency, reduced growth rates, and interference with respiration (Bruton, 1985). Originally researchers only looked at the effects of exposure concentration. Newcombe and MacDonald (1991) recognized the importance of duration of exposure as well as concentration of exposure in determining the effects of suspended sediments on fish and invertebrates. Newcombe and Jensen (1996) generated tables where the biological response can be inferred from concentration and duration of suspended sediments. General reviews of the biological effects of suspended sediments on fish and shellfish (Wilber and Clarke, 2001) as well as corals and aquatic plants (Berry *et al.*, 2003) have also been completed. After consolidating the available information, generalizations are difficult to make because biological response to increased suspended sediments varies with species and sediment characteristics.

In general for non-salmonid estuarine fish, the eggs and larvae exhibit some of the most sensitive responses to suspended sediment exposures for all taxa with available data (Wilber and Clarke, 2001). Durations of egg exposure would differ depending on the egg form; demersal adhesive eggs would have longer exposure to sediment plumes caused by dredging than semi-buoyant or pelagic eggs. Atlantic herring eggs were found to have earlier hatching and shorter hatching lengths when exposed to high concentrations of suspended sediments (Messieh *et al.*, 1981). Behaviors of fish when exposed to increased levels of suspended sediments varied due to different foraging strategies for different species. Colby and Hoss (2004) found that prey availability interacts with total suspended sediment concentrations to affect fish feeding success on a species by species basis. See Wilber and Clarke (2001) for more details of sublethal and lethal effects from suspended sediments.

Finfish also have the ability to leave the area of disturbance. It is also expected that any larger motile organisms will temporarily move away from the area. The anadromous fish, alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*), called river herring migrate upstream to spawn during the late winter through spring. The Bourndale Herring Run provides safe passage for the river herring between the Cape Cod Canal in Bourne, MA and Great Herring Pond in Bourne and Plymouth, MA. In order to minimize any potential impacts to fish using this herring run, dredging will not occur within 500 yards of the mouth of the Herring River, formerly known as the Monument River, between March 15 and July 30, the time of highest migration.

Submerged aquatic vegetation (SAV) can be impacted by suspended sediments due to the changes in underwater light penetration needed for photosynthesis. These effects may be difficult to separate from those associated with deposition of the sediments on the SAV (Germano and Cary, 2005). Although eelgrass does grow in the area of the Hog Island section of the channel (Buzzards Bay side of the canal), the eelgrass is approximately 100 feet away from the channel and associated side slope according to the MA GIS eelgrass maps. See Figure 6 for State generated map of

eelgrass. Any increase in suspended sediment concentrations resulting from dredging activities will be short-lived and would not alter light penetration over periods long enough to impact photosynthesis.

## 6.2.3 Placement/Disposal Areas

Placement or disposal of dredged material from the Cape Cod Canal has the potential to cause mortality to the existing benthic invertebrate community through burial by deposited sediments. It is possible that some burrowing organisms may survive these conditions by burrowing through the sediments given sufficient time between disposal events. Studies have shown that organisms such as the nut clam can successfully emerge from 20 inches of burial providing the deposited sediments are similar to the pre-existing sediments (Kranz, 1974). Although some organisms may be killed by direct burial (typically soft-bodied species), the affected area is usually recolonized rapidly through recruitment from adjacent areas. Therefore, any temporary reduction in invertebrate abundance and diversity at the sites would not be considered a significant long-term impact. Benthic organisms are used as a food source for finfish and other invertebrates, therefore short-term localized changes to benthic prey might occur. Turbidity impacts to the water column as a result of disposal activities would be short-lived and not significant given the sandy nature of the material.

## 6.2.3.1 Cape Cod Canal Disposal Area

The Cape Cod Canal Disposal Site is 1 nautical mile in diameter. Disposal of dredged material at a specified buoy in the disposal site will confine the impacts of disposal to a particular area of the site. Therefore impacts would be limited to a specific area only affecting a limited percentage of the benthic population and fish and other motile invertebrates that feed on the benthos within the disposal site. Sea stars, some scallops, and crabs may be buried by the disposal events along with the polychaetes and other benthos, but some of the motile individuals may be able to escape burial.

Any impacts from localized turbidity and sedimentation as a result of disposal activities would be similar to that at the dredge area. Finfish that cannot avoid the disposal area may be impacted, but most juveniles and adults would be expected to have the ability to move away from any disturbances. Bivalve larvae exposed to high concentrations of suspended sediments for durations of 10 days or more had negative effects, but lower concentrations (actual values depend on the species) resulted in increased growth (Wilber and Clarke, 2001). Adult bivalves are tolerant of suspended sediments, but sublethal effects such as reduced pumping rates and growth can be realized with concentrations seen under natural conditions such as storm related events. Scallops can be found at the CCCDS, but previous sampling did not reveal any evidence of significant aggregations. Scallop eggs are demersal and cling to the bottom sediments (heavier than seawater) and as a result may be impacted by burial. The larvae are planktonic (float in the water column), so they could be negatively impacted by abrasion during disposal events. Young juvenile scallops attach themselves to shells and bottom debris by byssal threads, any young juveniles in the area of disposal may

be buried. Older juveniles and adults can swim and therefore have the potential to leave the area of impact before burial. While no aggregations of scallops have been found during the USACE sampling, areas of CCCDS may be used by scallop fishermen, but no specific area has been identified (pers. com. Massachusetts Division of Marine Fisheries, Vincent Malkoski). Disposal events could be placed to avoid direct burial of any scallop beds if they are identified. Scallop dredging itself has a negative impact on the benthic environment similar to that of maintenance dredging (Thrush *et al.*, 1995)

The impacts from suspended sediments have not been studied as intensively in crustaceans as fish and bivalves, but those tested exhibited detrimental responses only at dosages of suspended sediments that would be much higher than those expected from dredging projects (Wilber and Clarke, 2001).

#### 6.2.3.2 Town Neck Beach Placement Site

Benthic organisms living in the sediments of the beach or the nearshore areas may be impacted during the placement process by being buried by the addition of sand. Settling of suspended sediments may indirectly impact any benthic organisms in adjacent areas. Benthic organisms inhabiting intertidal and surf zone areas are well adapted to and tolerant of considerable changes in their environment (Naqvi and Pullen, 1982). Mobile organisms living on the surface sediments would be displaced. As the beach has been eroding rapidly the past few years and changing from sand to gravel, the benthic habitat is already in a state of disturbance. However, once the placement activities are completed, the area would be recolonized in a short time by recruitment of opportunistic species and by organisms living in adjacent areas.

Within the intertidal area approximately 5.0 acres of rocky habitat will be covered by sand to some extent. Currently the rocky substrate provides crevices for organisms to hide and attachment sites for macroalgae, encrusting algae and sponges, barnacles, and other invertebrates. These organisms provide a food source for terrestrial animals at low tide and fish at high tide. Much of the macroalgae (*Fucus*) is found on the larger rocks so some of habitat created by this plant should survive after the sand placement. As the placed sand is expected to erode over the years following placement, the rocks will once again provide surface for attachment and crevices for hiding as the surrounding sand is transported to another area.

The nearshore environment is more stable than the surf zone or intertidal areas of the beach and typically supports higher abundances of benthic organisms (Vesar, 2004). Impacts to the sandy nearshore environment adjacent to Town Neck Beach will also be temporary and short-term. The material will be transported out into the nearshore environment by wave and current action allowing for a more gradual accumulation of sediments and greater potential for organism to borrow through the sediments. As with the intertidal areas, localized minimally elevated concentrations of suspended sediments are anticipated from the project. The patches of sandy material between the rocks provides habitat for infauna that serves as a food source for larger invertebrates and fish. Rocky habitat is also present within the nearshore environment. The addition of sand has the potential to cover some of the smaller rocks and decrease or eliminate crevice hiding places as sand fills the space between rocks. The areas that have been rocky before the large increase in erosion rates will most likely return to a rocky habitat more rapidly than other areas due to the physical nature of the area. The return of the full resource use may take longer.

Most fish are quite tolerant of short-term exposure to elevated suspended sediment levels (see Stern and Stickle, 1978). Adult finfish can leave the area of disturbance. Recolonization by benthic species from adjacent areas and new recruitment is expected to occur in a relatively short period of time with no long-term negative impacts. Therefore, any temporary reduction in invertebrate abundance and diversity in the nearshore habitat adjacent to the beach is not considered to be significant. Benthic organisms are used as a food source for finfish and other invertebrates, therefore short-term localized changes to benthic prey might occur.

No deleterious impacts to intertidal or nearshore assemblages were identified in beach re-nourishment monitoring studies in New Jersey (USACE, 2001) or North Carolina (Versar, 2004) for sandy areas. Overall beach re-nourishment resulted in short-term declines in abundance, biomass and taxa richness. The response of surf zone fish has been localized attraction (northern Kingfish) or avoidance (bluefish) when pumping sand onto a beach (USACE, 2001) due to the increase in suspended sediments. The highly mobile nature of the fish community constrained the ability to detect impacts and recovery (Versar, 2004), but indicated the fish could move in and out of the areas impacted by re-nourishment activities. As this project will replace some rocky habitat with sandy habitat, there will be a shift of biota in these areas.

Fish such as juvenile Atlantic cod that use rocky substrate with vegetation could be negatively impacted by modifications to these habitats, if they use the intertidal areas. The Massachusetts Department of Marine Fisheries sampled the spatial distribution of age 0 and 1 Atlantic cod from 1978 through 1999. They collected the cod north and south of the project area but their sampling methods restricted access to the shallow depths, the <30 feet samples had a minimum depth of 16 feet and a mean depth of 27 feet (Howe et al., 2002). There is no data on the minimum depth for juvenile cod in Cape Cod Bay. In nearshore environments juvenile age 0 Atlantic cod feed on zooplankton by day and disperse to the bottom for more protective covering at the night and become less active (Grant and Brown, 1998a) showing diurnal activity. Grant and Brown (1998b) found age 0 cod to be localized and not moving more than a few hundred meters within shallow nearshore environments for several weeks after settling from a pelagic habitat and may remain localized during their first winter. Methven and Schneider (1998) found 4-7 meters to be the depth center of distribution for age 0 cod. Juvenile age 1 cod become more nocturnal with feeding on the benthos at night (Grant and Brown, 1998a). Habitat use of structurally complex bottoms containing seagrass, macroalgae, rocks and cobbles tend to be positively correlated with survival for young juvenile Atlantic cod (Tupper and Boutilier, 1995). At night age 0 cod disperse and cease foraging due to increased shoreward movement of 1 to 3 year old juvenile Atlantic cod. Juvenile cod were found to be capable of assessing the risk a predator represents and adjust their response accordingly (Gotceitas et al., 1995; Ryan et al., 2012). See Appendix F for more details on Atlantic cod.

Within the project areas there is limited eelgrass habitat that would provide any cover for juvenile cod and this eelgrass would not be directly impacted by the project, but sand may move through the area as the beach equilibrates. This project will temporarily decrease the amount of intertidal rock in the area and therefore, it will decrease potentially available hiding habitat for juvenile cod. As this habitat is not always available for the young juveniles to utilize as they seek shelter there must be suitable subtidal habitat available otherwise they would not be able to survive in the area. The literature refers to shallow habitat for resting not necessarily intertidal habitat.

Recovery of the intertidal or nearshore environments usually occurs in two to seven months (Nelson, 1993; USACE, 2001). Recovery takes longer if sediments do not match those currently on the beach especially if the new material contains silts or clays (ASMFC, 2002). The actual rate of recovery is also affected by the season of disturbance (Reilly and Bellis, 1983; Versar, 2004). Beaches dominated by organisms recruited from pelagic larval stock (e.g. mole crabs and coquina clams) placement impacts could be drastic, but ephemeral (Reilly and Belllis, 1983). If nourishment occurs during recruitment it might inhibit the recruitment effort. Slower recovery is expected from organisms that spend their entire life history (brood eggs and young) on the beach such as with some *Haustorius* species of amphipods (Reilly and Bellis, 1983). Also, monitoring has identified that some reductions in polychaete species were large natural variations in abundances (Vesar, 2004).

The concerns for this project are the change from rock to sand in the intertidal areas, although the areas were predominately sandy in the past before the sand transport to the area was disrupted. Eelgrass has been found to be growing near the western end of the project within the hook of the sand spit, as it is a protected tide pool area that is always submerged (see Figures 4 and 9A). There will be no direct impacts from beach nourishment, but there is the potential for sand to move into the area by local wave action. The subtidal area is much closer to shore on the western end of the project (see Figures 4 and 9) and seaward of the last groin small patches of eelgrass have been observed growing within the sand areas between the rocks. This eelgrass is sparse compared to that found in the tide pool. There will be no direct impacts from placement on the eelgrass in this area, but once again some indirect impacts may occur due to natural movement of the sediments. The sand may provide additional habitat for eelgrass to establish itself as long as the areas remain protected from the wave energy. Currently eelgrass growth is limited by the availability of suitable substrate in the nearshore environment. The far western end of Town Neck Beach near the Canal jetty contains a bed of eelgrass that has been mapped since 1995 and there will be no impacts to this bed from the proposed project.

Any seals in the water or on rocks in the areas adjacent to the project site would not be impacted by the placement of sand on the beach and in the intertidal zone.

#### 6.3 Essential Fish Habitat

#### 6.3.1 No Action Alternative

The No Action Alternative could have an impact on EFH due to a decrease in habitat depth over time. Overall the shoal areas in the canal are limited due to the strong currents, so it is not expected that any large area of EFH would be impacted by the No Action alternative. At the beach placement site, the No Action Alternative would allow for the continued erosion of sand habitat and more exposure of the rocky habitat.

#### 6.3.2 Dredge Areas and Placement/Disposal Sites

The Canal is covered by two 10' by 10' squares of latitude and longitude and the placement/disposal sites are within the same square as the most western end of the canal. The only difference between the squares is that the more western square includes habitat for Atlantic sea herring eggs and juvenile dogfish.

The Essential Fish Habitat Assessment of the areas to be dredged within the Cape Cod Canal and areas to be impacted by placement of dredged sediments on Town Neck Beach has concluded that there will be no significant impacts to Essential Fish Habitat, as defined by the Magnuson-Stevens Fishery Conservation and Management Act and amended by the Sustainable Fisheries Act of 1996, with this project. "Essential fish habitat" is broadly defined to include "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." Impacts to essential fish habitat from this project include temporary increases in turbidity within the water column and the temporary loss of benthic organisms at the points of dredging and disposal. Return of sandy habitats to areas that have eroded and are now rocky. However, this project is not expected to significantly affect any managed species or habitat. There would be a decrease in rocky intertidal habitat for any fish that use the rocks for cover, but as this habitat is not always available to the fish, the adjacent subtidal habitat provide the same coverage and is still within shallow waters.

Appendix F contains the EFH assessment for potential impacts from both dredging and placement/disposal activities from the Cape Cod Canal maintenance dredging project.

#### 6.4 Threatened and Endangered Species and Species of Concern

#### 6.4.1. Marine Mammals

#### 6.4.1.1 Right Whale (Baleana glacialis)

The endangered right whale has generally been found in Cape Cod Bay during the late winter and early spring. All of Cape Cod Bay has been established a critical habitat for the North Atlantic right whale since 1994. This whale has been most frequently sighted from late February through May with months of peak abundance being March through late April (Coler & Colantonio and Battelle, 1996). In past years, an estimated 25 to 40 right whales, including a few mother/calf pairs and juveniles have entered Cape Cod Bay to feed at some time during the spring (Coler & Colantonio and Battelle, 1996), 199 individuals were recorded as visiting Cape Cod Bay in 2010 (Stamieszkin *et al.*, 2010). Generally these whales leave Cape Cod Bay in April and May and move into the Great South Channel east of Cape Cod (Kenney *et al.*, 1995). Right whales are surface and subsurface feeders skimming copepods and euphausids (small crustaceans) from the water column. Calanoid copepods, specifically *Calanus finmarchicus*, have been found to be one of the primary zooplankton forms consumed by the right whale. These can occur in dense swarms in the waters of Cape Cod Bay in the spring (Mayo and Marx, 1990). Generally right whales move out of the area in the spring, but in years when zooplankton is abundant, some right whales (in particular mother/calf pairs) may remain in the bay for the entire summer.

The Cape Cod Canal Disposal Site which may be used for the proposed dredging project is located only 3 nautical miles from the east entrance to the Cape Cod Canal. This area is relatively shallow (approximately 70 feet deep) compared to the more central waters of Cape Cod Bay (90 - 120 feet deep). Right whales in Cape Cod Bay have generally been found to be most abundant in eastern Cape Cod Bay, particularly south and southeast of Race Point (Coler & Colantonio and Battelle, 1996 and Stamieszkin *et al.*, 2010). These data indicated very few right whale sightings in the proximity of the Cape Cod Canal and the Cape Cod Canal Disposal Site. A right whale may occasionally swim through the canal; on December 3, 2008 the canal was closed to maritime traffic for about 2½ hours as a whale swam from Cape Cod Bay to Buzzards Bay.

Based upon the above information, it is not likely that these mammals will appear in Cape Cod Bay in the vicinity of the dredge or disposal/placement areas, but during the late winter the possibility of right whales being in the vicinity of the disposal area is greater. Although the possibility of vessel interactions with resulting strikes that could injure or kill these mammals is low, during previous coordination, NMFS has requested that a qualified endangered species observer will be present aboard the disposal vessel(s) during daylight hours during the period from January 1 to May 31 of any year if the material is to be placed at CCCDS. Also, vessels operating between the Cape Cod Canal and the CCCDS during this time (January 1 - May 31) should not operate at speeds in excess of 5 knots after sunset, before sunrise, or in daylight conditions where visibility is less than one nautical mile. Also, NMFS has previously requested that the Corps adhere to all other requirements included in the special permit conditions developed between NMFS and the Corps for disposal at Massachusetts Bay Disposal Site.

The proposed dredging of the canal will include the removal of approximately 150,000 cubic yards of material. The material will be placed on Town Neck Beach or at the Cape Cod Canal Disposal Site. This material is primarily sand and gravel, with very little fines and as a result has been determined to be suitable for beach and open water disposal. Sandy material is generally not associated with high levels of organic carbon, and dredging of sandy material is not likely to result in the release of nutrients or

decreases in dissolved oxygen. Sand rapidly settles out of the water column and any effects on turbidity will be temporary and minimal.

If the material is placed on Town Neck Beach the sand would be placed within the dunes seaward into the intertidal zone. Any turbidity impacts to the intertidal and adjacent subtidal areas will occur in waters too shallow to have an impact on right whales or their foraging habitat.

The whales feed on zooplankton which inhabits the water column. The dredge material is sandy and will rapidly settle out to the bottom during disposal activities creating only a temporary water column impact. The Endangered Species Act Section 4(b)(2) Report for Critical Habitat for the North Atlantic Right Whale (NMFS, 2014) describes the effects from the discharge of dredge material in the open water as likely to be ephermeral since the currents would rapidly disperse sediment plumes at depths where the essential foraging features are not present. Therefore the cumulative effect of disposal of clean sand into right whale habitat should not have any adverse effects on right whale zooplankton food source or critical habitat.

In addition, during the times of anticipated right whale activity the Corps will adhere to the previously noted conditions. Therefore, if right whales occur in Cape Cod Bay during the project, the activity is not likely to adversely affect the species or critical habitat of the species, including the food source.

There is currently a proposal to expand the North Atlantic right whale critical habitat to include a larger area, but Cape Cod Bay will still be included with this critical habitat. The proposed project will not jeopardize the continued existence of the proposed species or result in the destruction or adverse modification of the proposed critical habitat.

In conclusion, the proposed maintenance dredging/disposal operations for the Cape Cod Canal is not likely to adversely affect the right whale or its critical habitat in Cape Cod Bay when adhering to the above specified conditions.

#### 6.4.1.2 Humpback Whales (Megaptera novaeangliae)

Humpback whales enter New England waters every year to feed on small schooling fish, such as sand lance, capelin, herring, and mackerel (Volgenau and Kraus, 1992). Generally they are present in New England waters from April to November each year with peak abundance in May and June. They are most frequently observed in northern Cape Cod Bay in April and May. However, they have been known to occasionally feed throughout Cape Cod Bay when large schools of small schooling fish are present (Coler & Colantonio and Battelle, 1996). They are rarely observed in southern and western Cape Cod Bay including the areas through which dredged material transits to reach the disposal site (Coler & Colantonio and Battelle, 1996). Given the imposed vessel operational requirements for the right whale that will be adhered to, and the rarity with which this species occurs in the area of the dredge and disposal sites, it is expected that the project operations will not likely affect the humpback whale or its habitat.

#### 6.4.1.3 Fin Whales (Balaenoptera physalus)

Fin whales are more abundant in the western North Atlantic Ocean than right or humpback whales, but they are sighted rarely in any season in central and southern Cape Cod Bay (Coler & Colantonio and Battelle, 1996). Therefore, it is anticipated that neither the dredging nor the disposal operations will likely affect the fin whale or its habitat.

## 6.4.1.4 Sei Whale (Balaenoptera borealis)

Sei whales have been infrequently observed in Cape Cod Bay. Sei whales are usually found in deeper waters than those in the Cape Cod Bay, but have been observed feeding in the Stellwagen Banks area. Since it is rare that the sei whale is found in the project areas, it would be unlikely that dredging or disposal operations will affect this species or its habitat. Also as noted previously, a trained observer will be on board the vessel if transiting in Cape Cod Bay in order to prevent possible encounters with any whales.

## 6.4.2 Sea Turtles

The federally endangered leatherback turtle (*Dermochelys coriacea*) and the threatened Kemp's ridley turtle (*Lepidochely's kempi*), loggerhead turtle (*Carretta carretta*) and green sea turtle (*Chelonia mydas*) have been noted in Cape Cod Bay and Buzzards Bay. No turtles are anticipated to be affected by placement of sand on the beach and in the intertidal zone. They can avoid any disturbance cause by the placement activities if present in the general area.

## 6.4.2.1 Kemp's Ridley Turtle (Lepidochelys kempi)

This endangered reptile is known to inhabit Cape Cod Bay in late summer and fall and possibly Buzzards Bay. The adults reside in the Gulf of Mexico and are known to breed only on the southern coast of Tamaulipas, Mexico. The juveniles (25 to 30 cm) appear to actively swim or drift with the Gulf Stream to find forage areas in the estuarine marshes of southern New England. Each fall a few juvenile *Lepidochelys kempi* are discovered stranded along the Cape Cod Bay shoreline. A possible explanation may be correlated to an attempt at a southerly migration as water temperatures cool. If the turtles' presence in the bay is a result of passive movements through the canal or via the Gulf Stream, the migratory stimulus may encourage active southerly movements that would entrap the turtle against the north shore of Cape Cod. It is also thought that this stranding could be the result of cold stunning (NOAA, 1991: from Coler & Colantonio and Battelle, 1996). If water temperature drops too rapidly, the metabolic rate of these turtles may slow to the point where both swimming and digestion cannot

function. The animal will then become comatose and death will occur if not warmed quickly (Coler & Colantonio and Battelle, 1996).

The disposal of sandy dredged material may impact various benthic organisms that are a food source for Ridley turtles; especially shellfish (*Cancer borealis, Cancer irroatus, Homarus americanus, Placopectens magellanicus, Mytilus edulis* and *Modiolus modiolus*) that have been identified in the CCCDS area. The deposition of clean sand does not exert a significant impact on this disposal site except for the burial of some benthic species. This loss in benthic productivity is spatially and temporally limited to the site and frequency of disposal. Recolonization of the benthic species would be expected to occur from larval recruitment within a few months and nearby surrounding areas would not be impacted by the disposal events.

The primary forage area of Kemp's ridley sea turtles is theorized to be nearshore bottom areas with dense aggregations of shellfish, particularly mussel beds. The biological community of the CCCDS contains low densities of turtle prey items, and therefore is not anticipated to be a significant forage area for *Lepidochelys kempi*.

Much of the human induced mortality of the Kemp's ridley turtle is the result of entanglement in fishing gear, primarily shrimp nets (National Research Council, 1990). Lobster gear and pound nets can also cause death when Kemp's ridley turtles (being benthic feeders) become entangled in them as well as other miscellaneous bottom debris. It is therefore expected that disposal of clean sand/gravel which does not contain debris will not pose a significant hazard to the Kemp's ridley turtle.

In conclusion, the proposed maintenance dredging with disposal at the CCCDS is not likely to adversely affect the Kemp's ridley turtle.

While no turtles are expected to be impacted by beach nourishment, if any cold stun turtles are found in the surf or on the Town Neck Beach they would most likely be Kemp ridley turtles. If any turtles are sighted the contractors will contact the Wellfleet Bay Wildlife Sanctuary.

#### 6.4.2.2 Loggerhead Turtle (Caretta caretta)

The loggerhead turtle is a threatened marine reptile that is sporadically encountered in Cape Cod Bay and Buzzards Bay. The spring and summer nesting habitats of adults are generally south of Cape Hatteras. Juveniles migrate northward in early summer to forage on the Continental Shelf. Cape Cod would be considered the most northerly expanse of their habitat. When water temperature falls to 10-15 °C cold stunning or dormancy may occur. To avoid these temperatures the organisms may be induced to migrate south. The occasional loggerhead which has found itself (actively or passively) transported into Cape Cod Bay may become trapped against the north shore of Cape Cod and stranded.

The loggerhead turtles feed in deep water areas on crabs, molluscs and sponges generally found around wrecks, underwater structures and reefs. Conceivably the Cape Cod Canal Disposal Site could provide a forage area for this species. Sponges (*Surerites ficus, Cliona celata*); mollusks (*Lunatia heros, Placopecten magellanicus, Modiolus modiolus*) and crustaceans (*Cancer irroratus, Cancer borealis, Mysis mixta, Pagurus\_acadianus* and *Homarus americanus* are known to inhabit this disposal site. The disposal of dredged material at CCCDS may impact a temporally and spatially limited forage area for this species, but faunal recruitment will reestablish the food source. Forage areas similar to this site are not unique or limited in the bay. Loggerhead turtles seek areas of greater relief (wrecks, rock ledge, etc.) that attract higher densities of prey organisms than flat sandy disposal areas. Loggerhead turtles could forage in the CCCDS, but this is not a known forage area for these sea turtles.

In conclusion, the proposed disposal of dredged material at the Cape Cod Canal Disposal Site is not likely to adversely affect this species. Although an insignificant component of a possible forage area for a few individuals may be impacted, this action is not likely to adversely affect the loggerhead sea turtle.

#### 6.4.2.3 Leatherback (Dermochelys coriacea)

The Federally endangered leatherback turtle is the second most common sea turtle along the eastern seaboard of the United States and is the most common sea turtle north of the 42°N latitude. Leatherbacks forage in temperate and subpolar waters and nest on tropical beaches. They have a layer of subcutaneous fat and circulatory adaptations to reduce the rate of heat loss through their flippers (Greer *et al.*, 1973), thus allowing them to survive and feed in colder temperate waters than other sea turtles.

Leatherback turtles are a largely pelagic, open ocean species. Adult leatherback turtles are common during the summer months in North Atlantic waters from Florida to Massachusetts (Goff and Lien, 1988). New England and Long Island Sound waters support the largest populations on the Atlantic coast during the summer and early fall (Lazell, 1980; Prescott, 1988; Shoop and Kenney, 1992). During the summer, leatherbacks move into fairly shallow coastal waters (but rarely into bays), apparently following their preferred jellyfish prey. In the fall, they move offshore and begin their migration south to the winter breeding grounds in the Caribbean (Payne *et al.*, 1984).

In conclusion, the proposed disposal of dredged material at the CCCDS is not likely to adversely affect this species. Based on the low frequency of occurrence and the fact that leatherback sea turtles don't feed on the benthos that may be impacted by disposal activities, this action is not likely to adversely affect this species.

#### 6.4.2.4 Green Turtle (Chelonia mydas)

The green turtle is the largest of the hard-shelled sea turtles. The species is distributed throughout the Caribbean Sea, the Gulf of Mexico, and in the western North

Atlantic from Florida to Massachusetts. Primary nesting sites are on the east coast of Florida. The number of nesting females in Florida is estimated at between 200 and 1,100 individuals. Current population trends are unavailable. However, since 1980, the number of green turtles nesting each year and the total population of green turtles in Florida waters appear to have increased gradually (Thompson, 1988; Steinback *et al.*, 1999).

During the summer, small numbers of green turtles venture as far north as New England. Green turtles are herbivorous as adults and feed in shallow coastal waters on sea grasses and marine algae. Some green turtles become cold-stunned each year by falling water temperatures in the fall and winter, especially in northern waters (Morreale and Standora, 1992). Green turtles occasionally strand on Cape Cod beaches. Natural and anthropogenic disturbances affect green turtles at their nesting locations and in offshore waters. Nesting habitat is lost to erosion, shoreline fortification, and beach renourishment. Green turtles are also susceptible to entanglement in shrimp trawls and in other fishing gear. They also frequently ingest and become entangled in marine debris or may collide with vessels.

In conclusion, the potential does exist for a transient green turtle to cross the path of disposal operations. However, since they feed primarily in shallow areas, green turtles would not likely be found using the disposal sites as a feeding ground. While they feed in shallow areas, they should be able to avoid any disturbances associated with the placement of sand on Town Neck Beach. Dredging and disposal activities are not anticipated to adversely affect any Green sea turtles.

#### 6.4.3 Fish

#### 6.4.3.1 Atlantic Sturgeon (Acipenser oxyrinchus)

Atlantic sturgeon from any of the five Distinct Population Segments (DPS), (Gulf of Maine DPS is listed as threatened other four DPSs are listed as endangered), may be present in the project area. After emigration from the natal estuary, subadult and adult Atlantic sturgeon forage within the marine environment, typically in waters less than 50 meters depth (ASSRT, 2007). Atlantic sturgeons may be occasional visitors to the project area, most likely while making coastal migrations or while foraging for benthic invertebrates and small fish such as sand lance. In bays and harbors foraging often occurs at or near areas with submerged vegetation or shellfish resources. The project area does not provide suitable habitat for overwintering; so the presence of Atlantic sturgeon is likely limited to the warmer months. The nearest spawning rivers are the Kennebec River, Maine and the Hudson River, New York, so no eggs, larvae or juvenile Atlantic sturgeon are likely to occur in the project area.

The Cape Cod Canal is associated with high currents so it is not likely that the sturgeons would be foraging within the canal and the canal is not expected to be dredged during the warmer months, therefore no impingement or entrainment of Atlantic sturgeon are anticipated from dredging activities. The majority of placement of the material on Town Neck Beach would be above the mean lower low water and any

increases in turbidity would be localized and temporary, therefore we do not anticipate any impacts to Atlantic sturgeon foraging. Atlantic sturgeon may be feeding and/migrating through the Cape Cod Bay. Any vessel transiting to the CCCDS would be traveling at low speeds so a vessel strike to a sturgeon is unlikely. There is nothing about the CCCDS that would attract the sturgeons to the disposal site as compared to any other area so it is unlikely that a sturgeon would be feeding in the area directly under a scow that is about to release dredged material, therefore this project is not likely to affect any Atlantic sturgeons.

#### 6.4.4 Birds

#### 6.4.4.1 Roseate Tern (Sterna dougallii)

The roseate tern is a worldwide species that breeds in two discrete areas in North America, the northeastern population breeds along the Atlantic coast of the United States from North Carolina to Maine. Bird Island in Buzzards Bay is a known nesting location during the period of April 15<sup>th</sup> to September 15<sup>th</sup>. The terns forage throughout Buzzards Bay and the entrance to the Canal. Roseate terns are specialized feeders which prey on small schooling marine fish. The fish are caught by plunging vertically into the water and seizing them with their bills or by surface-dipping and contact-dipping (US FWS, 1998). In Massachusetts, the roseates feed primarily on American sand lance and clupeids such as Atlantic herring, or blueback herring, mackerel, small bluefish or anchovies. They feed in specialized situations over shallow sandbars shoals, tidal inlets or by following schools of predatory fish which drive smaller prey fish to the surface (C. S. Mostello, 2007). Roseate terns tend to return regularly to the same fishing areas, sometimes as far as 25 kilometers from the breeding colony.

The birds are not likely to be in the area during the proposed dredging activities, but even if they were, the dredge areas are relatively small especially in the areas of concern (Mashnee Flats). The material to be dredged is clean sand and gravel which will settle out rapidly in close proximity to the dredging areas and at the placement/disposal areas. In addition, the zones of impact are in relatively deep water and small when compared to the overall wide range of foraging habitat available to the roseate terns. Also no dredging will occur outside the Federally-designated navigation channel so there should be no direct impact to the nearby foraging areas. The proposed work will have minimal or no adverse impacts on the foraging behavior and success of the roseate terns.

#### 6.4.4.2 Piping Plover (Charadrius melodus)

The piping plover is a federally listed threatened species that nests in open, sandy beaches with flat slopes close to the dunes. Piping plovers return to their breeding grounds in late March and early April and the nesting season may extend into late August although individual pairs may fledge young as early as July. Piping plovers are known to nest on Sandwich beaches, specifically the eastern end of Town Neck Beach seaward of the marsh area and along Spring Hill Beach. Atlantic Coast plovers nest on coastal beaches, sandflats at the ends of sand spits and barrier islands, gently sloped foredunes, sparsely vegetated dunes, and washover areas cut into or between dunes. Breeding plovers feed on exposed wet sand in wash zones; intertidal ocean beach; wrack lines; washover passes; mud-, sand-, and algal flats; and shorelines of streams, ephemeral ponds, lagoons, and salt marshes by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening. Small sand dunes, debris, and sparse vegetation within adjacent beaches provide shelter from wind and extreme temperatures.

Although the piping plovers do not currently nest on the section of Town Neck Beach proposed for sand placement, the larger sandy beach might attract them. No placement of dredged material will occur during the nesting season of April 1 through August 31 to avoid any impacts to nesting birds or their young in the area. Also the town of Sandwich will work with Massachusetts Audubon Society to monitor any nesting plovers on the beach.

#### 6.4.4.3 Red Knot (Calidris canutus rufa)

The US Fish and Wildlife Service lists the rufa red knot as threatened under the Endangered Species Act. The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the southeast United States, the northwest Gulf of Mexico, northern Brazil and Tierra del Fuego at the southern tip of South America travelling up to 19,000 miles. During both the northbound (spring) and southbound (fall) migrations, groups of a few individuals to thousands of knots can be found anywhere along the coastal and inland U.S. migration corridors from Argentina to Canada. In the spring, key staging and stopover areas to rest and feed in suitable habitats include Patagonia, Argentina; eastern and northern Brazil; the southeast United States; the Virginia barrier islands; and Delaware Bay. In the fall, key migration stopovers include Hudson Bay, James Bay, St. Lawrence River, Mingan Archipelago and Bay of Fundy in Canada; Massachusetts and New Jersey coasts; Altamaha River in Georgia; the Caribbean; and the northern coast of South America from Brazil to Guyana.

A migrating the red knot could stop to feed in the nearby intertidal areas of Sandwich Harbor marsh or on the western side of the Cape Cod Canal, but there are no appearances recorded in ebird (<u>www.ebird.org</u>). During northward migrations individual birds are found in Massachusetts in late May and June. Southward migrations red knots appear on the Atlantic Coast of the U.S., especially at Cape Cod and mainland areas of Massachusetts late July and the numbers of adults increase steadily until early August. Monomoy National Wildlife Refuge is a known molting site of the birds and they can be found in the area through October (Niles *et al.*, 2012). Dredging and placement of dredged material on Sandwich beaches would not occur between April 1 and August 31 to protect the nesting piping plovers, therefore there would be no impacts to migrating red knot from the proposed project.

#### 6.4.4.4 Least Tern (Sterna antillarum)

The least tern is a Massachusetts State species of special concern. It breeds along coastal and freshwater habitats of North America from Maine to Florida. Least terns nest in dry, exposed unvegetated areas on sandbars, or beaches in areas between the drift line and upland on a mix of sand, pebbles, shells and fine grained sand. The Massachusetts Audubon Society's Coastal Waterbird Program monitors the birds along Sandwich beaches. The least terns nest on the eastern end of the Town Neck Beach adjacent to the channel at Sandwich Harbor Inlet.

No placement of dredged material will occur during the nesting season of May through August 31 to avoid any impacts to nesting piping plovers or their young which will also protect any least terns on the beach.

#### 6.5 Historical and Archaeological Resources

#### 6.5.1 No Action Alternative

There would be no impacts to any historical or archaeological resources if the Cape Cod Canal was not dredged.

#### 6.5.2 Dredge and Placement/Disposal Areas

The maintenance dredging of portions of the Cape Cod Canal channel and basins will have no effect on historic properties as dredging will be confined to previously dredged areas.

The disposal of dredged material at the Cape Cod Canal Disposal site will have no effect on historic properties as this area was previously used for the disposal of dredged material.

Town Neck Beach has a severe erosion problem. It has been re-nourished in the past by the town. Placement of sand from the maintenance dredging of the Cape Cod Canal should have no effect on historic properties as it will have a protective effect on the bluffs and will temporarily stop the current erosion of the beach.

The Massachusetts State Historic Preservation Officer, the Massachusetts Board of Underwater Archaeological Resources and the THPO of the Wampanoag Tribe of Gay Head Aquinnah concurred with these determinations (see Appendix A, letters dated April 1, 2015, Feb 3, 2015, and September 16, 2014 respectively). Concurrence was assumed due to lack of response from the Mashpee Tribal Historic Preservation Officer (THPO).

#### 6.6 Socioeconomic Environment

#### 6.6.1 No Action Alternative

The No Action Alternative would not be beneficial to the area because further shoaling in the Canal, may cause some of the deep draft vessels to have to completely avoid the Canal and transit around Cape Cod. The reduction in available depth is significant and has the potential to cause tidal delays for some of the deep draft commercial vessels transiting the Canal. Transiting around Cape Cod would significantly increase the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

Without dredging the town of Sandwich needs to find an alternative sand source to renourish the dunes and beach. The dunes and beach help to protect the homes from storm damage and they have eroded to a point that each additional storm is a concern for these homeowners.

#### 6.6.2 Dredge and Placement/Disposal Areas

The overall effect of the maintenance dredging project will be beneficial as it will accommodate the deep draft vessel traffic through the canal. This would alleviate any additional costs associated with the tidal delays or the need to circumvent the canal. Placement of the dredged material on Town Neck Beach would provide needed sediment for the renourishment of the beach to protect nearby homes from storm damage. The erosion of the beach is affecting the dunes located seaward of the homes and currently many of the homes are vulnerable to impacts from storm events. The placement of sand will provide some protection until a long-term solution to the lack of sand transport to the area is identified.

# 7.0 AIR QUALITY STATEMENT OF CONFORMITY REQUIRMENTS

U.S. Army Corps of Engineers guidance on air quality compliance is summarized in Appendix C of the Corps Planning Guidance Notebook (ER1105-2-100, Appendix C, Section C-7, pg. C-47). Section 176 (c) of the Clean Air Act (CAA) requires that Federal agencies assure that their activities are in conformance with Federally-approved CAA state implementation plans for geographic areas designated as non-attainment and maintenance areas under the CAA. The EPA General Conformity Rule to implement Section 176 (c) is found at 40 CFR Part 93.

Clean Air Act compliance, specifically with EPA's General Conformity Rule, requires that all Federal agencies, including Department of the Army, review new actions and decide whether the actions would worsen an existing violation of National Ambient Air Quality Standards (NAAQS), cause a new NAAQS violation, delay the State Implementation Plan (SIP) attainment schedule of the NAAQS, or otherwise contradict the State's SIP. The State of Massachusetts is authorized by the EPA to administer its own air emissions permit program, which is shaped by its SIP. The SIP sets the basic strategies for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS). The SIP is the federally enforceable plan that identifies how that state will attain and/or maintain the primary and secondary National Ambient Air Quality Standards (NAAQS) established by the EPA (U.S. Environmental Protection Agency, 2014). In Massachusetts, Federal actions must conform to the Massachusetts state implementation plan or Federal implementation plan. For non-exempt activities, the USACE must evaluate and determine if the proposed action (construction and operation) will generate air pollution emissions that aggravate a non-attainment problem or jeopardize the maintenance status of the area for ozone. When the total direct and indirect emissions caused by the operation of the Federal action/facility are less than threshold levels established in the rule (40 C.F.R. § 93.153), a Record of Nonapplicability (RONA) is prepared and signed by the facility environmental coordinator.

## 7.1 General Conformity

The general conformity rule was designed to ensure that Federal actions do not impede local efforts to control air pollution. It is called a conformity rule because Federal agencies are required to demonstrate that their actions "conform with" (i.e., do not undermine) the approved SIP for their geographic area. However, this maintenance dredging project is exempt from performing a conformity review based on 40 CFR 93.153(c)(2) which states: "The following actions which would result in no emissions increase or an increase in emissions that is clearly de minimis: (ix) Maintenance dredging and debris disposal where no new depths are required, applicable permits are secured, and disposal will be at an approved disposal site."

# 8.0 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" require federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its program, policies, and activities on minority and low-income populations in the U.S., including Native Americans. The proposed action will not have any disproportionately high or adverse impacts on minority or low-income populations, or any adverse short or long-term environmental justice impacts because the proposed action will be dredging a Federal channel located in the waters of Cape Cod Canal in Bourne and Sandwich, MA, with placement of the dredged material on a local beach in Sandwich, MA or disposed of at an open water site, the CCCDS in Cape Cod Bay. There are no environmental justice populations located in these areas.

Executive Order 13045, "Protection of Children From Environmental Health Risks and Safety Risks," requires federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children. The proposed action will not pose any significant or adverse short or long-term health and safety risks to children because the dredging will take place in waters of the Cape Cod Canal and the placement of clean sand will be on a local beach.

# 9.0 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 and current activities in Cape Cod Canal include the maintenance dredging of the Federal channel and mooring basins, maintenance of the breakwaters, navigation through the channel, and recreational activities in the Canal. Reasonably foreseeable future actions include the continuation of the abovementioned activities. The effects of these previous, existing and future actions are generally limited to infrequent disturbances of the benthic communities in the dredged areas. Water quality, air quality, hydrology, and other biological resources are generally not significantly affected by these actions.

Cumulative impacts associated with placement/disposal of dredged material from the Cape Cod Canal at either Town Neck Beach or the CCCDS include burial of benthic organisms. The recovery time needed to establish a stable long term community in the area would be dependent on how often disposal actions occur. Town Neck Beach has areas of intertidal rock that have been exposed due to erosion and some of these areas will be buried by sand and even after the sand is eroded the habitat will not be fully functional until recruitment and growth of algae and epibenthic organisms. Any longterm solution to the lack of sediment transport along Town Neck Beach would negatively impact this habitat, but the project as proposed is only anticipated to cause a temporary impact to the rocky habitat as the sand is expected to erode from the area once again. Areas of CCCDS may be used by scallop fishermen, but no specific area has been identified. Disposal activities have the potential to bury some scallops, but would cause no additional overall impacts to the environment beyond what would be caused by the fishery.

Overall, at the dredged and placement/disposal areas, the direct effects of this project are not anticipated to add to negative impacts from other actions in the area. In the past thirty years the time period between individual maintenance dredging efforts has been two to nine years. The same level of effort is expected for future maintenance projects and it is expected that future dredging projects with disposal at CCCDS will not have a cumulative impact when taken together. Future beach nourishment projects will need to be reviewed as cumulative impacts to the intertidal rocky habitat that may remove some of the functionality of the habitat.

# **10.0 ACTIONS TAKEN TO MINIMIZE ADVERSE IMPACTS**

The following actions would minimize potential adverse impacts associated with this project:

• Actions that will be taken to minimize potential impacts to threatened and endangered species (whales and sea turtles) include an observer on the disposal vessel to CCCDS from January 1 through May 31 and regulated vessel speeds near disposal areas during times of reduced visibility.

• If a hopper dredge is used, there will be no dredging between June and October to protect sea turtles until a formal consultation is conducted with NMFS Protected Resources to confirm the need for this window.

• No placement of sediments on Town Neck Beach will occur from April 1 through August 31 to protect nesting and fledging piping plovers.

• The town of Sandwich will be responsible for the monitoring of piping plovers on Town Neck Beach.

• Efforts will be made to complete dredging in the area of the Mashnee Flats (Onset shoal area) by May 1 (if material is to be disposed of at CCCDS) to protect the foraging habitat of the endangered roseate terns.

• If any cold stunned sea turtles are sighted during construction operations, the Wellfleet Bay Wildlife Sanctuary will be contacted.

• Other actions that will be taken to minimize impacts to wildlife include restrictions so that dredging will not occur within 500 yards of the mouth of the Herring River (Monument River) between March 15 and July 30 to protect the herring run.

# **11.0 COORDINATION**

A Public Notice was released to the public on February 2, 2015 for a 30 day comment period. The following agencies were contacted. Agencies' concerns made known to the US Army Corps of Engineers are addressed in the Environmental Assessment.

## **FEDERAL**

U.S. Fish and Wildlife Service U.S. Environmental Protection Agency NOAA- Fisheries Habitat Conservation Division Protected Resources Division

# <u>STATE</u>

Massachusetts Coastal Zone Management Office Massachusetts Department of Environmental Protection Division of Wetlands and Waterways Regulations Massachusetts Historical Commission

## <u>TRIBES</u>

Mashpee Wampanoag Tribe Wampanoag Tribe

# LOCAL

Town of Sandwich, Town Manager Town of Sandwich, Department of Natural Resources Town of Sandwich, Conservation Commission

During the Public Notice period six letters were received from the general public, two in support of the project and five asking about placing some dredge material on Spring Hill Beach. Based on the coastal processes in the area, both beaches would best be served by the placing the limited amount of dredge material from the canal on Town Neck Beach. Responses to the public and original letters can be found in Appendix A. Comment letters were also received from Massachusetts Division of Fisheries and Wildlife, Massachusetts Division of Marine Fisheries and Mass Audubon.

# 12.0 REFERENCES

- Atlantic States Marine Fisheries Commission (ASMFC). 2002 Beach Nourishment: A review of the Biological and Physical Impacts. ASMFC Habitat Management Series # 7. November 2002. pp.174.
- Atlantic Sturgeon Status Review Team (ASSRT). 2007. Status review of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Report to National Marine Fisheries Service, Northeast Regional Office on February 23, 2007.
- Berry, W., N. Rubinstein, B. Melzian, and B. Hill. 2003. The biological effects of suspended and bedded sediment (SABS) in aquatic systems. Internal Report to US EPA, Office of Research and Development, National Health and Environmental Effects Laboratory, Narragansett, RI.

Bruton, M.N. 1985. The effects of suspendoids on fish. *Hydrobiologia*. 125:221-241.

- Clarke, D.G. and D.H. Wilber. 2000. Assessment of potential impacts of dredging operations due to sediment resuspension. DOER Technical Notes Collection (ERDC TN-DOER-E9). US Army Engineer Research and Development Center, Vicksburg, MS.
- Clarke, D., K. Reine, and C. Dickerson. (draft report). Suspended Sediment Plumes Associated with Hopper Dredges at Sesuit Harbor, Massachusetts, USACE, ERDC, Vicksburg, MS.
- Colby, D. and D. Hoss. 2004 Larval fish feeding responses to variable suspended sediment and prey concentrations. DOED Technical Notes Collection (ERDC TN-DOER-E16). US Army Engineer Research and Development Center, Vicksburg, MS.
- Coler & Colantonio Inc. and Battelle Ocean Sciences. 1996. Cape Cod Disposal Site Biological Assessment, Endangered Species. Prepared for US Army Corps of Engineers, New England Division, Waltham, MA, 141 pp.
- Collins, M.A. 1995. Dredging-induced near-field resuspended sediment concentrations and source strengths. Miscellaneous Paper D-95-2, U.S. Army Engineer Waterways Experimental Station, Vicksburg, MS.
- Cyrus, D.P. and S.J. M. Blaber. 1987. The influence of turbidity on juvenile marine fishes in estuaries. Part 2. Laboratory studies, comparisons with field data and conclusions. *Journal of Experimental Marine Biology and Ecology*. 109:71-91.
- ENSR International. 2002. Boston Harbor Navigation Improvement Project: Phase 2 Summary Report. Prepared for U.S. Army Corps of Engineers, New England

District and Massachusetts Port Authority. Document No. 9000-178-000. Contract No. DACW33-96-D-004, Task Order 51. May 2002.

- Goff, G. and J. Lien. 1988. Atlantic Leatherback Turtles (*Dermochelys coriaceae*) in Cold Water off Newfoundland and Labrador. The Canadian Field-Naturalist. 102(1):1-5.
- Gotceitas, V., S. Fraser, and J.A. Brown. 1995. Habitat use by juvenile Atlantic cod (*Gadus morhua*) in the presence of an actively foraging and non-foraging predator. *Marine Biology* 123:421-430.
- Gotceitas, V., S. Fraser, and J.A. Brown. 1997. Use of eelgrass beds (*Zostera marina*) by juvenile Atlantic cod (*Gadus morhus*). *Canadian Journal of Fisheries and Aquatic Sciences* 54:1306-1319.
- Grant, S.M. and J.A. Brown. 1998a. Diel foraging cycles and interactions among juvenile Atlantic cod (*Gadus morhua*) at a nearshore site in Newfoundland. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1307-1316.
- Grant, S.M. and J.A. Brown. 1998b. Nearshore settlement and localized populations of age 0 Atlantic cod (*Gadus morhua*) in shallow coastal waters of Newfoundland. Canadian *Journal of Fisheries and Aquatic Sciences* 55:1317-1327.
- Greer, A.E., J.D. Lazelle, and R.M. Wright. 1973. Anatomical Evidence for a Countercurrent Heat Exchange in the Leatherback Turtle (*Dermochelys coriacea*). Nature. 244:181.
- Hayes, Donald F. 1986. Guide to Selecting a Dredge for Minimizing Resuspension of Sediment. Environmental Effects of Dredging Technical Notes EEDP-09-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.
- Heck, K. L., K. W. Able, M. P. Fahay, and C. T. Rowan. 1989. Fishes and decapod crustaceans of Cape Cod eelgrass meadows: Species composition, seasonal abundance patterns and comparison with unvegetated substrates. Estuaries 12:59-65.
- Howe, A., and F. Germano. 1982. Fisheries and environmental baselines relative to dredge spoil disposal, Cape Cod Bay, 1981. Funded by Massachusetts Coastal Zone Management. Publication # 12954-43-100-9-83-CR. July 1982, 41 pp.
- Howe, A.B., S.J. Correia, T.P. Currier, J. King, and R. Johnston. 2002. Spatial distribution of Ages 0 and 1 Atlantic cod (*Gadus morhus*) off the eastern Massachusetts coast, 1978-1999, relative to 'Habitat Area of Special Concern'. Technical Report TR-12, Massachusetts Division of Marine Fisheries, Pocasset, MA.

- Hughes, J. E., L. A. Deegan, J. C. Wyda, M. J. Weaver and A. Wright. 2002. Loss of Eelgrass Habitat and Effects on Fish Communities of Southeastern Massachusetts. Estuaries 25(2): 235-249.
- Kenney, R.D., H.E. Winn, and M.C. Macauley. 1995. Cetaceans in the Great South Channel, 1979-1989: right whale (*Eubalaena glacialis*). Cont. Shelf Res. 19:385-414. <u>In</u>: Coler & Colantonio Inc and Battelle Ocean Sciences. 1996. Cape Cod Disposal Site Biological Assessment, Endangered Species.
- Lazell, J.D., Jr. 1980. New England Waters: Critical Habitat for Marine Turtles. Copeia: 2:290-295.
- Lindquist N. and L. Manning. 2001. Impacts of Beach Nourishment and Beach Scraping on Critical Habitat and Productivity of Surf Fish. Final Report.
- Mayo, C.A. and M.K. Marx. 1990. Surface forging behavior of the North Atlantic right whale (*Eubalaena glacialis*) and associated zooplankton characteristics. Canadian Journal of Zoology. 68:2214-2220.
- Messieh, S.N., D.J. Wildish, and R.H. Peterson. 1981. Possible impact from dredging and spoil disposal on the Miramichi Bay Herring Fishery. *Canadian Technical Report of Fisheries and Aquatic Sciences*. No. 1008. 33 pp.
- Methven, D.A. and D. C. Schneider. Gear-independent patterns of variation in catch of juvenile Atlantic cod (Gadus morhus) in coastal habitats. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1430-1442.
- Miller, D.C., C.L. Muir, and O.A. Hauser. 2002. Detrimental effects of sedimentation on marine benthos: what can be learned from natural processes and rates? Ecological Engineering 19:211-232.
- Morreale, S.J. and E.A. Standora. 1992. Habitat use and feeding activity of juvenile Kemp's ridleys in inshore waters of the northeastern U.S. Pages 75-77 in: Salmon and J. Wyneken. (Eds), Proceedings of the Eleventh Annual Workshop of Sea Turtle Biology and conservation. NOAA Technical Memorandum NMFS-SEFC-302.
- National Marine Fisheries Service (NMFS). 2014. Endangered Species Act (ESA) Section 4(b)(2) Report: Critical Habitat for the North Atlantic Right Whale (Eubalaena glacialis). Greater Atlantic Regional Fisheries Office and Southeast Regional Office. July 2014.
- National Oceanic and Atmospheric Administration (NOAA). 1991. Stellwagen Bank National Marine Sanctuary. Draft Environmental Impact Statement/Management Plan. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Sanctuaries and Reserves Division,

Washington, DC. 238 pp. <u>In</u>: Coler & Colantonio Inc and Battelle Ocean Sciences. 1996. Cape Cod Disposal Site Biological Assessment, Endangered Species.

- National Research Council. 1990. Decline of the Sea turtles. Causes and Prevention. National Academy Press, Washington, DC. 259 pp. <u>In</u>: Coler & Colantonio Inc and Battelle Ocean Sciences. 1996. Cape Cod Disposal Site Biological Assessment, Endangered Species.
- Naqvi, S.M. and E.J. Pullen. 1982. Effects of Beach Nourishment and Borrowing on Marine Organisms. Miscellaneous Report No. 82-14. U.S. Army Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, VA. December 1982, pp. 44.
- Nelson, W.G. 1993. Beach restoration in the Southeastern US: Environmental effects and biological monitoring. Ocean & Coastal Management. 19: 157-182.
- Newcombe, C.P. and J. Jensen. 1996. Channel suspended sediment and fisheries: A synthesis for quantitative assessment of risk and impact. *North American Journal of Fisheries Management*. 16(4):693-727.
- Newcombe, C.P. and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosytems. *North American Journal of Fisheries Management*. 11:72-82.
- Newell, R.C., L.J. Seiderer, N.M. Simpson, and J.E. Robinson. 2004. Impacts of marine aggregate dredging on benthic macrofauna off the south coast of the United Kingdom. *Journal of Coastal Research*. 20(1): 115-125.
- Niles, L.J., J. Burger, R.R Porter, A.D. Dey, S. Koch, B. Harrington, K. Iaquinto, and M. Boarman. 2012. Migration pathways, migration speeds and non-breeding areas used by northern hemisphere wintering Red Knots *Calidris canustus* of the subspecies *rufa*. *Wader Study Group Bulletin*. 119(3):195-203.
- Payne, P.M., L.A. Selzer, and A.R. Knowlton. 1984. Distribution and Density of Cetaceans, Marine Turtles and Seabirds in the Shelf Waters of the Northeastern United States, June 1980 - December 1983, Based on Shipboard Observation. Prepared under Contract No. NA-81-FA-C-00023. NMFS, Northeast Fishery Center. 246 pp.
- Prescott, R.L. 1988. Leatherbacks in Cape Cod Bay, Massachusetts, 1977-1987. Pages 83-84 in Schroeder, B. (Ed.). Proceedings of the Eighth Annual Workshop on Sea Turtle Conservation and Biology. NOAA Technical Memorandum NMFS-SEFC-214. 136 pp.

- Reilly Jr., F.J., and V.J. Bellis. 1983. The Ecologial Impact of Beach Nourishment with Dredged Materials on the Intertidal Zone at Bogue Banks, North Carolina. Miscellaneous Report No. 83-3, U.S. Army Corps of Engineers, coastal Engineering Research Center, Fort Belvoir, VA. March 1983, pp.75.
- Ryan, M.R., S.S. Killen, R.S. Gregory, and P.V.R. Snelgrove. 2012. Predators and distance between habitat patches modify gap crossing behavior of juvenile Atlantic cod (*Gadus morhua*, L. 1758). *Journal of Experimental Marine Biology* and Ecology 422-423:81-87.
- Shoop, C.R. and R.D. Kenney. 1992. Seasonal Distribution and Abundances of Loggerhead and Leatherback Sea Turtles in Waters of the Northeastern United States. Herpetology Monograph. 6:43-67
- Stamieszkin, K., L. Ganley, C. A. Mayo, R.H. Leeney, and M.K. Marx. 2010. Surveillance, Monitoring and Management of North Atlantic Right Whales in Cape Cod Bay and Adjacent Waters- 2010, Final Report. Provincetown Center for Coastal Studies, Provincetown, MA, November 2010, pp.31.
- Steinback, S., J. O'Neil, E. Thunberg, A. Gautam and M. Osborn. 1999. Volume I: Summary Report of Methods and Descriptive Statistics for the 1994 Northeast Region Marine Recreational Economics Survey. Prepared for the U.S. Department of Commerce, NOAA, NMFS. NOAA Technical Memorandum NMFS-F/SPO-37. August 1999.
- Stern, E.M. and W.B. Stickle. 1978. Effects of Turbidity and Suspended Material in Aquatic Environments. U.S. Army COE Waterways Exp. Stat. Tech. Rep. D-78-21.
- Thayer, G.W., W.J. Kenworthy, and M.S. Fonseca. 1984. The Ecology of Eelgrass Meadows of the Atlantic Coast: A Community Profile. U.S. Fish Wildl. Serv. FWS/OBS-84/02. 147 pp. Reprinted September 1985.
- Thompson, N.B. 1988. The status of loggerhead, *Caretta caretta*; Kemp's ridley, *Lepidochelys kempi*; and green, *Chelonia mydas*, sea turtles in U.S. waters. Mar. Fish. Rev. 50 (3):16-23.
- Truitt, C. 1986. "Fate of Dredged Material During Open Water Disposal," Environmental Effects of Dredging Programs Technical Note EEDP-01-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.
- Tupper, W., and R.G. Boutilier. 1995. Effects of habitat on settlement, growth, and postsettlement survival of Atlantic cod (*Gadus morhus*). Canadian Journal of *Fisheries and Aquatic Sciences* 52:1834-1841.

- Woods Hole Group (WHG). 2014, Proposed Town of Sandwich Dune and Beach Restoration Project. Expanded Environmental Notification Form for submittal to the Massachusetts EOEEA-MEPA Office. East Falmouth, MA, May 2014.
- USACE. 2001. The New York District's Biological Monitoring Program for the Atlantic Coast of new Jersey, Asbury Park to Manasquan Section Beach Erosion Control Project. USACE Engineer Research and Development Center, Vicksbury, MS. Final Report.
- USACE. 2003. Submittals to RIDEM, Providence River and Harbor Maintenance Dredging Project. Prepared by Woods Hole Group, CR Environmental, and ENSR Corporation for Corps, New England District, Concord, Massachusetts. November 2003.
- USACE 2014. Cape Cod Canal and Sandwich Beaches, Sandwich, Massachusetts. Federal Interest Determination for Continuing Authority Feasibility Investigation, Section 204 Beneficial Uses of Dredged Material Project. New England District, Concord, MA. September 2014.
- U.S. Environmental Protection Agency (EPA). 2014. Website accessed 10/14/14. http://www.epa.gov/airquality/greenbk/hncs.html#MASSACHUSETTS. Last updated July 2, 2014.
- US Fish and Wildlife Service (US FWS). 1998. Roseate Tern Recovery Plan, Northeastern Population. First Update. Northeast Region, Hadley, Massachusetts.
- Versar Inc. 2004. Year 2 Recovery from Impacts of Beach Nourishment on Surf Zone and Nearshore Fish and Benthic Resources on Bald Head Island, Caswell Beach, Oak Island, and Holden Beach, North Carolina. Final Study Finding. Columbia, MD 128 pp + appendices. Prepared for USACE, Wilmington District, Wilmington, NC, January 2004.
- Volgenau, L. and S. D. Kraus. 1992. The impact of entanglements on two substocks of the western North Atlantic humpback whale, *Megaptera novaenanliae*. Report to NOAA/NMFS, Marine Entanglement Research Program. Contract No. 43ABNF002563. <u>In</u>: Coler & Colantonio Inc and Battelle Ocean Sciences. 1996. Cape Cod Disposal Site Biological Assessment, Endangered Species.
- Wilber, D.L. and D.G. Clarke. 2001. Biological effects of suspended sediments: A review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries. North American Journal of Fisheries Management. 21:855-875.

# 13.0 COMPLIANCE WITH ENVIRONMENTAL FEDERAL STATUES AND EXECUTIVE ORDERS

This section describes the Federal laws, regulations and programs that are relevant to the dredging and placement of maintenance material from the Cape Cod Canal Federal Navigation Project in Sandwich and Bourne, Massachusetts.

#### 13.1 Federal Statutes

#### 1. Archaeological Resources Protection Act of 1979, as amended, 16 USC 470 et seq.

Compliance: Issuance of a permit from the Federal land manager to excavate or remove archaeological resources located on public or Indian lands signifies compliance. Not applicable.

2. Preservation of Historic and Archeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq.

Compliance: Project is been coordinated with the State Historic Preservation officer; project is not expected to require mitigation of historic or archaeological resources.

3. American Indian Religious Freedom Act of 1978, 42 U.S.C. 1996.

Compliance: Must ensure access by Native Americans to sacred sites, possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. Not applicable.

#### 4. Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Compliance: Public notice of the availability of this report to the Environmental Protection Agency is required for compliance pursuant to Section309 of the Clean Air Act. Record of Non Applicability of general conformity rule shows compliance with Section 176(c).

5. Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 <u>et seq</u>.

Compliance: A Section 404(b)(1) Evaluation and Compliance Review have been incorporated into this report. A Water Quality Certification pursuant to Section 401 of the Clean Water Act has been received from the state.

#### 6. Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 et seq.

Compliance: A CZM consistency determination pursuant to Section 307 of the Coastal Zone Management Act to determine that the proposed project is consistent to the maximum extent possible with the MA Office of Coastal Zone Management program was provided to the State for review and concurrence. Concurrence was received on April 6, 2015.
7. Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Compliance: Coordination is on going with the U.S. Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) with the presumption that no formal consultation is required pursuant to Section 7 of the Endangered Species Act.

#### 8. Estuary Protection Act, 16 U.S.C. 1221 et seq.

Compliance: Not applicable. This report is not being submitted to Congress.

9. Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.

Compliance: Public notice of availability of this report to the National Park Service (NPS) and Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

10. Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.

Compliance: Coordination with the USFWS, NMFS, and Massachusetts Department of Marine Fisheries signifies compliance with the Fish and Wildlife Coordination Act.

11. Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4 et seq.

Compliance: Public notice of the availability of this report to the National Park Service (NPS) and the Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

12. Marine Protection, Research, and Sanctuaries Act of 1971, as amended, 33 U.S.C. 1401 <u>et seq</u>.

Compliance: Not applicable; project does not involve the transportation nor disposal of dredged material in ocean waters pursuant to Sections 102 and 103 of the Act, respectively.

13. National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.

Compliance: Coordination with the State Historic Preservation Office signifies compliance.

14. Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3000-3013, 18 U.S.C. 1170

Compliance: Regulations implementing NAGPRA will be followed if discovery of human remains and/or funerary items occur during implementation of this project.

15. National Environmental Policy Act of 1969, as amended, 42 U.S.C 4321 et seq.

Compliance: Preparation of this Environmental Assessment signifies partial compliance with NEPA. Full compliance shall be noted at the time the Finding of No Significant Impact is signed.

16. Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.

Compliance: No requirements for USACE's projects or programs authorized by Congress. The proposed maintenance dredging has been Congressionally approved under the Continuing Authority program of the Rivers and Harbors Act.

17. Watershed Protection and Flood Prevention Act as amended, 16 U.S.C 1001 et seq.

Compliance: Floodplain impacts must be considered in project planning.

18. Wild and Scenic Rivers Act, as amended, 16 U.S.C 1271 et seq.

Compliance: Not applicable, project area is not a Wild or Scenic River.

19. Magnuson-Stevens Act, as amended, 16 U.S.C. 1801 et seq.

Compliance: Coordination with the National Marine Fisheries Service and preparation of an Essential Fish Habitat (EFH) Assessment signifies compliance with the EFH provisions of the Magnuson-Stevens Act. Response to the EFH conservation recommendation completes EFH compliance.

20. Coastal Barrier Resources Act, as amended, 16 U.S.C. 3501 et seq.

Compliance: The proposed placement site of Town Neck Beach is adjacent (just west of) to CBRS Town Neck Unit-14P (10/24/1990). This is an otherwise protected unit that no flood insurance can be issued for this area. Placement of material on the adjacent beach would have no impact on this unit.

### **13.2 Executive Orders**

1. Executive Order 11593, Protection and Enhancement of the Cultural Environment, 13 May 1971.

Compliance: Coordination with the State Historic Preservation Officer signifies compliance.

2. Executive Order 11988, Floodplain Management, 24 May 1977 amended by Executive Order 12148, 20 July 1979.

Compliance: Public notice of the availability of this report or public review fulfills the requirements of Executive Order 11988, Section 2(a) (2).

3. Executive Order 11990, Protection of Wetlands, 24 May 1977.

Compliance: Not applicable; project does not involve nor impact Federal wetlands.

4. Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, 4 January 1979.

Compliance: Not applicable; project is located within the United States.

5. Executive Order 12898, Environmental Justice, 11 February 1994.

Compliance: Not applicable; project is not expected to have a disproportionate impact on minority or low income population, or any other population in the United States.

## 6. Executive 13007, Accommodation of Sacred Sites, 24 May 1996

Compliance: Not applicable unless on Federal lands, then agencies must accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites.

7. Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, 21 April 1997.

Compliance: Not applicable; the project would not create a disproportionate environmental health or safety risk for children.

# 8. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, 6 November 2000.

Compliance: Consultation with Indian Tribal Governments, where applicable, and consistent with executive memoranda, DoD Indian policy, and Corps Tribal Policy Principals signifies compliance.

## 13.3 Executive Memorandum

1. Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, 11 August 1980.

Compliance: Not applicable; project does not involve or impact agricultural lands.

2. White House Memorandum, Government-to-Government Relations with Indian Tribes, 29 April 1994.

Compliance: Consultation with Federally Recognized Indian Tribes, where appropriate, signifies compliance.

#### FINDING OF NO SIGNIFICANT IMPACT Cape Cod Canal Maintenance Dredging Project Buzzards Bay & Cape Cod Bay, Massachusetts

The Cape Cod Canal Federal navigation project provides for an open canal 32 feet deep mean lower low water (MLLW) for a width of 540 feet in the land cut, 500 feet in a straight channel in Buzzards Bay to Wings Neck and 700 feet wide beyond the Wings Neck. The latter portion of the channel, shown on coastal charts as ending in the vicinity of Cleveland Ledge, actually continues about 3,000 feet beyond the lighthouse to deep water. There are two mooring basins: the west mooring basin on the south side near Hog Island about 3,300 feet long, about 350 feet wide and 32 feet deep, and the east mooring basin on the north side of the channel at Sandwich, about 2,500 feet long, about 350 feet wide and 25 feet deep. Currently shoaling has occurred in several areas of the project (specifically the near the south jetty, east mooring basin and adjacent channel, adjacent to both sides of the Sagamore Bridge, and an area by Onset Point) and the controlling depth is now at 30 feet below Mean Lower Low Water. This reduction is substantial and has already caused tidal delays for some of the deep draft commercial vessels moving through the Canal. Shoaling in the east mooring basin limits the available space to moor vessels in emergencies (e.g. icing).

The proposed work involves maintenance dredging and advanced maintenance dredging of approximately 150,000 cubic yards of clean sand and gravel from six shoals within the 32 feet deep channel and the 25 feet deep east mooring basin. In order to extend the time between dredge events, advanced maintenance will be conducted to reduce the sand wave shoals. The East Mooring Basin will be dredged to -32 feet and the depth of the channel will vary from -34 to -38 feet deep MLLW all with an additional 2 feet allowable overdepth. A hydraulic hopper dredge will be used to perform the proposed work. The dredged material will be placed on Town Neck Beach, Sandwich, Massachusetts or disposed of at the previously used open water disposal site, the Cape Cod Canal Disposal Site (CCCDS). Town Neck Beach is located adjacent to the south breakwater of the canal, and the placement will occur on the section of the beach seaward of the houses. The CCCDS is located approximately 3 nautical miles northeast of Cape Cod Canal Buoy #1 in Cape Cod Bay with the coordinates of the center point at 41° 49' 00" N, 70° 25' 00"W. The urgency to remove the shoals from the canal for safety concerns with disposal at CCCDS will take precedence over any the beneficial use alternatives of the dredged material (beach nourishment). The possibility of using dredged material from the Cape Cod Canal beneficially as a sand source to replenish eroded areas on Town Neck Beach is highly contingent upon the schedule for completion of the Section 204 study or the town financing the entire cost over the costs to place the material at CCCDS. The proposed work will take approximately three to four months to complete.

Due to the clean nature of the material to be dredged, it is determined that dredging and placement/disposal operations will have no significant long-term adverse impacts upon water quality outside of temporary turbidity and sedimentation localized to

the immediate areas of dredging and placement/disposal activities. The material to be dredged has been determined to be suitable for beach nourishment or open water disposal.

Biological impacts of the proposed work would consist of a temporary loss of benthic community at the dredging and disposal sites. However, these organisms will be replaced by recolonization of species from adjacent areas. If the material is placed on Town Neck Beach some rocky intertidal habitat that has been exposed due to erosion will be covered by sand and the functional habitat will be temporarily lost until the rocks are exposed once again by erosion and there is recruitment of algae and benthic organisms.

I find that based on the evaluation of environmental effects discussed in this document, the decision on this application is not a major federal action significantly affecting the quality of the human environment. Under the Council on Environmental Quality (CEQ) NEPA regulations, "NEPA significance" is a concept dependent upon context and intensity (40 C.F.R. § 1508.27). When considering a site-specific action like the proposed project, significance is measured by the impacts felt at a local scale, as opposed to a regional or nationwide context. The CEQ regulations identify a number of factors to measure the intensity of impact. These factors are discussed below, and none are implicated here to warrant a finding of NEPA significance. A review of these NEPA "intensity" factors reveals that the proposed action would not result in a significant impact—neither beneficial nor detrimental--to the human environment.

<u>Impacts on public health or safety</u>: The project is expected to have no effect on public health and safety.

<u>Unique characteristics</u>: The Cape Cod Canal is 17 miles long and connects Cape Cod Bay to Buzzards Bay. It is used for recreation and passage by commercial vessels. There are no unique environmental characteristics in this area that would be impacted by maintenance dredging of the Federal channel or mooring basin. There are no unique characteristics at the CCCDS disposal site. Some rocky intertidal habitat will be temporarily impacted due to burial, but the sand is expected to erode due to natural wave processes and storms and expose the rock once again.

<u>Controversy</u>: The proposed project is not controversial. State and federal resource agencies agree with the USACE's impact assessment.

<u>Uncertain impacts</u>: The impacts of the proposed project are not uncertain; they are readily understood based on past experiences from this project and other similar USACE projects.

<u>Precedent for future actions</u>: The proposed project is maintenance of an authorized project and will not establish a precedent for future actions other than future maintenance activities.

<u>Cumulative significance</u>: As discussed in the EA, to the extent that other actions are expected to be related to project as proposed, the majority of these actions will provide little measurable cumulative impact. Additional placement of sediments on the rocky intertidal habitat beyond this project would need to be reviewed as this would impact the recovery of habitat, although the rock was originally covered by sand until the sand transport to the area was interrupted.

<u>Historic resources</u>: The project will have no known negative impacts on any precontact archaeological sites recorded by the State of Massachusetts.

Endangered species: The project will have no known adverse impacts on any State or Federal threatened or endangered species or designated critical habitat for such species. A marine mammal observer will be aboard vessels transiting between the Canal and CCCDS during the period of January 1 through May 31. If a hopper dredge is used, no work will occur between June 1 and October 31 to protect sea turtles. To protect the piping plovers no placement of dredged material on Town Neck Beach will occur between April 1 and August 31 and the town of Sandwich will be responsible for monitoring the beach during the nesting season. To protect the roseate tern foraging habitat efforts will be made to complete all work in the Onset shoal area near Mashnee Flats prior to May 1 if the material is to be brought to CCCDS.

<u>Potential violation of state or federal law</u>: This action will not violate federal or state laws.

Measures to minimize adverse environmental effects of the proposed action are discussed in Section 10 of the EA.

Based on my review and evaluation of the environmental effects as presented in the Environmental Assessment, I have determined that the Cape Cod Canal maintenance dredging project in Sandwich and Bourne, Massachusetts is not a major Federal action significantly affecting the quality of the human environment. This project, therefore, is exempt from requirements to prepare an Environmental Impact Statement.

4 MAYS

Date

Christopher J. Barron Colonel, Corps of Engineers District Engineer

#### NEW ENGLAND DIVISION U.S. ARMY CORPS OF ENGINEERS, CLEAN WATER ACT SECTION 404 (b)(1) EVALUATION

<u>PROJECT</u>: Maintenance Dredging of the Federal Navigation Project at the Cape Cod Canal, Cape Cod Bay and Buzzards Bay, Massachusetts

PROJECT MANAGERS:	Bill Kavanaugh	<u>EXT</u> .	978-318-8326
	Michael Riccio	<u>EXT</u> .	978-318-8685
FORM COMPLETED BY:	Valerie Cappola	<u>EXT</u> .	978-318-8067

### PROJECT DESCRIPTION:

The Cape Cod Canal Federal navigation project provides for an open canal 32 feet deep mean lower low water (MLLW) for a width of 540 feet in the land cut, 500 feet in a straight channel in Buzzards Bay to Wings Neck and 700 feet wide beyond the Wings Neck. The latter portion of the channel, shown on coastal charts as ending in the vicinity of Cleveland Ledge, actually continues about 3,000 feet beyond the lighthouse to deep water. There are two mooring basins: the west mooring basin on the south side near Hog Island about 3,300 feet long, about 350 feet wide and 32 feet deep, and the east mooring basin on the north side of the channel at Sandwich, about 2,500 feet long, about 350 feet wide and 25 feet deep. Currently shoaling has occurred in several areas of the project (specifically the near the south jetty, east mooring basin and adjacent channel, adjacent to both sides of the Sagamore Bridge, and an area by Onset Point) and the controlling depth is now at 30 feet below Mean Lower Low Water. This reduction is substantial and has already caused tidal delays for some of the deep draft commercial vessels moving through the Canal. Shoaling in the east mooring basin limits the available space to moor vessels in emergencies (e.g. icing).

The proposed work involves maintenance dredging and advanced maintenance dredging of approximately 150,000 cubic yards of clean sand and gravel from six shoals within the 32 feet deep channel and the 25 feet deep east mooring basin. In order to extend the time between dredge events, advanced maintenance will be conducted to reduce the sand wave shoals. The East Mooring Basin will be dredged to -32 feet and the depth of the channel will vary from -34 to -38 feet deep MLLW all with an additional 2 feet allowable overdepth. A hydraulic hopper dredge will be used to perform the proposed work. The dredged material will be placed on Town Neck Beach, Sandwich, Massachusetts or disposed of at the previously used open water disposal site, the Cape Cod Canal Disposal Site (CCCDS). Town Neck Beach is located adjacent to the south breakwater of the canal, and the placement will occur on the section of the beach seaward of the houses. The CCCDS is located approximately 3 nautical miles northeast of Cape Cod Canal Buoy #1 in Cape Cod Bay with the coordinates of the

center point at 41° 49' 00" N, 70° 25' 00"W. The urgency to remove the shoals from the canal for safety concerns with disposal at CCCDS will take precedence over any the beneficial use alternatives of the dredged material (beach nourishment). The possibility of using dredged material from the Cape Cod Canal beneficially as a sand source to replenish eroded areas on Town Neck Beach is highly contingent upon the schedule for completion of the Section 204 study or the town financing the entire cost over the costs to place the material at CCCDS. The proposed work will take approximately three to four months to complete.

## 1. <u>Review of Compliance (Section 230.10(a)-(d)).</u>

		YES	NO
a.	The discharge represents the least environmentally damaging	Х	
	practicable alternative and if in a special aquatic site, the activity		
	associated with the discharge must have direct access or proximity		
	to, or be located in the aquatic ecosystem to fulfill its basic purpose.		
b.	The activity does not appear to: 1) violate applicable state water	Х	
	quality standards or effluent standards prohibited under Section 307		
	of the CWA; 2) jeopardize the existence of Federally listed		
	threatened and endangered species or their habitat; and 3) violate		
	requirements of any Federally designated marine sanctuary.		
с.	The activity will not cause or contribute to significant degradation	Х	
	of waters of the U.S. including adverse effects on human health, life		
	stages of organisms dependent on the aquatic ecosystem, ecosystem		
	diversity, productivity and stability, and recreational, aesthetic, and		
	economic values.		
d.	Appropriate and practicable steps have been taken to minimize	Х	
	potential adverse impacts of the discharge on the aquatic		
	ecosystem.		

## 2. <u>Technical Evaluation Factors (Subparts C-F).</u>

			Not		
		N/A	Significant	Significant	
a.	Potential Impacts on Physical and Chemical Cha	racterist	ics of the Aqua	atic	
	Ecosystem (Subpart C)		1		
	1) Substrate		X		
	2) Suspended particulates/turbidity		X		
	3) Water column impacts		X		
	4) Current patterns and water circulation	Х			
	5) Normal water fluctuations	Х			
	6) Salinity gradients	Х			
b.	Potential Impacts on Biological Characteristics of	of the Aq	uatic Ecosyste	em (Subpart	
	D)				
	1) Threatened and endangered species		X		
	2) Fish, crustaceans, mollusks, and other		X		
	organisms in the aquatic food web				
	3) Other wildlife (mammals, birds, reptiles,		X		
	and amphibians)				
с.	Potential Impacts on Special Aquatic Sites (Subpart E).				
	1) Sanctuaries and refuges		X		
	2) Wetlands	X			
	3) Mud flats	Х			

			N/A	Not Significant	Significant
	4)	Vegetated shallows		X	
	5)	Coral reefs	X		
	6)	Riffle and pool complexes	X		
d.	Pot	ential Effects on Human Use Characteristics	(Subpart	F).	
	1)	Municipal and private water supplies	X		
	2)	Recreational and commercial fisheries		Х	
	3)	Water-related recreation		Х	
	4)	Aesthetics impacts		Х	
	5)	Parks, national and historic monuments,	X		
		national seashores, wilderness areas,			
		research sites and similar preserves			

## 3. Evaluation and Testing (Subpart G).

a.	The following information has been considered in evaluating the biological			
	availability of possible contaminants in dredged or fill material. (Check only those			
	appropriate.)			
	1)	Physical characteristics	Х	
	2)	Hydrography in relation to known or anticipated sources of contaminants	Х	
	3)	Results from previous testing of the material or similar material in the vicinity of the project	Х	
	4)	Known, significant sources of persistent pesticides from land runoff or percolation		
	5)	Spill records for petroleum products or designated hazardous substances (Section 311 of CWA)	Х	
	6)	Public records of significant introduction of contaminants from industries, municipalities, or other sources.		
	7)	Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities		
	8)	Other sources (specify)		
	List appropriate references. See Environmental Assessment for Maintenance			
	Dre	edging of the Cape Cod Canal, Cape Cod Bay and Buzzards Bay Massachu	isetts	

		YES	NO
b.	An evaluation of the appropriate information in 3a above indicates	Х	
	that there is reason to believe the proposed dredged material is not a		
	carrier of contaminants or that levels of contaminants are		
	substantively similar at extraction and disposal sites and not likely to		
	require constraints. The material meets the testing exclusion criteria.		

### 4. <u>Disposal Site Delineation (Section 230.11(f)).</u>

a.	The following information has been considered in evaluating the biological			
	availability of possible contaminants in dredged or fill material. (Check only the			
	appropriate.)			
	1) Depth of water at disposal site		Х	
	2) Current velocity, direction, variability at disposal site		Х	
	3) Degree of turbulence			
	4) Water column stratification			
	5) Discharge vessel speed and direction		Х	
	6) Rate of discharge		Х	
	7) Dredged material characteristics (constituents, amount, and type of		Х	
	material, settling velocities)			
	8) Number of discharges per unit of time			
	9) Other factors affecting rates and patterns of mixing (specify)			
	List appropriate references. See Environmental Assessment for Maintenance			
	Dredging of the Cape Cod Canal, Cape Cod Bay and Buzzards Bay Massachus			
	Y	YES	NO	
b.	An evaluation of the appropriate information factors in 4a above	Х		
	indicated that the disposal sites and/or size of mixing zone are			
	acceptable.			

## 5. Actions to Minimize Adverse Effects (Subpart H).

	YES	NO
All appropriate and practicable steps have been taken, through	X	
application of recommendation of Section 230.70-230.77 to ensure		
minimal adverse effects of the proposed discharge.		

## List actions taken

See Cape Cod Canal Maintenance Dredging Environmental Assessment

## 6. Factual Determination (Section 230.11).

A review of appropriate information, as identified in Items 2-5 above, indicates there is minimal potential for short or long term environmental effects of the proposed discharge as related to:

		YES	NO
a.	Physical substrate at the disposal site (review Sections 2a, 3, 4, and	X	
	5 above)		
b.	Water circulation fluctuation and salinity (review Sections 2a, 3, 4,	X	
	and 5)		
с.	Suspended particulates/turbidity (review Sections 2a, 3, 4 and 5)	X	
d.	Contaminant availability (review Sections 2a, 3, and 4)	X	
e.	Aquatic ecosystem structure, function and organisms (review	Х	
	Sections 2b and 2c, 3, and 5)		
f.	Proposed disposal site (review Sections 2, 4, and 5)	Х	
g.	Cumulative effects on the aquatic ecosystem	X	
h.	Secondary effects on the aquatic ecosystem	X	

#### 7. Findings of Compliance or Non-compliance

· · · · · · · · · · · · · · · · · · ·	YES	NO
The proposed disposal site for discharge of dredged or fill material	Х	
complies with the Section 404(b)(1) guidelines.		Į

nrY 1

Date

Christopher J. Barron Colonel, Corps of Engineers District Engineer

6

## APPENDIX A- COORDINATION LETTERS



Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker Governor Matthew A. Beaton Secretary

Karyn E. Polito Lieutenant Governor Martin Suuberg Commissioner

April 3, 2015

William Kavanaugh U.S. Army Corps of Engineers 696 Virginia Road Concord, MA 01742

Re: Re-issue 401 WATER QUALITY CERTIFICATION Application for BRP WW 07, Major project dredging

At: Cape Cod Bay/Buzzards Bay -- Cape Cod Canal, BOURNE, SANDWICH

401 WQC Transmittal №: X264655 Wetlands File №: N/A ACoE Application №: N/A

Dear Mr. Kavanaugh:

The Department has reviewed your application for Water Quality Certification (WQC), as referenced above. In accordance with the provisions of Section 401 of the Federal Clean Water Act as amended (33 U.S.C. §1251 et seq.), MGL c.21, §§ 26-53, and 314 CMR 9.00, it has been determined there is reasonable assurance the project or activity will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law.

The waters of Cape Cod Canal are designated in the Massachusetts Surface Water Quality Standards as Class SB. Waters of Cape Cod Bay and Buzzards Bay are designated in the Massachusetts Surface Water Quality Standards as Class SA. Class SA waters are intended "as excellent habitat" and Class SB waters are intended as "habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation." Anti-degradation provisions of these Standards require that "existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

<u>Background</u>: The authorized Cape Cod Canal (CCC) Federal Authorized Navigation Channel consists of the following:

Two jetties, total length of 600 feet; 3000 feet long backwater at the east end of the Canal; 17.5 mile long channel with a depth of -32 ft MLW and various widths; West Mooring Basin (WMB) with a depth of -32 ft MLW; East Mooring Basin (EMB) with a depth of -25 ft MLW.

This information is available in alternate format. Call Michelle Waters-Ekanem, Diversity Director, at 617-292-5751. TTY# MassRelay Service 1-800-439-2370 MassDEP Website: www.mass.gov/dep

Printed on Recycled Paper

401 Water Quality Certification, ACoE Cape Cod Canal Dredging, Bourne and Sandwich Transmittal №: X264665 Cape Cod Bay and Buzzards Bay and Town Neck Beach nourishment Page 2 of 8

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the canal. These conditions increase the risk of grounding within the canal and create a hazardous situation for deep draft vessels.

On August 27, 1998, the Department issued a 401 Water Quality Certification, Transmittal No. P24673, to the U.S. Army Corps of Engineers (ACoE) to conduct maintenance dredging at the east and west ends of the Canal. Similar work was done also in 1990.

Maintenance dredging was last done in 2010 under a 401 Water Quality Certification issued on December 10, 2009, transmittal No. X224618.

<u>Proposed project</u>: This project consists of the maintenance dredging of approximately 150,000 yd<sup>3</sup> of sediment from six areas in the main-ship channel and EMB. In order to reduce the frequency of maintenance dredging, advance maintenance dredging is being proposed to reduce the sand wave shoals in the surrounding environment. The shoal areas in the authorized 32-foot deep main-ship channel will be dredged to depths ranging from -36 feet Mean Low Low Water (MLLW) to -40 feet MLLW, which includes 2 feet of overdredge. The shoal areas in the authorized 25 foot deep EMB will be dredged to -34 feet MLLW.

The six shoal areas and corresponding dredge depths are:

- East Mooring Basin, dredge depth -32' MLLW;
- 2. East Mooring Basin Channel, dredge depth -38' MLLW;
- 3. South Breakwater, dredge depth -38' MLLW;
- 4. Onset, dredge depth -37' MLLW;
- 5. West Sagamore, dredge depth -37' MLLW;
- 6. East Sagamore, dredge depth -34' MLLW.

The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during late fall of 2015 to early spring of 2016. The dredged material will be pumped to Town Neck Beach in Sandwich to be beneficially reused as nourishment material.

The Town of Sandwich submitted an Expanded Environmental Notice Form (ENF) for the construction and restoration of Town Neck Beach (EEA file # 15213), and received a Certificate dated July 18, 2014 from the Secretary of Energy and Environmental Affairs. The proposed project would restore approximately 5,000 linear feet of barrier beach and coastal dune habitat. Approximately 388,000 yd<sup>3</sup> of beach compatible sand would be used to nourish the barrier beach and to create a dune system. Of this volume, 150,000 yd<sup>3</sup> of dredged material would be from the six shoal areas.

The Town of Sandwich received an Order of Conditions from the Sandwich Conservation Commission and is in the process of preparing a Chapter 91 application for construction and restoration of Town Neck Beach.

<u>Rare Species and Rare Wildlife Habitat</u>: The proposed dredge areas in the East Mooring Basin, East Mooring Basin Channel and Onset are located within the Priority Habitats of Rare Species, Estimated Habitats of Rare Wildlife, in accordance with the Massachusetts Natural Heritage Atlas, 13<sup>th</sup> Edition. The Department contacted the Natural Heritage Endangered Species Program (NHESP) of Mass Division Fisheries and Wildlife during the preparation of the 401 Water Quality Certification, ACoE Cape Cod Canal Dredging, Bourne and Sandwich Transmittal №: X264665 Cape Cod Bay and Buzzards Bay and Town Neck Beach nourishment Page 3 of 8

December 10, 2008 401 WQC. At that time, NHESP confirmed that there would not be any restrictions or conditions for the Cape Cod Canal maintenance dredging and filing per the Massachusetts Endangered Species Act (MESA) would not be required.

However, the proposed nourishment footprint at Town Neck Beach will have an impact on the nesting and foraging habitat of state and federally listed birds. In its comment letter to EEA during the MEPA review, NHESP recommended that the proponent (i.e. Town of Sandwich) consult with NHESP in developing a Massachusetts Endangered Species Act (MESA) permitting plan that will take into account the benefits of beach nourishment and minimize/mitigate any short and long-term impacts associated with the project.

<u>Sediment sampling data</u>: Results of the grain-size analysis performed in 1996 showed the sediment consisted of mainly sand with one percent or less of silt/clay. The Department has no reason to suspect the sediment is not mainly sand and this can be easily verified during beach nourishment. For future maintenance dredging, the ACoE should provide an updated grain-size analysis of the sediment in the Cape Cod Canal.

<u>Beneficial Reuse of sediments</u>: The proposed dredged material has been designated as beach nourishment material at Town Neck Beach in the Town of Sandwich. As a contingency, the dredged material can be disposed of at the Cape Cod Bay Disposal Site (CCBDS). A Suitability Determination dated October 23, 2014 is included in the 401 application.

<u>Public Notice</u>: The public notice of the 401 WQC application was published in the Cape Cod Times on February 24, 2015. The Department did not receive any comment during the 21-day public comment period, which ended on March 17, 2015.

<u>Section 61 Findings</u>: As the applicant, ACoE did not prepare an Environmental Notice (ENF) or Environmental Impact Report (EIR) in accordance with M.G.L. Chapter 30, Sections 61 to 62H including (M.E.P.A.) claiming sovereign immunity<sup>1</sup> from MEPA, but instead prepared a Feasibility Report, Environmental Assessment, and a Finding of No Significant Impact (FONSI) as required under the National Environmental Policy Act (NEPA).

Therefore, based on information currently in the record, the Department grants a 401 Water Quality Certification for this project subject to the following conditions to maintain water quality, to minimize impact on waters and wetlands, and to ensure compliance with appropriate state law. The Department further certifies in accordance with 314 CMR 9.00 that there is reasonable assurance the project or activity will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law. Finally, the Department has determined that upon satisfying the conditions and mitigation requirements of this approval, the project provides a level of water quality necessary to protect existing uses and accordingly finds that the project as implemented satisfies the Surface Water Quality Standards at 314 CMR 4.00.

 The Contractor shall take all steps necessary to assure that the proposed activities will be conducted in a manner that will avoid violations of the anti-degradation provisions of Massachusetts Surface Water Quality Standards that protect all waters, including wetlands.

<sup>&</sup>lt;sup>1</sup> There is ambiguity regarding the scope of sovereign immunity with regard to state regulation of the proposed activity, pursuant to the Clean Water Act, 33 U.S.C. § 1251. The Department does not address this issue at this time and reserves all rights to assert jurisdiction relative to the Clean Water Act in future projects.

401 Water Quality Certification, ACoE Cape Cod Canal Dredging, Bourne and Sandwich Transmittal №: X264665 Cape Cod Bay and Buzzards Bay and Town Neck Beach nourishment Page 4 of 8

- 2. Prior to the start of work, the Department shall be notified of any change(s) in the proposed project or plans that may affect waters or wetlands. The Department will determine whether the change(s) require a revision to this Certification.
- 3. Dredging in accordance with this Certification may begin following the 21-day appeal period and once all other permits have been received.
- 4. Work in waters and wetlands shall conform substantially to the February 10, 2015 correspondence to the Wetlands and Waterway Program, and the February 2015 Environmental Assessment, Findings of No Significant Impact and Clean Water Act Section 404(b)(1) Evaluation, and preliminary plan, consisting of 13 sheets, prepared by the U.S. Army Corps of Engineers, New England District, submitted in the 401 application to this Department. The Department shall be notified if there are modifications and or deletions of work as specified in the plans. Depending on the nature and the scope of the change, approval by the Department may be required.
- 5. The Department shall be notified, attention Ken Chin 617-292-5893, one week prior to the start of in-water work so that Department staff may inspect the work for compliance with the terms and conditions of this Certification.
- 6. The Certification remains in effect for a duration of five years.
- 7. Future maintenance dredging may be conducted as necessary for the duration of this Certification, provided that:
  - a. the initial project and any subsequent dredging has been conducted satisfactorily with no violations of the terms and conditions of this Certification or any violations which did occur have been resolved to the satisfaction of the Department;
  - b. information is submitted to the Department regarding final end use/disposal of the dredged material for review and approval. Under no circumstances may future maintenance dredging be conducted without obtaining approval from the Department for final end use/disposal. No further approval from the Department will be required if the reuse locations are selected based on the Section 204 Study;
  - c. the grain-size distribution of the sediment to be dredged is compatible with the grainsize distribution of the <u>approved</u> receiving beach(es), and such compatability is documented, in accordance with the document entitled Beach Nourishment, Mass DEP's Guide to Best Management Practices for Projects in Massachusetts, March 2007;
  - d. an updated suitability determination from the ACoE for unconfined ocean disposal is submitted to the Department;
  - e. a due-diligence evaluation to determine that no known spills of oil or other toxic substances have occurred which could have contaminated the sediment in the dredge area is completed and submitted to the Department;
  - f. the volume of future maintenance dredging does not exceed 250,000 cubic yards; and
  - g. the Department is notified prior to commencement of maintenance dredging.
- 8. Disposal of any volume of dredged material at any location in tidal waters is subject to approval by this Department and the Massachusetts Coastal Zone Management office.

401 Water Quality Certification, ACoE Cape Cod Canal Dredging, Bourne and Sandwich Transmittal №: X264665 Cape Cod Bay and Buzzards Bay and Town Neck Beach nourishment Page 5 of 8

- 9. There shall be no equipment such as pipes placed within 25 feet of the edge of the eelgrass bed when pumping the sediment onto Town Neck Beach.
- 10. Run-off from the sediment slurry after it is pumped on Town Neck Beach shall be directed <u>away</u> from the two eelgrass areas as shown on the plan.
- 11. A 75 foot buffer area shall be maintained between the landward edge of the eelgrass bed and the seaward edge of the intertidal nourishment.
- 12. In order to minimize impacts to adult horseshoe crabs preparing to spawn on the bordering beach, no dredging shall occur between May 1<sup>st</sup> and June 30<sup>th</sup> at the Onset Shoal area.
- 13. The applicant, or their contractor, shall make every feasible effort to complete the project within the permitted timeframe. Should the applicant, or their contractor, fail to complete the project and wish to request an amendment to the Certification for incursion into the no-dredge period, the written request shall be received by the Department by April 15<sup>th</sup>. The following information shall be included in the request:
  - a. project location and transmittal number,
  - b. the date on which dredging started,
  - c. the number of days and hours per day the dredge operated,
  - d. expected daily average production rate and the actual daily average production rate,
  - e. an explanation of why the project failed to remain on schedule,
  - f. an account of efforts made to get the project back on schedule,
  - g. a plan depicting the areas that remain to be dredged,
  - h. the number of cubic yards that remain to be dredged,
  - i. an accurate estimate of the number of days required to complete the project,
  - j. an evaluation of the impact of continued dredging on the species of concern,
  - k. a description of any efforts that will be made to minimize the impacts of the project on the species of concern, and a realistic assessment of any societal/financial effects of a denial of permission to continue dredging.

The Department will share the information with other resource agencies and a decision to grant or deny the amendment shall be made by May 1<sup>st</sup>. Requests for amendment received after April 15<sup>th</sup> will be considered at the Department's discretion.

- 14. Within 30 days of the completion of the initial dredging, and any future maintenance dredging to be conducted, a bathymetric survey of the dredged area in the main-ship channel and east mooring basin depicting post-dredge conditions shall be conducted. At a minimum, the survey shall include an overlay of the dredge footprint (i.e. top of slope) with sufficient coordinates in the Massachusetts State Plane (e.g. longitude and latitude) to clearly delineate the dredge footprint. The survey shall be sent within five working days after its completion to the Department and a copy shall be sent to the Massachusetts Coastal Zone Management office, attention: Robert Boeri.
- 15. No later than four weeks after issuance of the Certification, the applicant shall submit a notification procedure outlining the reporting process to the Department for incidents relating to the dredging activities impacting surrounding resource areas and habitats such as, but not limited to, observed dead or distressed fish or other aquatic organisms, observed oily sheen on surface water, sediment spill, turbidity plume beyond the deployed BMPs, and

barging or equipment accident/spill. If at any time during implementation of the project any incident creates environment impacts such as those listed above, all site related activities impacting the water shall cease until the source of the problem is identified and adequate mitigating measures employed to the satisfaction of the Department.

This certification does not relieve the applicant of the obligation to comply with other applicable state or federal statutes or regulations. Any changes made to the project as described in the previously submitted Notice of Intent, 401 Water Quality Certification application, or supplemental documents will require further notification to the Department.

Certain persons shall have a right to request an adjudicatory hearing concerning certifications by the Department when an application is required:

- a. the applicant or property owner;
- b. any person aggrieved by the decision who has submitted written comments during the public comment period;
- c. any ten (10) persons of the Commonwealth pursuant to M.G.L. c.30A where a group member has submitted written comments during the public comment period; or
- d. any governmental body or private organization with a mandate to protect the environment, which has submitted written comments during the public comment period.

Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of public notice. To request an adjudicatory hearing pursuant to M.G.L. c.30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to the Department, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one (21) days from the date of issuance of this Certificate, and addressed to:

Case Administrator Department of Environmental Protection One Winter Street, 2<sup>nd</sup> Floor Boston, MA 02108

A copy of the request shall at the same time be sent by certified mail or hand delivery to the issuing office of the Wetlands and Waterways Program at:

Department of Environmental Protection One Winter Street, 5<sup>th</sup> Floor Boston, MA 02108

A Notice of Claim for Adjudicatory Hearing shall comply with the Department's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

a. the 401 Certification Transmittal Number and DEP Wetlands Protection Act File Number;b. the complete name of the applicant and address of the project;

401 Water Quality Certification, ACoE Cape Cod Canal Dredging, Bourne and Sandwich Transmittal №: X264665 Cape Cod Bay and Buzzards Bay and Town Neck Beach nourishment Page 7 of 8

- c. the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
- d. if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
- e. a clear and concise statement that an adjudicatory hearing is being requested;
- f. a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the Department's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory hearing, including specifically the changes desired in the final written Certification; and
- g. a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the Department of Environmental Management (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars (\$100) must be mailed to:

Commonwealth of Massachusetts Department of Environmental Protection Commonwealth Master Lockbox P.O. Box 4062 Boston, MA 02211

The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. The Department may waive the adjudicatory-hearing filing fee pursuant to 310 CMR 4.06(2) for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

Failure to comply with this certification is grounds for enforcement, including civil and criminal penalties, under MGL c.21 §42, 314 CMR 9.00, MGL c. 21A §16, 310 CMR 5.00, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

401 Water Quality Certification, ACoE Cape Cod Canal Dredging, Bourne and Sandwich Transmittal №: X264665 Cape Cod Bay and Buzzards Bay and Town Neck Beach nourishment Page 8 of 8

If you have questions on this decision, please contact Ken Chin at 617-292-5893.

Sincerely,

Douglas E. Fine Assistant Commissioner Bureau of Water Resources

#### enclosure: Departmental Action Fee Transmittal Form

CC:

Sandwich Conservation Commission, 16 Jan Sebastian Drive, Sandwich, MA 02563 Bourne Conservation Commission, 24 Perry Avenue, Buzzards Bay, MA 02532

ecc: Karen Adams, Regulatory/Enforcement Division, U.S. Army Corps of Engineers, 696 Virginia Road, Concord, MA 01742-2751

Robert Boeri, CZM, 251 Causeway Street, Suite 800, Boston, MA 02114

Eileen Feeney, DMF, 838 South Rodney French Blvd., New Bedford, MA 02744

Amy Hoenig, DFW, Massachusetts Natural Heritage and Endangered Species Program, 1 Rabbit Hill Road, Westborough, MA 01581

David Hill, Liz Kouloheras, DEP SERO

KC/X264665



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

#### February 10, 2015

Programs and Project Management Division Civil Works/IIS Project Management Branch

Massachusetts Department of Environmental Protection ATTN: Mr. Ken Chin Division of Water Pollution Control One Winter Street Boston, Massachusetts 02108

Dear Mr. Chin:

I am writing to request 401 Water Quality Certification (WQC) for the placement/disposal of dredged material from the proposed maintenance dredging and advance maintenance dredging of the Cape Cod Canal (CCC) in Bourne and Sandwich, Massachusetts.

The authorized Federal Navigation Project (FNP) provides for a 600 feet long jetty and a 3000 feet long breakwater at the east end of the Canal; a channel, 32 feet deep and varying in width (i.e. from 500 – 700 feet) throughout its 17.5 mile length, and two mooring basins: the West Mooring Basin, 32 feet deep and the East Mooring Basin (EMB), 25 feet deep. A map depicting the FNP is enclosed for your reference.

The CCC connects Buzzards Bay and Cape Cod Bay. Use of the CCC saves mariners an average of 135 miles of coastwise travel while circumnavigating Cape Cod and the Nantucket shoals. Roughly 14,000 commercial and recreational vessels transit the 17.4 mile waterway each year. The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships and passenger ferries as well as recreational vessels. The FNP is part of the Intra-Coastal Waterway and is an integral segment of the corridor for petroleum products being delivered to the northeast region.

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the project. This combination creates hazardous conditions for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Shoaling in the main-ship channel consists of large sand wave formations. Recent hydrographic surveys indicate that shoaling has occurred in six areas of the project (see Enclosure 1) and the controlling depth in the Canal proper is now at 30' below Mean Lower Low Water (MLLW). The reduction in available depth is significant

and has resulted in draft restrictions being placed on vessels transiting the Canal, tidal delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor vessels in emergencies (e.g. icing). Further shoaling in the Canal may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod thereby significantly increasing the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas in the authorized, 32-feet deep by 500-feet wide, main-ship channel and the 25-feet deep EMB portions of the project. In order to extend the time between maintenance dredging events, advance maintenance is being proposed to reduce the sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 feet deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. The majority of the advance maintenance dredging will be performed in prism of the sand-waves (i.e. in the vertical dimension). The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

A study is currently underway under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project to rebuild the dunes and beach berm (i.e. to protect the homes in the area) on a 2,500 foot long eroded section of Town Neck Beach in Sandwich (See Enclosure 2). Town Neck Beach has experienced increased erosion (currently estimated to be about 5 feet per year) due in large part to severe coastal storms such as Hurricane Sandy and more recently, Winter Storm Juno.

The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and for the potential beach nourishment. If the 204 study is completed in time to coincide with this maintenance dredging event, and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay any additional costs over and

above the Federal base plan (i.e. dredging and placement of the material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach.

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the Cape Cod Canal Buoy #1. The center is located at 41° 49'N, 70° 25'W. The CCCDS is a previously used disposal site, last used for disposal of material from the Canal in 1990.

Enclosed (on CD) is a copy of our draft EA for your reference. All pertinent information necessary for establishing compliance with the State's water quality standards for placement of the material on Town Neck Beach or at the CCCDS are included in this letter and/or the enclosed draft EA. A legal advertisement notifying the public that an application for 401 WQC has been submitted to the Massachusetts Department of Environmental Protection will be printed in the newspaper in concert with our submittals to the Department. A copy of the notice will be sent to you when available.

Please feel free to contact me at (978) 318-8328 or Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067 if you have any questions or require additional information.

Sincerely,

Bill Kavanargh

Bill Kavanaugh Project Manager

Enclosures

Copy Furnished: via email

Ms Eileen Feeney, Division of Marine Fisheries; Eileen.Feeney@state.ma.us Ms. Amy Coman, Fish and Wildlife; Amy.Coman@state.ma.us



THE COMMONWEALTH OF MASSACHUSETTS EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS OFFICE OF COASTAL ZONE MANAGEMENT 251 Causeway Street, Suite 800, Boston, MA 02114-2136 (617) 626-1200 FAX: (617) 626-1240

April 6, 2015

Bill Kavanaugh Department of the Army U.S. Army Corps of Engineers New England District 696 Virginia Road Concord, MA 01742

Re: CZM Federal Consistency Review of the Cape Cod Canal FNP; Bourne and Sandwich.

Dear Mr. Kavanaugh:

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the proposed U.S. Army Corps of Engineers project to perform maintenance dredging of the Cape Cod Canal, with anticipated placement at Town Neck Beach in Sandwich.

We concur with your certification and find that the activity as proposed is consistent with the CZM enforceable program policies.

If the above-referenced general permit is modified in any manner, including any changes resulting from permit, license or certification revisions, including those ensuing from an appeal, or the general permit is noted to be having effects on coastal resources or uses that are different than originally proposed, it is incumbent upon the Corps to notify CZM, submit an explanation of the nature of the change pursuant to 15 CFR 930, and submit any modified state permits, licenses, or certifications. CZM will use this information to determine if further federal consistency review is required.

Thank you for your cooperation with CZM.

Sincerely,

Bruce K. Carlisle, Director

BKC/rlb CZM#14959



Karen Kirk Adams, Chief Regulatory Branch, US Army Corps of Engineers
Ben Lynch, Program Chief Wetlands and Waterways Regulation, MA DEP
Lealdon Langley Wetlands and Waterways Regulation, MA DEP
Ken Chin Water Quality Certification, MA DEP
Kathryn Ford, Project Review Coordinator MA DMF
Steve McKenna CZM Cape and Islands Regional Coordinator

cc:



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

February 10, 2015

Programs and Project Management Division Civil Works/IIS Project Management Branch

Mr. Robert Boeri Project Review Coordinator The Massachusetts Office of Coastal Zone Management 251 Causeway Street, Suite 800 Boston, Massachusetts 02114-2138

Dear Mr. Boeri:

I am writing to request your concurrence with our Coastal Zone Management Program Consistency Determination on our proposal to perform maintenance dredging and advance maintenance dredging of the Cape Cod Canal (CCC) in Bourne and Sandwich, Massachusetts.

The authorized Federal Navigation Project (FNP) provides for a 600 feet long jetty and a 3000 feet long breakwater at the east end of the Canal; a channel, 32 feet deep and varying in width (i.e. from 500 – 700 feet) throughout its 17.5 mile length, and two mooring basins: the West Mooring Basin, 32 feet deep and the East Mooring Basin (EMB), 25 feet deep. A map depicting the FNP is enclosed for your reference.

The CCC connects Buzzards Bay and Cape Cod Bay. Use of the CCC saves mariners an average of 135 miles of coastwise travel while circumnavigating Cape Cod and the Nantucket shoals. Roughly 14,000 commercial and recreational vessels transit the 17.4 mile waterway each year. The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships and passenger ferries as well as recreational vessels. The FNP is part of the Intra-Coastal Waterway and is an integral segment of the corridor for petroleum products being delivered to the northeast region.

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the project. This combination creates hazardous conditions for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Shoaling in the main-ship channel consists of large sand wave formations. Recent hydrographic surveys indicate that shoaling has occurred in six areas of the project (see Enclosure 1) and the controlling depth in the Canal proper is now at 30' below Mean Lower Low Water (MLLW). The reduction in available depth is significant and has resulted in draft restrictions being placed on vessels transiting the Canal, tidal

delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor vessels in emergencies (e.g. icing). Further shoaling in the Canal may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod thereby significantly increasing the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas in the authorized, 32-feet deep by 500-feet wide, main-ship channel and the 25-feet deep EMB portions of the project. In order to extend the time between maintenance dredging events, advance maintenance will be performed to reduce the sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 feet deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

As you know, a study is currently underway under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project to rebuild the dunes and beach berm (i.e. to protect the homes in the area) on a 2,500 foot long eroded section of Town Neck Beach in Sandwich (See Enclosure 2). Town Neck Beach has experienced increased erosion (currently estimated to be about 5 feet per year) due in large part to severe coastal storms such as Hurricane Sandy and more recently, Winter Storm Juno.

The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and for the potential beach nourishment. If the 204 study is completed in time to coincide with this maintenance dredging event, and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay any additional costs over and above the Federal base plan (i.e. dredging and placement of the material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach.

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the Cape Cod Canal Buoy #1. The center is located at 41° 49'N, 70° 25'W. The CCCDS is a previously used disposal site, last used for disposal of material from the Canal in 1990.

We have determined that the proposed work is consistent, to the maximum extent practicable, with the Massachusetts Coastal Zone Management Program policies and I am requesting your concurrence with our determination. Attached is information which is the basis for our consistency determination and enclosed on CD is a copy of the draft Environmental Assessment for this proposal. I would appreciate your concurrence with our consistency determination by April 10, 2015.

Please feel free to contact Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067 or myself at (978) 318-8328 if you have any questions or require additional information.

Sincerely,

Bill Kovanaugh

Bill Kavanaugh Project Manager

Enclosures

#### Coastal Zone Management Program Consistency Determination Cape Cod Canal Federal Navigation Project Sandwich and Bourne, Massachusetts

Below are the applicable enforceable policies of the Massachusetts Coastal Zone Management Program along with a Summary Statement below each Policy. Below each Policy and Summary Statement is pertinent information relative to the Corps of Engineers proposal to perform maintenance dredging and advance maintenance dredging in the Cape Cod Canal Federal Navigation Project (FNP) which is the basis for our Coastal Zone Management Program Consistency Determination.

#### **Coastal Hazards Policy #2**

Summary Statement: Ensure that construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. Flood or erosion control projects must demonstrate no significant adverse effects on the project site or adjacent or down-coast areas.

This proposal does not involve a flood control or an erosion control project. This proposal involves maintenance dredging and advance maintenance dredging of several areas of a Federally-authorized navigation project and the potential beneficial re-use of the dredged material on a public beach (Town Neck Beach). Alternatively, the dredged material may be disposed in a previously used open water disposal site (CCCDS). This proposal is not likely to adversely affect water circulation or sediment transport. In fact, if the material is placed onto Town Neck Beach as proposed, it will positively affect an area that has been sand-starved and eroded.

#### **Growth Management Policy #2**

Summary Statement: Ensure that state and federally funded infrastructure projects in the coastal zone primarily serve existing developed areas, assigning highest priority to projects that meet the needs of urban and community development centers.

The Cape Cod Canal is an authorized Federal Navigation Project (FNP) located in an already developed area. The Cape Cod Canal is the only Federal navigation project in the New England District to be identified in the Fiscal Year 2015 President's Budget denoting its ranking (nationally) as a high-use, high priority FNP. The dredging and placement/disposal of material from the Cape Cod Canal is required to allow for safe navigation through the Canal. Deep draft vessels along with the regional economy will be negatively impacted if the FNP is not maintained.

#### Habitat Policy #1

Summary Statement: Protect coastal, estuarine, and marine habitats—including salt marshes, shellfish beds, submerged aquatic vegetation, dunes, beaches, barrier beaches, banks, salt ponds, eelgrass beds, tidal flats, rocky shores, bays, sounds, and other ocean habitats—and coastal freshwater streams, ponds, and wetlands to preserve critical wildlife habitat and other important functions and services including nutrient and sediment attenuation, wave and storm damage protection, and landform movement and processes.

This proposal involves maintenance dredging and advance maintenance dredging of around 150,000 cubic yards of sand and gravel from a Federally-authorized navigation project and the potential beneficial re-use of the dredged material on Town Neck Beach. Alternatively, the dredged material may be placed at the previously used, Cape Cod Canal Disposal Site (CCCDS).

If the dredged material is placed on Town Neck Beach, the project will restore a 2,500 foot long sand starved and severely eroded section of Town Neck Beach in front of 33 properties along Freeman Avenue, White Path Lane, and Bay Beach Lane. The project will recreate the dunes and beach berm to similar conditions that could be found on the beach in 1952 and will result in an estimated annual benefits (i.e. in reducing impacts to structures and shorefront land parcels over five years) of over \$410,000. Absent any beach re-nourishment, we estimate that Town Neck Beach will continue to erode at a rate of 5 feet per year and eventually the homes along Freeman Avenue, White Path Lane, and Bay Beach Lane will be lost.

No significant adverse impacts are anticipated to any; salt marshes, shellfish beds, banks, salt ponds, tidal flats, bays, sounds, vegetation, dunes, beaches, barrier beaches, banks or ocean habitats as a result of this proposal. However, in order to restore the upland portion of the beach, some rocky intertidal habitat will be impacted (i.e. buried) resulting in a decrease in rocky intertidal habitat as a result of direct beach placement. We estimate that approximately 5.01 acres (of the estimated 7.3 acres of rocky intertidal habitat in the immediate area) will be directly impacted. It should be noted that some of this rocky intertidal habitat was exposed due in large part to the continued erosion of the beach and dune system in this area. Recreation of the beach may result in an increase in additional habitat for the threatened piping plover.

The most recent eelgrass survey conducted by the town of Sandwich found a small amount of eelgrass within the "hook" of the spit area off Town Neck Beach and USACE found some sparse areas of eelgrass within the sub-tidal habitat adjacent to the most eastern end of the project. No eelgrass will be directly impacted by sand placement; however, as the beach equalizes and the sediment naturally moves seaward, some eelgrass may be covered. We do not anticipate any significant adverse impacts to any eelgrass as a result of this proposal. Additional information can be found in Sections 5.2 and 6.2 of the draft Environmental Assessment.

We do not anticipate any significant adverse impacts to any coastal, estuarine or marine habitats as a result of maintenance dredging and disposal of the material at the alternate disposal area (i.e. CCCDS).

#### Ports and Harbors Policy #1

Summary Statement: Ensure that dredging and disposal of dredged material minimize adverse effects on water quality, physical processes, marine productivity, and public health and take full advantage of opportunities for beneficial re-use.

The dredging and placement/disposal of clean sand from the Cape Cod Canal FNP will not significantly impact water quality, physical processes, marine resources, or public health. Dredging and placement/disposal of dredged material will impact existing benthic resources in the project footprint, but re-colonization of benthic species from adjacent areas will allow the impacted areas to quickly recover to pre-dredge conditions. The addition of sand to the Town Neck Beach is a beneficial re-use of the dredged material. Based on benthic sampling conducted by the Town of Sandwich in October 2014 the beach currently has a low density and low diversity of benthic invertebrates. Water quality impacts at the dredging areas and Town Neck Beach or Cape Cod Canal Disposal Site will be limited to short-term increases in turbidity. Placement of dredged sediments on Town Neck Beach would keep the clean sand within the littoral system and re-nourishes the beach. As part of this proposal, USACE will seek a 401 Water Quality Certificate (WQC) from the Commonwealth for the disposal of dredged material in state waters. We have sought and received a WQC from the Commonwealth on similar maintenance dredging projects in the past.

#### Ports and Harbors Policy #2

Obtain the widest possible public benefit from channel dredging and ensure that Designated Port Areas and developed harbors are given highest priority in the allocation of resources

This proposal involves expending Federal funds to provide needed maintenance dredging of portions of a Federally-authorized navigation project to provide safe navigation through the Canal. As mentioned previously, the Cape Cod Canal is the only Federal navigation project in the New England District to be identified in the Fiscal Year 2015 President's Budget denoting its ranking (nationally) as a high-use, high priority FNP. If the material is placed on Town Neck Beach, we estimate that there will be over \$410,000 realized (annually) in storm damage reduction.

#### Water Quality Policy #1

Summary Statement: Ensure that point-source discharges and withdrawals in or affecting the coastal zone do not compromise water quality standards and protect designated uses and other interests.

*This proposal involves maintenance dredging and potentially pumping the dredged material onto a beach, which would create a discharge of water runoff into State waters, or; the disposal of* 

material into an open water site. This discharge is not considered a "point-source discharge" by conventional standards; however, MACZM regulations require that the discharge of dredged material be coordinated with them. The material to be dredged from the Federal channel has undergone physical analysis and has always been found to be clean sand. Based on a review of recent and historical data and a lack of potential sources of contaminants, it is the Corps of Engineers' determination that the material is acceptable for placement on Town Neck Beach and at the Cape Cod Canal Disposal Site (CCCDS). The pumping of clean sand onto Town Neck Beach in Sandwich will temporarily increase turbidity in the waters adjacent to the beach; however, impacts will be short-term and localized and will not significantly affect water quality in the vicinity of the site. The disposal of clean sand and gravel material at the CCCDS will temporarily increase turbidity in the waters in and adjacent to the disposal area. However, the impacts will be short-term and localized. This proposal will be coordinated with the appropriate Federal and state resource agencies including, but not limited to, the US Environmental Protection Agency and the Massachusetts Department of Environmental Protection (MADEP). A request for 401 Water Quality Certification (WQC) for the discharge of dredged material into State waters will be submitted to the MADEP.
Town of Sandwich The Oldest Town on Cape Cod



**Department of Natural Resources** 

16 Jan Sebastian Drive Sandwich, MA 02563 (508) 833-8054 FAX (508) 833-0018

March 16, 2015

Mr. Kevin R. Kotelly, P.E. Regulatory Division US Army Corps of Engineers 696 Virginia Road Concord, Massachusetts 01742-2751

## Re: Piping Plover Monitoring Commitment for Town Neck Beach in Sandwich, MA

Dear Mr. Kotelly,

The purpose of this letter is to inform you that the Town of Sandwich has the resources and is committed to monitoring the entire Town Neck Beach area, including any new habitat created by the reconstruction project. The monitoring will be managed by Mass Audubon or other qualified entity according to the U.S. Fish and Wildlife Service Guidelines.

The Town of Sandwich adopted a Beach Management Plan (BMP) in 2013 with specific provisions for protecting state and federally listed shorebirds. The BMP documents the rules, regulations, policies and long-term maintenance plans for the coastal resources. It also defines objectives for the safe use and conservation of the beaches, defines annual monitoring programs for shorebirds, and outlines steps for the Town to control access to the beach by vehicles and dogs.

Please let me know if you have any further questions or need any additional information.

Sincerely,

Mark S. Galkowski Director

cc: Ms. Susi von Oettingen, U.S. Fish & Wildlife Service
Ms. Valerie Cappola, USACOE
Mr. George Dunham, Town Manager
Mr. Kirk Bosma, Woods Hole Group, Inc.



#### DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

March 23, 2015

Regulatory Division File Number: NAE-2014-259

Susi von Oettingen Endangered Species Biologist U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, New Hampshire 03301-5031

Dear Ms. Von Oettingen:

This letter follows our recent discussion concerning the Town of Sandwich, Massachusetts, application for a Department of the Army permit for the placement of 41 acres of beach nourishment material below the high tide line of waters of the United States along the coastline of Sandwich. This project is an extension of the US Army Corps of Engineers (USACE) Section 204 project for which informal consultation with your agency pursuant to Section 7 of the Endangered Species Act has already been requested. Although separate projects from USACE's prospective, the western 2,500 feet of the Town's proposed project covers the same area as the Section 204 project, therefore, we request the consultation include both projects.

The project proposes to restore the public beach along the eroded Sandwich shoreline. The Town is seeking the flexibility to construct the project using a mixture of trucking and/or hydraulic pumping of dredged sediment, potentially in phases over multiple years. This will allow beneficial reuse of dredged sediment when it becomes available from nearby dredging projects, with additional sand trucked to the site from local sources. A suitability determination will be needed on all material to determine compatibility with the existing beach.

In our recent phone discussion, you indicated that the Piping Plover, a Federally listed threatened or endangered species, is present in or near the project area. The proposed project may affect the species and its habitat due to dredged material disposal activities. However, it is anticipated that the project will avoid adverse effects and possibly benefit piping plovers for the following reasons:

• The project was designed to avoid direct placement of sand at the eastern end of the barrier beach where past monitoring has shown the greatest concentration of piping plover nesting, including piping plovers. The restoration project tapers to meet the natural grades and slopes of the existing beach approximately 1,000 feet (ft) from the eastern end of the beach. Nearshore slopes at the end of the project will range from 1V:20H to 1V:15H, and will therefore not pose barriers to foraging piping plovers. Additionally, the net longshore

transport from west to east will serve to naturally nourish the piping plover habitat located at the eastern end of the barrier, outside the restoration footprint.

- The beach restoration project will enhance piping plover habitat which has degraded over the years due to the lack of adequate sediment supply. Interruptions in the littoral drift have starved the Town of Sandwich beaches of valuable sediment. As a result, the Sandwich beaches have retreated landward, leaving large areas of cobble and gravel in the intertidal zone. While the eastern end of the beach currently serves as piping plover habitat, its value has been decreasing over the years due to a reduction in sand. The proposed project will provide a source of sediment to the eroded eastern end of Town Neck Beach, which will enhance habitat.
- The proposed project will improve the habitat value of the existing dune overwash fans. Past monitoring has shown that the dune overwash fans are a preferred nesting location for piping plovers. Unfortunately, the reduced sediment supply has caused the overwash areas to become more deeply incised into the barrier and they are commonly inundated during spring high tides. This has resulted in the loss of plover nests and a general degradation of the habitat. The project proposes to address this issue by increasing the dune elevation in the fan areas enough to prevent overwash during spring high tide events. The slopes in the overwash areas will be a 1V:10H grade and will therefore maintain piping plover nesting habitat.
- The Town Beach nourishment project should enhance the access to a portion of the public beach that does not provide high quality nesting habitat (although some nesting habitat will be present and managed). The Town anticipates that users will be less likely to walk further to seek sandy stretches of beach towards the eastern tip. Additionally, the wider and higher beach will allow reconstruction of the beach access stairs leading from the parking lot without risk of repeated storm damage. As such, beachgoers will have direct access to the restored beach via the stairs and will be less likely to use the overwash areas for beach access. Although nesting habitat is symbolically fenced to protect piping plovers, pedestrians have been documented crossing the fencing. Providing easy direct access to the beach will redirect foot traffic away from protected nesting habitat and therefore minimizing disturbance to piping plovers.

The Corps has determined the following measures should be implemented to avoid impacts to piping plovers:

- 1. The initial and all subsequent beach nourishment activities authorized herein, unless otherwise directed by the Corps, shall be placed at no steeper of a slope than 10:1 (10 horizontal to 1 vertical) as shown on the attached plans and have no vegetation plantings. This is to create or restore degraded plover habitat.
- 2. All beach nourishment and related construction activities are prohibited on or within 200 meters of suitable piping plover nesting habitat from April 1st to September 1st of any year.

If any disposal or construction activity could unavoidably extend into this restriction period, the permittee must notify the USFWS (see 2d below) at least two weeks prior and the USFWS may require the following in order to avoid adversely affecting breeding piping plovers:

- a. A qualified piping plover monitor<sup>1</sup> must be in place by April 1st of the year in which disposal is to occur to document location and activities of breeding plovers and to observe disposal activities relative to plover activities during the upcoming disposal period. In any calendar year, pre-disposal or related construction activity surveys shall begin one week prior to April 1st or one week prior to the commencement of any on-site project activity if the activity starts after April 1st. On at least four non-consecutive days, the piping plover monitor shall survey the project area (including landing, staging, operation, sand-transport and beach nourishment areas) for the occurrence of territorial, courting or nesting piping plovers. Each day's monitoring shall consist of two separate surveys conducted during different times of the tidal cycle;
- b. Dredge/disposal activities must be located 200 meters or more from piping plover territories and/or nests;
- c. Plovers must be monitored continuously during project activities. Piping plover monitoring field notes shall be provided to the USFWS upon request. Piping plover monitoring is the process of observing and recording data on piping plover breeding activities without causing disturbance to the birds under observation. Monitoring includes, but is not limited to, detecting and recording locations of territorial and courting adults, locating nests and incubating adults, locating broods, interpreting piping plover behaviors, and documenting observations in legible, complete field notes. Except to determine the number of eggs in a newly discovered nest, monitoring is done using binoculars or spotting scopes from a distance of at least 50 meters;
- d. If it is determined by the on-site qualified piping plover monitor that piping plovers are disturbed by the activity, (i) all work shall cease immediately and (ii) the USFWS shall be notified immediately at (603) 223-2541 x22 for further consultation.
- In association with authorized activities, if a crushed nest or a dead piping plover chick or adult is found, the permittee is required to immediately contact the Division of Law Enforcement, USFWS, Office of Law Enforcement, 70 Everett Avenue, Suite 315, Chelsea, MA 02150; (617) 889-6616.
- 4. The following management actions must be implemented each year following disposal in perpetuity as long as the piping plover monitor determines that it remains potentially suitable piping plover nesting habitat<sup>2</sup>. This is to avoid adverse effects to Piping Plovers from recreational impacts associated with the nourished beach:
  - a. Any suitable piping plover habitat created by work performed under this authorization shall be managed in accordance with the USFWS, Northeast Region, April 15, 1994 document titled, Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act ("Guidelines") for managing recreational beaches on which

Federally listed piping plovers may be present. This document is located at: http://www.fws.gov/northeast/pipingplover/pdf/recguide.pdf.

- b. The disposal area shall be posted with warning signs and/or "symbolic fencing"<sup>3</sup> before April 1 of each year and managed according to the Guidelines.
- 5. These conditions are applicable as long as piping plovers are listed under Section 4 of the Endangered Species Act.

<sup>1</sup>A qualified piping plover monitor is a person who has the skills, knowledge and ability to conduct monitoring. <sup>2</sup> "Potentially suitable piping plover nesting habitat" is habitat that contains natural features associated with known plover habitat and that could be reasonably expected to be occupied by piping plovers either in the upcoming nesting season or in the reasonably foreseeable future.

<sup>3</sup> Symbolic fencing refers to two strands of light-weight string, tied between posts to delineate at least a 50 meter radius around nest areas where pedestrians and vehicles should not enter.

The Corps has determined that with the implementation of these measures, the project is not likely to adversely affect piping plovers or their critical habitat. The above measures would be included as special conditions to the permit. We are requesting that the U.S. Fish and Wildlife Service concur with our not likely to adversely affect determination.

Please contact Kevin Kotelly at (978) 318-8703 or <u>kevin.r.kotelly@usace.army.mil</u> if further information is required.

Sincerely,

Karen K. Adams Chief, Permits and Enforcement Branch Regulatory Division

Enclosures

Copies Furnished:

George H. Dunham, Town Manager, 130 Main Street, Sandwich, Massachusetts 02563, gdunham@townofsandwich.net

Beth Hayes, Woods Hole Group, Inc., 81 Technology Park Drive, East Falmouth, MA 02536, bhays@whgrp.com

Susi vonOettingen@fws.gov

Valerie.a.cappola@usace.army.mil



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

February 10, 2015

Programs and Project Management Division Civil Works/IIS Project Management Branch

U.S. Fish and Wildlife Service ATTN: Mr. Tom Chapman New England Field Office 70 Commercial Street, Suite 300 Concord, New Hampshire 03301

Dear Mr. Chapman:

I am writing to request your comments on USACE's proposal to perform maintenance dredging and advance maintenance dredging of the Cape Cod Canal (CCC) in Bourne and Sandwich, Massachusetts.

The authorized Federal Navigation Project (FNP) provides for a 600 feet long jetty and a 3000 feet long breakwater at the east end of the Canal; a channel, 32 feet deep and varying in width (i.e. from 500 – 700 feet) throughout its 17.5 mile length, and two mooring basins: the West Mooring Basin, 32 feet deep and the East Mooring Basin (EMB), 25 feet deep. A map depicting the FNP is enclosed for your reference.

The CCC connects Buzzards Bay and Cape Cod Bay. Use of the CCC saves mariners an average of 135 miles of coastwise travel while circumnavigating Cape Cod and the Nantucket shoals. Roughly 14,000 commercial and recreational vessels transit the 17.4 mile waterway each year. The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships and passenger ferries as well as recreational vessels. The FNP is part of the Intra-Coastal Waterway and is an integral segment of the corridor for petroleum products being delivered to the northeast region.

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the project. This combination creates hazardous conditions for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Shoaling in the main-ship channel consists of large sand wave formations. Recent hydrographic surveys indicate that shoaling has occurred in six areas of the project (see Enclosure 1) and the controlling depth in the Canal proper is now at 30' below Mean Lower Low Water (MLLW). The reduction in available depth is significant and has resulted in draft restrictions being placed on vessels transiting the Canal, tidal

delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor vessels in emergencies (e.g. icing). Further shoaling in the Canal may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod thereby significantly increasing the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas in the authorized, 32-feet deep by 500-feet wide, main-ship channel and the 25-feet deep EMB portions of the project. In order to extend the time between maintenance dredging events, advance maintenance is being proposed to reduce the sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 feet deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

A study is currently underway under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project to rebuild the dunes and beach berm (i.e. to protect the homes in the area) on a 2,500 foot long eroded section of Town Neck Beach in Sandwich (See Enclosure 2). Town Neck Beach has experienced increased erosion (currently estimated to be about 5 feet per year) due in large part to severe coastal storms such as Hurricane Sandy and more recently, Winter Storm Juno.

The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and for the potential beach nourishment. If the 204 study is completed in time to coincide with this maintenance dredging event, and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay any additional costs over and above the Federal base plan (i.e. dredging and placement of the material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach.

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the east entrance to the Cape Cod Canal. The CCCDS was last used for disposal of material dredged from the Canal in 1990.

It is our preliminary determination that the proposed work is not likely to adversely affect any listed species under the jurisdiction of the US FWS. Contingent upon placing material on Town Neck Beach, the Town of Sandwich has accepted the responsibility of monitoring for piping plovers on Sandy Beach starting April 1, 2016. Massachusetts Audubon will be monitoring the beach for the town and a copy of the letter detailing this commitment will be sent as soon as we receive it. Enclosed (on CD) is a copy of our draft EA for your reference. We are requesting that you review the information and provide us with your concurrence on this determination and any additional comments pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended concerning the proposed project. We are also requesting a final Fish and Wildlife Coordination Act Report (FCAR) be provided to us at the same time. We would appreciate your comments by March 11, 2015.

Please feel free to contact myself at (978) 318-8328 or Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067 if you have any questions or require additional information.

Sincerely,

Bill Kovanough

Bill Kavanaugh Project Manager

Enclosures

Copy Furnished: via email

Ms. Susi VonOettingen: Susi\_vonOettingen@fws.gov Ms. Maria Tur:Maria\_Tur@fws.gov



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

APR 1 4 2015

Bill Kavanaugh Project Manager Department of the Army U.S. Army Corps of Engineers New England District 696 Virginia Road Concord, Massachusetts 01742-2751

# **RE: Cape Cod Canal Federal Navigation Project**

Dear Mr. Kavanaugh,

We have completed an Endangered Species Act (ESA) section 7 consultation in response to your letter received February 13, 2015, and correspondence providing additional information through March 16, 2015, regarding the above-referenced proposed project. We concur with your determination that the proposed project may affect, but is not likely to adversely affect, any species listed by us as threatened or endangered or any designated critical habitat. We also concur with your determination that because the action is not likely to destroy or adversely modify the proposed right whale critical habitat a conference is not required. Our supporting analysis is provided below.

# **Proposed Project**

The U. S. Army Corps of Engineers (USACE) is proposing to perform maintenance and advance dredging of the Cape Cod Canal (CCC) Federal Navigation Project (FNP) in Bourne and Sandwich, Massachusetts. The CCC connects Buzzards Bay and Cape Cod Bay. Approximately 14,000 commercial and recreational vessels transit the 17.5 mile waterway each year. The CCC is part of the Intra-Coastal Waterway, and is an integral segment of the corridor for movement of petroleum products to the northeast region. The proposed project will involve dredging and disposal of the dredged material either at Town Neck Beach in Sandwich, Massachusetts for beach nourishment, or at the Cape Cod Canal Disposal Site (CCCDS).

Specific project activities include:

• Maintenance and advance dredging (in order to extend the amount of time between maintenance dredging events) of six areas within the CCC to remove approximately' 169,000 cubic yards (cy) of material. The six areas (see Table 1, below) will be dredged to depths ranging from -36 feet MLW to -40 feet MLW, which includes 2 feet of overdredge. The proposed work will be completed by a hydraulic hopper dredge between November 1, 2015 and May 31, 2016.



Dredging location	Dredge area	Proposed depth	Estimated volume
(within CCC)		(below MLW)	of dredge material
South Breakwater Shoal	6.67 acres	38' plus 2'	9,315 cy
East Mooring Basin,	2.56 acres	38' plus 2'	7,880 cy
Channel Shoal			
East Mooring Basin,	22.3 acres	32' plus 2'	110,295 cy
Basin Shoal			
East Sagamore Shoal,	6.64 acres	34' plus 2'	6,429 cy
East of the Bridge			
West Sagamore Shoal,	8.21 acres	37' plus 2'	24,172 cy
West of the Bridge			
Onset Shoal	7. 98 acres	37' plus 2'	11,117 cy
TOTAL	54.36 acres	N/A	169,208 cy

Table 1: Proposed dredging activities

• The dredged material will be placed on Town Neck Beach, Sandwich, Massachusetts or disposed of at the CCCDS. Town Neck Beach is located adjacent to the south breakwater of the canal, and the placement will occur on a 2,500 foot section of the beach seaward of the houses. The CCCDS is located approximately three nautical miles northeast of Cape Cod Canal Buoy #1 in Cape Cod Bay with the coordinates of the center point at 41° 49' 00" N, 70° 25' 00"W. USACE determined that the dredge material, which is predominantly sand and gravel (less than 1% fines in most prior testing locations), is not a carrier of contaminants, and is therefore suitable for unconfined disposal at either location. USACE's preferred alternative is to place the material on Town Neck Beach.

The CCCDS is in the Cape Cod Bay Seasonal Management Area. Therefore, if dredge material is transported by barge to the CCCDS, disposal vessels transiting from January 1 to May 15 may not exceed 10 knots. Furthermore, from January 1 through May 31, disposal vessels transiting between the dredge site and CCCDS shall operate at speeds not to exceed 5 knots after sunset, before sunrise, or in daylight conditions where visibility is less than one nautical mile. During that same time period (January 1 through May 31), an approved endangered species observer must be present aboard disposal vessels transiting between the dredge site and the CCCDS during daylight hours.

All previously established special permit conditions for use of the CCCDS outlined in our letter dated September 9, 1998 to USACE, incorporated by reference, will be required (see Appendix A).

#### **Description of the Action Area**

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). For this project, the action area consists of the six dredging areas within the canal (see Table 1; Figure 1), the CCCDS, the route travelled by the barges to the disposal sites, and the underwater areas where the effects of dredging and dredge material disposal (i.e., increases in suspended sediment) will be experienced. In the vicinity of dredging operations, a near-bottom turbidity plume of resuspended bottom material may extend 2,300 to 2,400 feet down current from the dredge (USACE 1983). In the immediate vicinity of the dredge, a well-defined upper plume is generated by the overflow process. Approximately 1,000 feet behind the dredge, the two plumes merge into a single plume (USACE 1983). By a distance of 4,000 feet from the dredge, plume concentrations are expected to return to background levels (USACE 1983).

At the disposal site, the open water disposal activities are expected to produce turbidity plumes that will be fully dissipated at a distance of 6,500 foot radius from the site of disposal. Wilber *et al.* (2006) reported that elevated TSS concentrations associated with the active beach nourishment site were limited to within 1,310 foot radius of the discharge pipe in the swash zone (defined as the area of the nearshore that is intermittently covered and uncovered by waves). Other studies found that the turbidity plume and elevated TSS levels are expected to be limited to a narrow area of the swash zone up to 1,640 feet down current from the discharge pipe (Schubel *et al.* 1978, Burlas *et al.* 2001).

Based on this information, the action area consists of the project footprints of the six areas within the canal to be dredged, areas within 4,000 feet down current of the dredging operation, the routes travelled by the barges from the dredge sites to the disposal sites, the area within a 6,500-foot radius from the open water disposal area, as well as that area within 1,640 feet down current from the beach where sediments would be deposited. These areas are expected to encompass all of the direct and indirect effects of the proposed projects.

The sediment in the areas to be dredged consists of sand and gravel. No eelgrass or shellfish beds exist in the project footprint; however, eelgrass has been mapped adjacent to Town Neck Beach near the Canal south jetty since 1995, as well as outside the channel near Hogs Island on the western end of the canal. Parts of the canal last underwent maintenance dredging in 2010.



Figure 1: Cape Cod Canal Federal Navigation Project (USACE 2014)

## NMFS Listed Species and Critical Habitat in the Action Area

The following ESA-listed species and critical habitat may be present in the action area.

#### Whales

Federally endangered North Atlantic right whales (*Eubalaena glacialis*), fin (*Balaenoptera physalus*), and humpback whales (*Megaptera novaeangliae*) are found seasonally in Massachusetts waters. North Atlantic right whales have been documented in the nearshore waters of Massachusetts from December through June. Humpback whales feed during the spring, summer, and fall along the eastern coast of the United States.

Small numbers of humpback whales may be present in Massachusetts waters year round, though sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge (CETAP 1982) and peak in May and August (Waring *et al.* 2010). Fin whales found off the eastern United States are centered along the 100 meter (328 foot) isobaths; however, sightings are spread out over shallower and deeper water, with their summer feeding range occurring mainly between 41°N and 51°N, from shore seaward to the 1,000-fathom (6,000 feet) contour (NMFS 2010; Kenney and Winn 1987; Hain *et al.* 1992). No humpback or fin whales have been observed in the CCC. Thus, based on the best available information, we do not expect humpback and fin whales to be present in the area influenced by dredging activities. These species however, may be present at the CCCDS and along the transit route.

The seasonal presence of right whales in Massachusetts waters is thought to be closely associated to the seasonal presence of dense patches of their preferred copepod prey (primarily *Calanus finmarchus* but also *Pseudocalanus* spp. and *Centropages* spp.; Pace and Merrick 2008). North Atlantic right whales have been documented in Cape Cod Bay in relatively high numbers in January through May (see http://www.nefsc.noaa.gov/psb/surveys/). While these records show relatively few right whale sightings within the canal, there is precedent for their occurrence. At least 10 separate sightings of right whales in the canal have been reported since 1957 (most recently in April 2014). Based on the best available information, right whales may be present in the CCC, at the CCCDS, and along the transit route.

#### **Designated Right Whale Critical Habitat**

Certain New England waters were designated as critical habitat for Northern right whales in 1994 (59 FR 28793). The Great South Channel critical habitat is the area bounded by 41°40' N/69°45' W; 41°00' N/69°05' W; 41°38' W; and 42°10' N/68°31' W. The Cape Cod Bay critical habitat is the area bounded by 42°02.8' N/70°10' W; 42°12' N/70°15' W; 42°12' N/70°30' W; 41°46.8' N/70°30' W and on the south and east by the interior shore line of Cape Cod, Massachusetts. The CCCDS and the area down current of Town Neck Beach where increased levels of total suspended solids (TSS) will be experienced are within the area designated as critical habitat; the area to be dredged is not in the area where the direct and indirect effects of dredging will be present.

## **Proposed Right Whale Critical Habitat**

On February 20, 2015, we published a proposed rule to expand critical habitat for the North Atlantic right whale (80 FR 9313). The proposed boundaries would expand the critical habitat to roughly 29,945 square nautical miles, and include northeast feeding areas in the Gulf of Maine/Georges Bank region and calving grounds from southern North Carolina to northern Florida (see Figure 2). The CCCDS and the area down current of Town Neck Beach where increased levels of total suspended solids (TSS) will be experienced are within the proposed critical habitat; the area to be dredged is not.



Figure 2: Existing and proposed critical habitat for the North Atlantic right whale

## Sea Turtles

Four species of federally listed threatened or endangered sea turtles are found seasonally in the coastal waters of Massachusetts, including the action area: the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead (*Caretta caretta*), and the endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. In general, listed sea turtles are seasonally distributed in coastal U.S. Atlantic waters, migrating to and from habitats extending from Florida to New England, with overwintering concentrations in southern waters. As water temperatures rise in the spring, these turtles begin to migrate northward. As temperatures decline rapidly in the fall, turtles in northern waters begin their southward migration. Sea turtles are at least 15°C. This generally coincides with the months of May through November, with the highest concentration of sea turtles present from June through October (Shoop and Kenney 1992; Morreale and Standora 2005).

No studies of sea turtles near the action area are available to estimate the depth at which they typically occur; however, studies of sea turtles near Long Island, NY have shown that the species typically occur in waters with depths between 16 and 49 feet deep and in areas where the waters are slow-moving or still (i.e., less than 2 knots) (Ruben and Morreale 1999). Thus, based on the best available information, we assume their preferred foraging depth is between 16 and 49 feet deep. The areas to be dredged to depths ranging from -36 feet MLW to -40 feet MLW fall within

the range where sea turtles might be expected to occur, but the canal typically has strong tidal currents, and limited forage for sea turtles exists (i.e., no submerged aquatic vegetation (SAV) or shellfish beds, limited benthic invertebrates). Therefore, the dredge sites are not expected to serve as foraging areas for sea turtles and sea turtle presence in the canal is likely limited to occasional transient sea turtles.

The months of November and December are cold stun season in the northeast region. The term "cold stunning" refers to the hypothermic reaction that occurs when sea turtles are exposed to prolonged cold water temperatures. Initial symptoms include a decreased heart rate, decreased circulation, and lethargy, followed by shock, pneumonia, and possibly death. Sea turtles typically begin to migrate south by late October; it is largely unknown why some sea turtles do not migrate south prior to the drop in water temperatures. Some animals foraging in shallow bays and inlets may become susceptible to cold stunning because the temperatures in these areas can drop quite rapidly and unexpectedly. Kemp's ridley sea turtles are the most common cold stunned species. Loggerhead and green sea turtles are also often affected by cold stunning.

The largest concentration of cold stunned turtles occurs in Massachusetts, on Cape Cod Bay beaches.<sup>1</sup> In any given year, between 50 and 200 sea turtles are expected to cold stun in MA from late October through December (243 on average from 2009-2013). In 2014, an unprecedented cold stunning event occurred, in which approximately 1,200 turtles washed up on MA beaches. Five of those turtles stranded on Sandwich beaches, and in the past (2009-2013), an average of four turtles have stranded in Sandwich during cold stun events. While, historically, a relatively small number of turtles have washed up on Sandwich beaches, a larger number may be present in the waters of the action area, between the entrance of the CCC, the vessel routes between the canal and the CCCDS or Town Neck Beach, and the areas potentially impacted by sediment plumes associated with dredge disposal at either site. Cold stunned sea turtles have never been recovered within the waters or nearshore habitats of the CCC.

Given that no dredging will occur between June 1 and October 30, we do not expect sea turtles to be in the dredging area during project operation. Based on the best available information, cold stunned sea turtles may be present in the waters between the entrance of the CCC and the disposal locations during transit and disposal activities from November 1 through December 30.

## Atlantic Sturgeon

There are five DPSs of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) listed as threatened or endangered. Atlantic sturgeon originating from the New York Bight, Chesapeake Bay, South Atlantic and Carolina DPSs are listed as endangered; the Gulf of Maine DPS is listed as threatened. The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida and includes the action area.

At around three years of age, subadults exceeding 70 centimeters in total length begin to migrate to marine waters (Bain *et al.* 2000). After emigration from the natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters less than 50 m in depth, using coastal bays, sounds, and ocean waters (ASSRT 2007). In rivers and estuaries,

<sup>&</sup>lt;sup>1</sup> In addition to Massachusetts, New York, specifically Long Island beaches, also see several cold stunned turtles each winter.

Atlantic sturgeon typically use the deepest waters available; however, Atlantic sturgeon also occur over shallow (2.5 m), tidally influenced flats and mud, sand, and mixed cobble substrates (Savoy and Pacileo 2003). Occurrence in these shallow waters is thought to be tied to the presence of benthic resources for foraging.

As Atlantic sturgeon spawn in freshwater portions of large rivers and early life stages are not tolerant of salinity, their eggs and larvae will not occur in any part of the action area. Because the action area is not located in a river where sturgeon spawn, no juveniles will be present as this life stage remains in the natal river. Adult and subadult Atlantic sturgeon from any of the five DPSs may occur in any part of the action area. Because the action area does not contain any known overwintering areas, Atlantic sturgeon are most likely to be present in the action area from April through November, but could be present at any time of the year. We do not have any estimates of the number of Atlantic sturgeon present in Cape Cod Bay generally or the action area specifically; however, Atlantic sturgeon have been reported as bycatch in commercial fisheries operating in Cape Cod Bay (Stein *et al.* 2004b). Due to the limited presence of suitable forage, we expect little, if any, foraging to occur in the action area. We expect the presence of Atlantic sturgeon in the action area to be limited to occasional transient subadults or adults originating from any of the five DPSs.

#### Shortnose Sturgeon

Shortnose sturgeon (*Acipenser brevirostrum*) occur in rivers and estuaries along the East Coast of the U.S. and Canada (SSSRT 2010). There are 19 documented populations of shortnose sturgeon ranging from the St. Johns River, Florida (possibly extirpated from this system) to the Saint John River in New Brunswick, Canada. While movements between river systems have been documented in the Gulf of Maine, between the Connecticut and Hudson, and in the Southeast, interbreeding between river populations is limited to very few individuals per generation; this results in morphological and genetic variation between most river populations (see Walsh *et al.* 2001; Grunwald *et al.* 2002; Waldman *et al.* 2002; Wirgin *et al.* 2005). Indirect gene flow estimates from mitochondrial DNA indicate an effective migration rate of less than two individuals per generation (SSSRT 2010). This means that while individual shortnose sturgeon may move between rivers, very few sturgeon are spawning outside their natal river; it is important to remember that the result of physical movement of individuals is rarely genetic exchange.

Genetically distinguishable populations of shortnose sturgeon occur in the Connecticut and Merrimack Rivers (SSSRT 2010). As noted above, in some areas, including the Gulf of Maine, nearshore coastal migrations and movements between river systems have been documented. For example, approximately 70% of shortnose sturgeon tagged in the Penobscot River made regular seasonal movements out of the river, with some fish spending up to a year outside of the river (Zydlewski *et al.* 2011).

Little information is available about the use of waters between the Connecticut and Merrimack rivers, including the action area, by shortnose sturgeon. There is information which demonstrates that fish occasionally move between the Hudson and rivers in Connecticut as one Hudson River origin shortnose sturgeon was captured in both the Connecticut and Housatonic rivers (Savoy 2004 in SSSRT 2010). Additionally, in fall 2014, a shortnose sturgeon was caught in the

Merrimack River (MA) carrying a tag which was implanted in the Connecticut River in 2001 (pers. comm. Kieffer and Savoy 2014). Genetic information is not yet available for this fish so we do not know the river of origin of this fish. At this time, the available tagging and tracking information is too limited to determine if Hudson and Connecticut River shortnose sturgeon are making regular movements outside of their natal rivers and whether movement as far as the Merrimack River is a normal behavior. The genetic differentiation between these populations is thought to be a reflection of the rarity of these types of movements. However, the capture of a shortnose sturgeon in the Housatonic River and the movement of a shortnose sturgeon from the Connecticut River to the Merrimack River, indicate that occasional shortnose sturgeon may be present in nearshore coastal waters and rivers between the Connecticut and Merrimack rivers. Shortnose sturgeon moving between the Connecticut and Merrimack Rivers could pass through the action area. We have no information to predict whether shortnose sturgeon moving north of Cape Cod would travel through the CCC or move south around Cape Cod.

Subadult and adult shortnose sturgeon do not have to swim through the action area to access foraging, overwintering, or spawning areas. However, given the movement of a shortnose sturgeon from the Connecticut River to the Merrimack River, and because there is nothing preventing shortnose sturgeon from entering the action area, we assume that at least occasional transient subadult or adult shortnose sturgeon occur in the action area. Based on the timing of documented coastal movements in the Gulf of Maine, we expect presence of shortnose sturgeon to be limited to May (Zydlewski *et al.* 2011). As shortnose sturgeon spawn in freshwater portions of large rivers and early life stages are not tolerant of salinity, their eggs and larvae will not occur in any part of the action area.

#### **Effects of the Action**

#### **Hopper Dredge**

Dredged material is raised by dredge pumps through dragarms connected to drags in contact with the channel bottom and discharged into hoppers built in the vessel. Hopper dredges are equipped with large centrifugal pumps similar to those employed by other hydraulic dredges. Suction pipes (dragarms) are hinged on each side of the vessel with the intake (drag) extending downward toward the stern of the vessel. The drag is moved along the bottom as the vessel moves forward at speeds up to three mph. The dredged material is sucked up the pipe and deposited and stored in the hoppers of the vessel.

Most sea turtles and sturgeon are able to escape from the oncoming draghead due to the slow speed that the draghead advances (up to 3 mph or 4.4 feet/second). Interactions with a hopper dredge result primarily from crushing when the draghead is placed on the bottom or when an animal is unable to escape from the suction of the dredge and becomes stuck on the draghead (i.e., impingement). Entrainment occurs when organisms are sucked through the draghead into the hopper. Mortality most often occurs when animals are sucked into the dredge draghead, pumped through the intake pipe and then killed as they cycle through the centrifugal pump and into the hopper.

Interactions with the draghead can also occur if the suction is turned on while the draghead is in the water column (i.e., not seated on the bottom). USACE implements procedures to minimize

the operation of suction when the draghead is not properly seated on the bottom sediments which reduces the risk of these types of interactions.

#### Hopper Dredge Interactions – Impingement/Entrainment

#### Sea Turtles and Whales

Sea turtles are vulnerable to impingement and entrainment in hydraulic hopper dredges. However, as no dredging with a hopper dredge will occur during the time of year when sea turtles are likely to be present in the dredging area (i.e., June 1 - October 30), no impingement or entrainment of sea turtles will occur.

Whales are too large to be vulnerable to impingement or entrainment in hopper dredges. There are no reports of interactions between dredging equipment and marine mammals. Based on this information, no effects between hopper dredges and sea turtles or whales will occur.

#### Sturgeon

Sturgeon are vulnerable to interactions with hopper dredges. The risk of interactions is related to both the amount of time sturgeon spend on the bottom and the behavior the fish are engaged in (i.e., whether the fish are overwintering, foraging, resting or migrating), as well as the intake velocity and swimming abilities of sturgeon in the area (Clarke 2011). Intake velocities at a typical large self-propelled hopper dredge are 11 feet per second. Exposure to the suction of the draghead intake is minimized by not turning on the suction until the draghead is properly seated on the bottom sediments and by maintaining contact between the draghead and the bottom.

In general, entrainment of large mobile animals, such as the sturgeon, is relatively rare. Several factors are thought to contribute to the likelihood of entrainment. One factor influencing potential entrainment is the swimming stamina and size of the individual fish at risk (Boysen and Hoover 2009). Swimming stamina is positively correlated with total fish length. Entrainment of larger sturgeon, such as the subadults and adults that may occur in the action area, is less likely due to the increased swimming performance and the relatively small size of the draghead opening (standard grating size is four inches by four inches). The estimated minimum size for sturgeon that out-migrate from their natal river is greater than 70cm; therefore, that is the minimum size of sturgeon anticipated in the action area.

In areas where animals are present in high density, the risk of an interaction is greater because more animals are exposed to the potential for entrainment. The hopper dredge draghead operates on the bottom and is typically at least partially buried in the sediment. Sturgeon are benthic feeders and are often found at or near the bottom while foraging or while moving within rivers. Sturgeon at or near the bottom could be vulnerable to entrainment if they were unable to swim away from the draghead. Information suggests that Atlantic sturgeon migrating in the marine environment do not move along the bottom, but move further up in the water column. While it is generally assumed that shortnose sturgeon travel in the lower portion of the water column, we would not expect them to be on the seafloor unless they are foraging or overwintering. If sturgeon are up off the bottom while in marine areas, such as the CCC, which lacks preferred forage habitat, the potential for interactions with the dredge are further reduced. We expect the occurrence of sturgeon in the area to be limited to rare transients. Furthermore, the CCC has been dredged with relative frequency and there has never been an observed interaction with sturgeon. Given the rarity of sturgeon in the CCC and the lack of preferred forage habitat in the dredge site footprints, an interaction of a sturgeon with a hopper dredge in the action area is extremely unlikely. Therefore, direct effects of hopper dredge operations on sturgeon are discountable.

## *Hopper Dredge Interactions – Sediment Plume*

Dredging operations cause sediment to be suspended in the water column. This results in a sediment plume in the water, typically present from the dredge site and decreasing in concentration as sediment falls out of the water column as distance increases from the dredge site. The nature, degree, and extent of sediment suspension around a dredging operation are controlled by many factors including: the particle size distribution, solids concentration, and composition of the dredged material; the dredge type and size, discharge/cutter configuration, discharge rate, and solids concentration of the slurry; operational procedures used; and the characteristics of the hydraulic regime in the vicinity of the operation, including water composition, temperature and hydrodynamic forces (i.e., waves, currents, etc.) causing vertical and horizontal mixing (USACE 1983).

Resuspension of fine-grained dredged material during hopper dredging operations is caused by the dragheads as they are pulled through the sediment, turbulence generated by the vessel and its prop wash, and overflow of turbid water during hopper filling operations. During the filling operation, dredged material slurry is often pumped into the hoppers after they have been filled with slurry in order to maximize the amount of solid material in the hopper. The lower density turbid water at the surface of the filled hoppers overflows and is usually discharged through ports located near the waterline of the dredge. In the vicinity of hopper dredge operations, a nearbottom turbidity plume of resuspended bottom material may extend 2,300 to 2,400 feet down current from the dredge (USACE 1983). In the immediate vicinity of the dredge, a well-defined upper plume is generated by the overflow process. Approximately 1,000 feet behind the dredge, the two plumes merge into a single plume (USACE 1983). Suspended solid concentrations may be as high as several tens of parts per thousand (ppt; grams per liter) near the discharge port and as high as a few parts per thousand near the draghead. In a study done by Anchor Environmental (2003), nearfield concentrations ranged from 80.0-475.0 mg/l. Turbidity levels in the nearsurface plume appear to decrease exponentially with increasing distance from the dredge due to settling and dispersion, quickly reaching concentrations less than one ppt. By a distance of 4,000 feet from the dredge, plume concentrations are expected to return to background levels (USACE 1983). Studies also indicate that in almost all cases, the vast majority of resuspended sediments resettle close to the dredge within one hour, and only a small fraction takes longer to resettle (Anchor Environmental 2003).

Overall, water quality impacts are anticipated to be minor and temporary in nature. Once dredging operations are complete, the project area will return to ambient conditions within an hour due to the large grain size of the dredge material (mostly sand and gravel) and the canal's strong tidal currents.

## Sturgeon

The life stages of sturgeon most vulnerable to increased sediment are eggs and non-mobile larvae which are subject to burial and suffocation. As noted above, no sturgeon eggs and/or larvae will

be present in the action area. Sturgeon in the action area during dredging may try to avoid a sediment plume by swimming around it. However, given the relatively narrow width of the canal (500-700 feet), the sturgeon may not be able to avoid the plume. Expected TSS levels (up to 575.0 mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical (Burton 1993)).. Based on this information, the effects of suspended sediment resulting from dredging activities on sturgeon are extremely unlikely; therefore, effects to sturgeon from turbidity related to dredging activities are discountable.

## Whales

No information is available on the effects of total suspended solids (TSS) on whales. TSS is most likely to affect whales if a plume causes a barrier to normal behaviors. Whales in the action area during dredging may try to avoid a sediment plume by swimming around it. However, given the relatively narrow width of the canal (500-700 feet), whales may not be able to avoid the plume. As the TSS levels expected (up to 575.0 mg/L) in the plume are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical (Burton 1993)), it is reasonable to assume that these levels would also be below those that would cause adverse effects to whales. Based on this information, the effects of suspended sediment resulting from dredging activities on whales are extremely unlikely; therefore, effects to whales from turbidity related to dredging activities are discountable.

## Hopper Dredge Interactions – Effects on Prey

Dredging can affect future use of the canal by sea turtles and sturgeon by reducing prey species through the alteration of the existing biotic assemblages. The areas to be dredged have predominantly sand and gravel substrate and no SAV or shellfish beds. Eelgrass has been mapped adjacent to Town Neck Beach near the Canal south jetty since 1995, as well as outside the channel near Hogs Island on the western end of the canal; however, any increase in suspended sediment concentrations resulting from exposure to the dredging plume would be short-lived (i.e., less than an hour) and would not alter light penetration over periods long enough to impact photosynthesis. Green sea turtles forage on sea grasses and no sea grasses will suffer adverse effects from the dredging of the canal. Leatherback sea turtles feed on jellyfish. As jellyfish are not benthic species and not vulnerable to interactions with the dredge, there is not likely to be a reduction in the forage base for leatherbacks. Kemp's ridley and loggerhead sea turtles typically feed on crabs, other crustaceans and mollusks. Some of the prey species targeted by turtles and sturgeon, including crabs, are mobile; therefore, some individuals are likely to avoid the dredge. While there is likely to be some temporary reduction in the amount of prey in the dredge areas, the action will result in the loss of only a portion (approximately 54 acres) of the available forage in the canal and surrounding marine habitat. Depending on the species, recolonization will begin within two months, with complete recolonization in a year (Burlas et al. 2001, Guerra-Garcia and Garcia-Gomez 2006). The dredge area is not known to be a preferred foraging ground for sea turtles or sturgeon, but should the species opportunistically forage in this area, they would only be exposed to a reduction in forage in a small area for the season immediately following dredging. The loss of sea turtle and sturgeon prey resulting from dredging will be so small and temporary that the effects will be undetectable and therefore, insignificant.

In summary, as (1) the area to be directly affected by dredging is small (approximately 54 acres) relative to the available forage habitat in the action area; (2) few motile organisms will be affected by the proposed dredging; and (3) recolonization of the benthic community will be rapid, we have determined that any effects to foraging sea turtles and sturgeon will be insignificant.

## **Disposal of Dredged Material at Town Neck Beach**

USACE's preferred alternative is to dispose of all dredge material on a 2,500 foot section of Town Neck Beach in Sandwich, MA. The hopper dredge will pull up to a pump-out buoy (e.g., it may be a few mooring dolphins lashed together or it could be floating) and hook up its discharge pipe to the end of the pipe hooked to the buoy and extending to the beach. Dredged material will then be re-fluidized and piped directly from the hopper dredge to the beach. Though the exact process may vary slightly with each dredge, re-fluidizing occurs by drawing water into a sluiceway from a sea chest near the stern of the dredge. The dredge has a large grated opening that is located on the inside wall of the dredge (i.e., inside the crack where the two halves meet). It is only accessible when the hopper is open, and therefore it would not be possible for turtles or sturgeon to get impinged or entrained on or through the grating. The pipe extending to the beach will be laid on the ocean bottom. While the presence of the pipe will cause a small amount of benthic habitat to be unavailable to sturgeon and sea turtles, the extremely small area affected will render any effects immeasurable.

The placement of dredged material along beaches or shorelines will cause an increase in localized turbidity in the nearshore environment. Nearshore turbidity impacts from fill placement are directly related to the quantity of fines (silt and clay) in the nourishment material. As the material from the borrow areas consists of beach quality sand of similar grain size and composition as indigenous beach sands, we expect short suspension time and containment of sediment during and after placement activities. As such, turbidity impacts will be short-term (i.e., turbidity impacts will dissipate completely within several hours of the cessation of operations (Greene 2002)) and will be spatially limited to the vicinity of the dredge outfall pipe, the pump out buoy/mooring station, and dredge anchor points.

The Atlantic States Marine Fisheries Commission (Greene 2002) review of the biological and physical impacts of beach nourishment cites several studies report that the turbidity plume and elevated total suspended sediment levels drop off rapidly seaward of the sand placement operations. Wilber et al. (2006) evaluated the effects of a beach nourishment project along the coast of northern New Jersey and reported that maximum bottom surf zone and nearshore total suspended sediment concentrations related to nourishment activities were 64 mg/L and 34 mg/L, which were only slightly higher than background maximum bottom total suspended sediment concentrations in the surf and nearshore zones on unnourished portions of the beach (i.e., less than 20 mg/L). Additionally, Wilber et al. (2006) reported that elevated total suspended sediment concentrations associated with the active beach nourishment site were limited to within 400 m (1,310 feet) of the discharge pipe in the swash zone (defined as the area of the nearshore that is intermittently covered and uncovered by waves), while other studies found that the turbidity plume and elevated total suspended sediment levels are expected to be limited to a narrow area of the swash zone up to 500 m (1,640 feet) down current from the discharge pipe (Schubel et al. 1978; Burlas et al. 2001). Based on this and the best available information, turbidity levels created by the beach fill operations along the shoreline are expected to be between 34-64 mg/l;

limited to an area approximately 500 m down current from the discharge pipe; and, are expected to be short term, only lasting several hours.

## **Exposure to the Sediment Plume**

#### Sturgeon

The life stages of sturgeon most vulnerable to increased sediment are eggs and non-mobile larvae which are subject to burial and suffocation. As noted above, neither sturgeon eggs nor larvae will be present in the action area. Sturgeon in the action area during disposal would likely be capable of avoiding any sediment plume by swimming around it. The TSS levels expected (up to 64.0 mg/L) are well below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical (Burton 1993)). Based on this information, the impacts of suspended sediment resulting from dredging activities on sturgeon will be immeasurable; therefore, effects to sturgeon from turbidity related to dredging activities are insignificant.

#### Sea Turtles

If sea turtles appear in the nearshore environment of the action area between November 1 and December 31, there is a high likelihood that the animals will be suffering from a cold stunning event. As surviving turtles may be having a hypothermic reaction resulting in lethargy, shock, and/or pneumonia, they may not be able to avoid sediment plumes related to beach nourishment activities. Vessel operators and individuals working on the beach will be on alert for cold stunned turtles, and will temporarily cease operations and call the Wellfleet Bay Wildlife Sanctuary should they see an animal in the action area that could be affected by additional dredge disposal. Given the absence of documentation evidencing harmful effects of beach nourishment on cold stunned sea turtles, and the fact that sea turtles are air breathers, effects of the onshore disposal of dredge material are extremely unlikely; therefore, the effects of beach nourishment on sea turtles are discountable.

#### Whales

We do not expect whales to occur in the near shore shallow waters of the action area 500m down current of the discharge pipe; therefore, there will be no effects to whales from increased turbidity associated with the placement of dredged material on Town Neck Beach.

## Effects on Prey

## Sturgeon and Sea Turtles

Approximately five acres of rocky intertidal habitat will be partially covered by sand. Rocky intertidal habitat provides hiding places for organisms, as well as attachment sites for algae and invertebrates. Benthic organisms living in the nearshore areas may be buried by the addition of sand or settling of suspended sediments. The majority of the impacted rocky intertidal area is shallower than the preferred depths of marine foraging sea turtles and sturgeon (i.e., 16-49 feet and 16-164 feet, respectively). Though the species may opportunistically forage in the area, the impacted area's depth is suboptimal for foraging, and constitutes only a small fraction of the available habitat for foraging in Cape Cod Bay. Based on habitat characteristics, we do not expect sturgeon or sea turtles to forage in the affected area. As such, potential burial of benthic

resources in this area is extremely unlikely to affect foraging sea turtles or sturgeon and effects to these species are discountable.

## **Disposal of Dredged Material at CCCDS**

During the discharge of dredged sediment from the barge at a disposal site, suspended sediment levels have been reported to be as high as 500.0 mg/l within 250 feet of the disposal vessel, decreasing to background levels (i.e., 15.0-100.0 mg/l depending on location and sea conditions) within 1,000-6,500 feet (USACE 1983). Total suspended solids near the center of the sediment plume body have been observed to return to near background levels in 35 to 45 minutes (Battele 1994 *in* USACE and EPA 2010).

#### **Exposure to the Sediment Plume**

#### Sturgeon

While fish eggs and larvae can be buried or smothered as suspended solids settle out of the water column, no early life stages of listed species occur at the disposal site. Sturgeon are most likely to be affected by the discharge of sediment at the disposal site if the plume causes a barrier to normal behaviors. As the species is highly mobile, they are able to avoid any sediment plume and any effect on their movements or behavior is not able to be measured or detected. Additionally, the TSS levels expected (up to 500.0 mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical (Burton 1993)). Based on this information, effects of suspended sediment resulting from disposal activities are extremely unlikely and therefore, discountable.

## Sea Turtles

If sea turtles appear in the offshore environment of the action area between November 1 and December 31, there is a high likelihood that the animals will be suffering from a cold stunning event. As surviving turtles may be having a hypothermic reaction resulting in lethargy, shock, and/or pneumonia, they may not be able to avoid sediment plumes related to offshore disposal activities. An onboard observer, required for offshore dredge disposal, as well as the vessel operator, will be on alert for cold-stunned turtles, and will temporarily cease operations and call the Wellfleet Bay Wildlife Sanctuary should they see an animal in the action area that could be affected by dredge disposal. Also, if threatened or endangered species of any kind (including whales and sea turtles) are sighted within 500 yards from the disposal point, operators must wait for the animals to leave the area or must use an alternative disposal point specified by USACE within the boundary of the designated disposal site (see Section III of Appendix A for more detail). Given the presence of the onboard observer, the absence of documentation evidencing harmful effects of offshore disposal on cold stunned sea turtles, and the fact that sea turtles are air breathers, effects of the disposal activities are extremely unlikely; therefore, the effects of disposal activities on sea turtles are discountable.

## Whales

No information is available on the effects of total suspended solids (TSS) on whales. TSS is most likely to affect whales if a plume causes a barrier to normal behaviors. While the temporary (i.e., 35-45 minutes) increase in suspended sediments may cause whales to alter their normal movements, any change in behavior is not able to be measured or detected, as it will only involve

movements that alter their course out of the sediment plume (i.e., a maximum distance of 6,500 feet from disposal location). In addition, an approved endangered species observer will be present aboard the disposal vessel as it transits between the dredge site and the CCCDS during daylight hours. If threatened or endangered species of any kind (including whales and sea turtles) are sighted within 500 yards from the disposal point, operators must wait for the animals to leave the area or must use an alternative disposal point specified by USACE within the boundary of the designated disposal site (see Section III of Appendix A for more detail). Based on this information, any temporary increase in suspended sediment is extremely unlikely to disrupt the feeding behavior of whales, or hinder the movement of whales between foraging areas or while migrating, or otherwise negatively affect listed species in the action area; therefore, the effects of suspended sediment on whales resulting from the disposal of dredge material are discountable.

#### Effects on Prey

Disposal operations can bury benthic prey. Direct impacts to fish or other mobile species during placement of dredge material at the disposal site are expected to be minimal due to the small contact footprint of the fluidized sediments as they leave the barge (typically 50 feet by 100 feet). Given the small area impacted by each disposal event, mobile species are expected to be able to avoid the falling sediment and would not be subject to burial. Right whales in Cape Cod Bay are generally feeding on copepods, while humpback and fin whales feed on krill and small schooling fish, primarily Atlantic herring<sup>2</sup>, mackerel and sand lance. Because of the limited area (50 feet by 100 feet), the short time disposed materials are expected to be in the water column, and the ability of prey species to avoid the sediment plume, mobile prey species will not be affected by disposal activities. Therefore, there will be no effects to whale foraging.

The only species that are likely to be buried are immobile benthic organisms. Sea grasses and macroalgae that green sea turtles forage on are not present at the disposal site. The species that leatherback sea turtles forage on (e.g., jellyfish) are mobile and not likely to be vulnerable to burial. Some species of mollusks and gastropods that loggerhead sea turtles, Kemp's ridley sea turtles, and sturgeon feed on have limited mobility and could be buried during disposal operations. Some buried animals will be able to unbury themselves. The surrounding areas where dredge material will be placed are expected to be recolonized by individuals from similar habitats nearby. The substrate at the CCCDS varies in composition from 31-66% sand and 36-69% silt. Given this range, we expect full recolonization of the impacted area to take between six months and three years (Newell et al. 1998). Any reduction in benthic prey at the disposal site will be limited to the small area where dredge material will be placed (50 feet by 100 feet) and thus, the effects of the potential loss of prey for Kemp's ridley and loggerhead sea turtles and sturgeon will be undetectable, as only a fraction of the benthic species that these species prey on will be affected, and those temporary losses will occur in a very small area. Green and leatherback sea turtles will not experience any reduction in prey. Effects to Kemp's ridley and loggerhead sea turtles and sturgeon are insignificant.

<sup>&</sup>lt;sup>2</sup> It is important to distinguish between Atlantic herring and the species commonly referred to as "river herring" because there are often references made to "herring" without further specificity about which species is being referred to. Atlantic herring are a marine species that occurs exclusively in saline waters; these small schooling fish are preyed upon by large whales. The term river herring refers to alewife and blueback herring which are small anadromous fish that spawn in rivers and then make oceanic migrations.

#### **Vessel Interactions**

Collision with vessels remains a source of anthropogenic mortality for sea turtles, sturgeon, and whales. The proposed project will lead to a small temporary increase in vessel traffic (i.e., hopper dredge movement) within the action area; however, the increase is not expected to be measurable relative to the existing vessel traffic in the CCC and Cape Cod Bay. With any increase in vessel traffic, some increased risk of vessel strike to listed species is possible. However, due to the limited information available regarding the incidence of ship strikes and the factors contributing to ship strike events, it is difficult to determine how a particular number of vessel transits or a percentage increase in vessel traffic will translate into a number of likely ship strike events or percentage increase in collision risk. In spite of being one of the primary known sources of direct anthropogenic mortality to whales, and to a lesser degree, sea turtles and sturgeon, ship strikes remain relatively rare, stochastic events, and a small, temporary increase in vessel traffic in the action area would not necessarily translate into an increase in ship strike events. The risk of a vessel interaction with listed species in the action area is discussed below.

#### Sea Turtles

Interactions between vessels and sea turtles occur and can result in injury or death. Most forms of vessel interactions result from contact between sea turtles and boat propellers. Information is lacking on the type or speed of vessels involved in turtle vessel strikes. However, there does appear to be a correlation between the number of vessel struck turtles and the level of recreational boat traffic (NRC 1990). Although little is known about sea turtle reaction to vessel traffic, it is generally assumed that turtles are more likely to avoid injury from slower-moving vessels since the turtle has more time to maneuver and avoid the vessel. However, sea turtles appearing in the offshore environment of the action area between November 1 and December 31 may be suffering from a cold stunning event. Turtles surviving a cold stun event may be having a hypothermic reaction resulting in lethargy, shock, and/or pneumonia, and may not be able to avoid even slow moving vessel traffic related to dredge disposal activities. The speed of the hopper dredge is not expected to exceed 10 knots while transiting to and from the disposal site. The 10 knot or less speed of the vessels is likely to reduce the chances of collision with a sea turtle. In addition, the presence of an experienced endangered species observer who can advise the vessel operator to slow the vessel or maneuver safely when sea turtles are spotted will further reduce the potential risk for interaction with vessels. Based on this and the best available information, we believe the potential interaction of a hopper dredge and a sea turtle is extremely unlikely; therefore, the effects are discountable.

#### Sturgeon

There is limited information on the effects of vessel operations on shortnose sturgeon. It is generally assumed that as shortnose sturgeon are benthic species, that their movements are limited to the bottom of the water column and that vessels operating with sufficient navigational clearance would not pose a risk of ship strike. Shortnose sturgeon may not be as susceptible due to their smaller size in comparison to Atlantic sturgeon that are larger and for which ship strikes have been documented more frequently. However, anecdotal evidence suggests that shortnose sturgeon at least occasionally interact with vessels, as evidenced by wounds that appear to be caused by propellers. There has been only one confirmed incidence of a ship strike on a shortnose sturgeon (Kennebec River, Maine, <20 foot boat) and two suspected ship strike mortalities (Delaware River).

Aside from these incidents, no information on the characteristics of vessels that are most likely to interact with shortnose sturgeon is available and there is no information on the rate of interactions. However, assuming that the likelihood of interactions increases with the number of vessels present in an area, below, we consider the likelihood that an increase in the number of vessels operating in the action area, in addition to to baseline conditions, would increase the risk of interactions between shortnose sturgeon and vessels in the action area generally.

As noted in the 2007 Status Review and the final listing rule, in certain geographic areas vessel strikes have been identified as a threat to Atlantic sturgeon. While the exact number of Atlantic sturgeon killed as a result of being struck by boat hulls or propellers is unknown, it is an area of concern in the Delaware and James rivers. Brown and Murphy (2010) examined 28 dead Atlantic sturgeon observed in the Delaware River from 2005-2008, and found that 14 (50%) of the mortalities resulted from apparent vessel strikes and 10 of the 14 (71%) had injuries consistent with being struck by a large vessel (Brown and Murphy 2010).

The factors relevant to determining the risk to Atlantic sturgeon from vessel strikes are currently unknown, but they may be related to size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of Atlantic sturgeon in the area (e.g., foraging, migrating, etc.). Large vessels have been implicated because of their deep drafts (up to 40-45 feet) compared to smaller vessels (15 feet), which increases the probability of vessel collision with demersal fishes like sturgeon, even in deep water (Brown and Murphy 2010). Smaller vessels and those with relatively shallow drafts provide more clearance with the river bottom and reduce the probability of vessel-strikes. Because hopper dredges have shallow drafts relative to the offshore environment, the chances of vessel-related mortalities are expected to be low.

It is important to note that vessel strikes have only been identified as a significant concern in the Delaware and James rivers and current thinking suggests that there may be unique geographic features in these areas (e.g., potentially narrow migration corridors combined with shallow/narrow river channels) that increase the risk of interactions between vessels and Atlantic sturgeon. These geographic features are not present in the CCC, which is sufficiently wide and deep enough to allow sturgeon passage while vessels are in the CCC, or the rest of the action area.

We have considered the likelihood that an increase in vessel traffic associated with the proposed project would generally increase the risk of interactions between Atlantic and shortnose sturgeon and vessels in the action area. The use of a hopper dredge will cause a small, localized, temporary increase in vessel traffic. Given the large volume of traffic in the CCC and Cape Cod Bay, the increase in traffic associated the proposed project is extremely small.

Given the extremely small increase in vessel traffic and the slow speeds that these vessels are expected to operate at, and that the action area is not a known overwintering, foraging, or spawning area, there will be no measurable or detectable increase in the risk of vessel strike. Thus, effects to shortnose and Atlantic sturgeon from the increase in vessel traffic are insignificant.

## Whales

Large whales, particularly right whales, are vulnerable to injury and mortality from ship strikes. Ship strike injuries to whales take two forms: (1) propeller wounds characterized by external gashes or severed tail stocks; and (2) blunt trauma injuries indicated by fractured skulls, jaws, and vertebrae, and massive bruises that sometimes lack external expression (Laist et al. 2001). Collisions with smaller vessels may result in propeller wounds or no apparent injury, depending on the severity of the incident. Laist et al. (2001) reports that of 41 ship strike accounts that reported vessel speed, no lethal or severe injuries occurred at speeds below 10 knots, and no collisions have been reported for vessels traveling less than 6 knots. Most ship strikes, however, have occurred at vessel speeds of 13-15 knots or greater (Jensen and Silber 2004; Laist et al. 2001). An analysis by Vanderlaan and Taggart (2007) showed that at speeds greater than 15 knots, the probability of a ship strike resulting in death increases asymptotically to 100%. At speeds below 11.8 knots, the probability decreases to less than 50%, and at 10 knots or less, the probability is further reduced to approximately 30%. As noted above, under the proposed action, the speed of the dredge is not expected to exceed 10 knots while transiting to and from the disposal sites, making vessel strikes extremely unlikely. Based on this information, and the fact that vessel strike avoidance measures will be in place throughout the proposed action (see permit conditions in Appendix A), an interaction between the hopper dredge and a listed species of whale extremely unlikely; therefore, effects are discountable.

## Effects to Existing Right Whale Critical Habitat

We have considered whether the disposal of dredged material (offshore or onshore) would have any direct or indirect effects to right whale critical habitat. Right whales use the waters of Cape Cod Bay for foraging (primarily for copepods). Regardless of the dredge material disposal method employed, critical habitat will be exposed to temporary increases in suspended sediment levels. We expect suspended sediment levels to be as high as 500.0 mg/l within 250 feet of the hopper dredge disposal at the CCCDS, decreasing to background levels (i.e., 15.0-100.0 mg/l depending on location and sea conditions) within 1,000-6,500 feet (USACE 1983). We also anticipate total suspended solids near the center of the sediment plume body to return to near background levels in 35 to 45 minutes (Battele 1994 *in* USACE and EPA 2010). For nearshore disposal, we expect short term (i.e., several hours) increases in turbidity levels created by beach fill operations along the shoreline (i.e., approximately 500 meters down current from the discharge pipe) to be between 34-64 mg/l.

We do not expect any measurable adverse effects on copepods in Cape Cod Bay as a result of dredge material disposal. Copepods in Cape Cod Bay originate from Jordan, Wilkinson, and George's Basin. The action area does not extend to these basins and we do not expect any effects to the generation of copepods in these areas that could be attributable to dredge material disposal at either location. Dredge material disposal will also not affect any of the physical or oceanographic conditions that serve to aggregate copepods in Cape Cod Bay. For these reasons, effects to critical habitat will be insignificant.

## **Section 7 Conclusion**

Based on the analysis that all effects of the proposed project will be insignificant or discountable, we concur with your determination that the proposed maintenance and advance dredging of the

Cape Cod Canal FNP is not likely to adversely affect any listed species or designated critical habitat. Therefore, no further consultation pursuant to Section 7 of the ESA is required.

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required. As noted above, we expect that you will provide us with refined project plans once they are available. At that time, if we determine the project will cause effects not considered here, reinitiation of this consultation will be necessary. Should you have any questions about this correspondence please contact Zach Jylkka at (978) 282-8467 or by e-mail (Zachary.Jylkka@Noaa.gov).

#### **Technical Assistance for Proposed Critical Habitat**

On February 20, 2015, we published a proposed rule to expand the critical habitat for right whales in the North Atlantic by two new areas (80 FR 9313). The areas under consideration as critical habitat contain approximately 29,945 square nautical miles of marine habitat in the Gulf of Maine and Georges Bank region (Unit 1, Northeastern US Foraging Area) and off the Southeast U.S. coast (Unit 2, Southeastern Calving Habitat). Once an area is proposed for critical habitat, the conference provisions of the ESA may apply (see ESA section 7(a)(4) and 50 CFR 402.10). Conference is defined as "a process which involves informal discussions between a Federal agency and the Service... regarding the impact of an action on proposed species or proposed critical habitat and recommendations to minimize or avoid the adverse effects" (50 CFR 402.02). Further stated in 50 CFR 402.10, "Federal agencies are required to confer with NMFS on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat."

We have reviewed the proposed action in order to provide guidance to you as to whether a conference is required in this case. Dredge disposal at the CCCDS and anticipated sediment plumes from onshore disposal will fall within Unit 1 of the proposed right whale critical habitat. The proposed rule identifies the following four physical and biological features of foraging habitat that are essential to the conservation of the species: (1) The physical oceanographic conditions and structures of the Gulf of Maine and Georges Bank region that combine to distribute and aggregate *C. finmarchicus* for right whale foraging, namely prevailing currents and circulation patterns, bathymetric features (basins, banks, and channels), oceanic fronts, density gradients, and temperature regimes; (2) Low flow velocities in Jordan, Wilkinson, and Georges Basins that allow diapausing *C. finmarchicus* to aggregate passively below the convective layer so that the copepods are retained in the basins; (3) Late stage *C. finmarchicus* in dense aggregations in the Gulf of Maine and Georges Bank region; and (4) Diapausing *C. finmarchicus* in aggregations in the Gulf of Maine and Georges Bank region.

## Effects on Physical and Biological Features (1) and (2)

Dredge material disposal will not affect any of the physical or oceanographic conditions that serve to aggregate copepods in Cape Cod Bay. The action area does not extend to Jordan, Wilkinson, and Georges Basins, and we do not expect any effects to the generation of copepods in these areas that could be attributable to dredge material disposal at either location. Therefore, there will be no effects on physical and biological features (1) and (2) from the proposed action.

## Effects on Physical and Biological Features (3) and (4)

In July 2014, we published an ESA Section 4(b)(2) Report which included an evaluation of different activities which may affect the proposed critical habitat in such a way that would trigger consultation under section 7 of the ESA, should the proposed critical habitat advance to a final rule. The disposal of dredge material can result in a number of potential environmental effects including increased turbidity, disturbance of benthic communities, water quality degradation, resuspension of contaminants and toxins. Provided that dredge material adheres to applicable regulations under the Clean Water Act (CWA) and the Marine Protection, Research, and Sanctuaries Act (MPRSA), also known as the Ocean Dumping Ban Act (33 U.S.C. § 1251and 1401 et seq.), we state in the report that: "We have not identified any routes of effects from dredging related activities to the essential foraging features based on our review of past actions that involved dredging. The discharge of dredge material in the marine environment would likely have ephemeral effects given prevailing currents that would rapidly disperse sediment plumes at depths where the essential foraging features are not present." The material proposed for disposal at CCCDS or Town Neck Beach adheres to the applicable regulations under the CWA and MPRSA. Based on the findings of our 4(b)(2) report and the best available information, we conclude that the proposed action will not have any effect on physical and biological features (3) or (4) (i.e., dense aggregations of C. finmarchicus (diapausing or otherwise) in the Gulf of Maine and Georges Bank region).

As all effects of the proposed action are likely to be insignificant and discountable, it is not reasonable to anticipate that this action would be likely to result in the destruction or adverse modification of proposed right whale critical habitat. As such, no conference is necessary.

#### **Essential Fish Habitat**

NMFS Habitat Conservation Division (HCD) is responsible for overseeing programs related to Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act and other NOAA trust resources under the Fish and Wildlife Coordination Act. HCD issued comments on the proposed project on March 20, 2015. If you have any questions regarding those comments or wish to discuss EFH further, please contact Alison Verkade at (978) 281-9266 or Alison.Verkade@noaa.gov.

Sincerely

John K. Bullard Regional Administrator

EC: Jylkka, GARFO/PRD Madley, GARFO/PRD Verkade, GARFO/HCD Cappola, USACE

 $\label{eq:FileCode: Section 7 Non-Fisheries ACOE Informal 2015 New England District Cape Cod Canal PCTS NER-2015-12130$ 

#### References

- Anchor Environmental. 2003. Literature review of effects of resuspended sediments due to dredging. June. 140 pp.
- Army Corps of Engineers (USACE). 1983. Dredging and Dredged Material Disposal. U.S. Dept. Army Engineer Manual 111 0-2-5025.
- Army Corps of Engineers (USACE) and Environmental Protection Agency (EPA). 2010. Site Management and Monitoring Plan for the Historic Area Remediation Site. April 29, 2010. 77pp.
- Atlantic Sturgeon Status Review Team (ASSRT). 2007. Status Review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. 174 pp.
- Battele. 1994. Plume Tracking of Dredged Material Containing Dioxin. Report prepared under contract to U.S. Environmental Protection Agency, Region 2, New York. Contract No. 68-C2-0134, Work Assignment 7. February 14, 1994.
- Boysen, K. A. and Hoover, J. J. (2009), Swimming performance of juvenile white sturgeon (Acipenser transmontanus): training and the probability of entrainment due to dredging. Journal of Applied Ichthyology, 25: 54–59.
- Brown, J.J. and G.W. Murphy. 2010. Atlantic sturgeon vessel strike mortalities in the Delaware River. Fisheries 35(2):72-83.
- Burlas, M., G. L Ray, & D. Clarke. 2001. The New York District's Biological Monitoring Program for the Atlantic Coast of New Jersey, Asbury Park to Manasquan Section Beach Erosion Control Project. Final Report. U.S. Army Engineer District, New York and U.S. Army Engineer Research and Development Center, Waterways Experiment Station.
- Burton, W. 1993. Effects of bucket dredging on water quality in the Delaware River and the potential for effects on fisheries resources. Prepared by Versar, Inc. for the Delaware Basin Fish and Wildlife Management Cooperative, unpublished report. 30 pp.
- Cetacean and Turtle Assessment Program (CeTAP). 1982. Final report or the cetacean and turtle assessment program, University of Rhode Island, to Bureau of Land Management, U.S. Department of the Interior. Ref. No. AA551-CT8-48. 568 pp.
- Clarke, D. 2011. Sturgeon Protection. Presented to the Dredged Material Assessment and Management Seminar 24-26 May, 2011 Jacksonville, FL.
- Collins, M. R. and T. I. J. Smith. 1997. Distribution of shortnose and Atlantic sturgeons in South Carolina. North American Journal of Fisheries Management. 17: 995-1000.

- Dadswell, M. 2006. A review of the status of Atlantic sturgeon in Canada, with comparisons to populations in the United States and Europe. Fisheries 31: 218-229.
- Dovel, W. L. and T. J. Berggren. 1983. Atlantic sturgeon of the Hudson River estuary, New York. New York Fish and Game Journal 30: 140-172.
- Dunton *et al.* 2010. Abundance and distribution of Atlantic sturgeon (*Acipenser oxyrinchus*) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. Fish. Bull. 108(4):450–465.
- Erickson *et al.* 2011. Use of pop-up satellite archival tags to identify oceanic-migratory patterns for adult Atlantic Sturgeon, Acipenser oxyrinchus oxyrinchus Mitchell, 1815. *J. Appl. Ichthyol.* 27: 356-365
- Greene, K. 2002. Beach Nourishment: A Review of the Biological and Physical Impacts. Atlantic States Marine Fisheries Commission (ASMFC) Habitat Management Series #7. 179 pp.
- Guerra-Garcia, J.M. and J. C. Garcia-Gomez. 2006. Recolonization of defaunated sediments: Fine versus gross sand and dredging versus experimental trays. Estuarine Coastal and Shelf Science 68 (1-2): 328-342.
- Hain, J.H.W., M.J. Ratnaswamy, R.D. Kenney, and H.E. Winn. 1992. The fin whale, Balaenoptera physalus, in waters of the northeastern United States continental shelf. Rep. Int. Whal. Commn. 42:653–669.
- Holland, B.F., Jr. and G.F. Yelverton. 1973. Distribution and biological studies of anadromous fishes offshore North Carolina. North Carolina Department of Natural and Economic Resources, Division of Commercial and Sports Fisheries, Morehead City. Special Scientific Report 24:1-132.
- Jensen, A. S., and G. K. Silber. 2004. Large Whale Ship Strike Database. U.S. Department of Commerce, NMFS-OPR-25 37.
- Kenney, R.D. and H.E. Winn. 1987. Cetacean biomass densities near submarine canyons compared to adjacent shelf/slope areas. Continental Shelf Research 7:107–114.
- Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, M. Podesta. 2001. Collisions between ships and whales. Marine Mammal Science 17(1):35-75.
- Laney, R.W., J.E. Hightower, B.R. Versak, M.F. Mangold, W.W. Cole Jr., and S.E. Winslow. 2007. Distribution, Habitat Use, and Size of Atlantic Sturgeon Captured during Cooperative Winter Tagging Cruises, 1988-2006. American Fisheries Society Symposium 56: 000-000.

- Morreale, SJ. and E.A Standora. 2005. Western North Atlantic waters: Crucial developmental habitat for Kemp's ridley and loggerhead sea turtles. Chel. Conserv. Biol. 4(4):872-882.
- Murawski, S. A. and A. L. Pacheco. 1977. Biological and fisheries data on Atlantic Sturgeon, *Acipenser oxyrhynchus* (Mitchill). National Marine Fisheries Service Technical Series Report 10: 1-69.
- National Marine Fisheries Service (NMFS). 2010. Recovery Plan for the Fin Whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD.
- National Marine Fisheries Service (NMFS). 2011. Recovery Plan for the Sei Whale (*Balaenoptera borealis*). National Marine Fisheries Service, Silver Spring, MD.
- National Research Council (NRC). 1990. Decline of sea turtles: causes and prevention. National Academy Press, Washington D.C. 259 pages.
- Newell, R. C., Seiderer, L. J., and Hitchcock, D. R. (1998). The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Oceanography and Marine Biology: An Annual Review, 36, 127-178.
- Pace, R.M. III, Merrick, R.L. 2008. Northwest Atlantic Ocean Habitats Important to the Conservation of North Atlantic Right Whales (Eubalaena glacialis). Northeast Fish Sci Cent Ref Doc. 08-07; 24 p.
- Ruben, H. J., and Morreale, S. J. 1999. Draft Biological Assessment for Sea Turtles: New York and New Jersey Harbor Complex. Unpublished Biological Assessment submitted to the National Marine Fisheries Service.
- Savoy, T. and D. Pacileo. 2003. Movements and important habitats of subadult Atlantic sturgeon in Connecticut waters. Transactions of the American Fisheries Society 132: 1-8.
- Schubel, J.R., H.H. Carter; R.E. Wilson, W.M. Wise, M.G. Heaton, and M.G; Gross. 1978. Field investigations of the nature, degree, and extent of turbidity generated by open-water pipeline disposal operations. Technical Report D-78-30; U.S. Army Engineer Waterways. Experiment Station, Vicksburg, Miss., 245 pp.
- Shoop, C.R. and R.D. Kenney. 1992. Seasonal distributions and abundances of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetological Monographs 6: 43-67.
- Shortnose Sturgeon Status Review Team. 2010. A Biological Assessment of shortnose sturgeon (*Acipenser brevirostrum*). Report to National Marine Fisheries Service, Northeast Regional Office. November 1, 2010. 417 pp.

- Smith, T. I. J. 1985. The fishery, biology, and management of Atlantic sturgeon, *Acipenser* oxyrhynchus, in North America. Environmental Biology of Fishes 14(1): 61-72.
- Stein, A. B., K. D. Friedland, and M. Sutherland. 2004a. Atlantic sturgeon marine distribution and habitat use along the northeastern coast of the United States. Transactions of the American Fisheries Society 133: 527-537.
- Stein, A. B., K. D. Friedland, and M. Sutherland. 2004b. Atlantic sturgeon marine bycatch and mortality on the continental shelf of the Northeast United States. North American Journal of Fisheries Management 24: 171-183.
- Vanderlaan A.S.M. and C.T. Taggart. 2007. Vessel collisions with whales: The probability of lethal injury based on vessel speed. Marine Mammal Science 23:144-156.
- Vladykov, V.D. and J.R. Greeley. 1963. Order Acipenseroidea. Pages 24-60 in Fishes of the Western North Atlantic. Memoir Sears Foundation for Marine Research 1(Part III). xxi + 630 pp.
- Waldman, J.R., C. Grunwald, J. Stabile, and I. Wirgin. 2002. Impacts of life history and biogeography on genetic stock structure in Atlantic sturgeon, Acipenser oxyrinchus oxyrinchus, Gulf sturgeon A. oxyrinchus desotoi, and shortnose sturgeon, A. brevirostrum. Journal of Applied Ichthyology 18: 509–518.
- Walsh, M.G., M.B. Bain, T. Squires, J.R. Walman, and Isaac Wirgin. 2001. Morphological and genetic variation among shortnose sturgeon Acipenser brevirostrum from adjacent and distant rivers. Estuaries Vol. 24, No. 1, p. 41-48. February 2001.
- Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel, editors. 2010. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2010. NOAA Tech Memo NMFS NE 219.
- Welsh, S. A., S. M. Eyler, M. F. Mangold, and A. J. Spells. 2002. Capture locations and growth rates of Atlantic sturgeon in the Chesapeake Bay. Pages 183-194. In: W. Van Winkle, P. J. Anders, D. H. Secor, and D. A. Dixon, (editors), Biology, management, and protection of North American sturgeon. American Fisheries Society Symposium 28, Bethesda, MD.
- Wilber, D.H., D.G. Clarke & M.H. Burlas. (2006). Suspended sediment concentrations associated with a beach nourishment project on the northern coast of New Jersey. Journal of Coastal Research 22(5): 1035 1042.
- Wirgin, I., C. Grunwald, E. Carlson, J. Stabile, D. Peterson, and J. Waldman. 2005. Range-wide Population Structure of Shortnose Sturgeon Acipenser brevirostrum Based on Sequence Analysis of the Mitochondrial DNA Control Region. Estuaries 28: 406-421.
Zydlewski, G. B., Kinnison, M. T., Dionne, P. E., Zydlewski, J. and Wippelhauser, G. S. (2011), Shortnose sturgeon use small coastal rivers: the importance of habitat connectivity. Journal of Applied Ichthyology, 27: 41–44. doi: 10.1111/j.1439-0426.2011.01826.x

### **Appendix A: Permit Conditions for Disposal of Dredged Material at the Cape Cod Canal Disposal Site**<sup>3</sup>

## PERMIT SPECIAL CONDITIONS FOR VESSEL OPERATIONS AND THE USE OF THE CAPE COD CANAL AND BUZZARDS BAY DISPOSAL SITES

1. From January 1 through May 31 of any year, disposal vessels including tugs, barges, scows transiting between the Cape Cod Canal and the CCDS and the BBDS shall operate at speeds not exceeding 5 knots after sunset, before sunrise, or in daylight conditions where visibility is less than one nautical mile. Disposal shall not be permitted if these requirements cannot be met due to weather or sea conditions. In that regard, the permittee and contractor must be aware of predicted conditions before departing for the disposal site. The intent of this condition is to reduce the potential for vessel collisions with endangered species, including large whales.

2. From January 1 through May 31 disposal operations at the CCDS and BBDS must have a qualified endangered species observer present aboard disposal vessels transiting between the Cape Cod Canal and the CCDS and BBDS during daylight hours. NMFS has provided criteria for a qualified endangered species observer. A qualified observer must be capable of: a) maintaining an active lookout for whales during vessel transit between the Cape Cod Canal and the disposal sites and during disposal activities at the disposal site; b) identifying to species a large whale from 500 yards, and observe a sea turtle at 100 yards; and c) guiding the vessel operator on the conditions from 50 CFR Parts 217 and 222. The observer may perform other duties while not in transit or during active disposal operations as long as these duties do not interfere with an ability to maintain a lookout for endangered species.

3. The specific federal regulation for protection of North Atlantic right whales is outlined below (Section I). The Common wealth of Massachusetts has a parallel regulation in effect in state waters. However, as a condition on the use of the CCDS and BBDS, operators must not only adhere to regulations for the protection of right whales but must follow additional requirements as explained in Sections II, ID, and IV below to protect all species of large whales from a potential vessel collision. Vessel operators and endangered species observers shall follow these guidelines to minimize the conflicts with threatened or endangered species.

# I. Legal requirements for operation of any vessel around North Atlantic Right Whales:

50 CPR Parts 217 and 222 222.32 Approaching North Atlantic Right Whales

<sup>&</sup>lt;sup>3</sup> These permit conditions were attached to a September 9, 1998 NMFS letter to Mr. William H. Lawless, Chief, Regulatory Branch, New England District, U.S. Army Corps of Engineers.

(a) *Prohibitions*. Except as provided under paragraph (c) of this section, it is unlawful for any person subject to the jurisdiction of the United States to commit, attempt to commit, to solicit another to commit, or cause to be committed any of the following acts:

(1) Approach (including by interception) within 500 yards (460m) of a right whale by vessel, aircraft or any other means;

(2) Fail to undertake required right whale avoidance measures specified under paragraph (b) of this section.

(b) *Right Whale Avoidance Measures*. Except as provided under paragraph (c) of this section, the following avoidance measures must be taken if within 500 yards (460m) of a right whale:

(1) If underway, a vessel must steer a course away from the right whale, and immediately leave the area at a safe slow speed;

(2) An aircraft must take a course away from the right whale and immediately leave the area at a constant air speed.

(c) *Exceptions*. The following exceptions apply to this section, but any person who claims the applicability of an exception has the burden of proving that the exception is applicable:

(1) Paragraphs (a) and (b) of this section do not apply if a right whale approach is authorized by NMFS through a permit issued under subpart C (Endangered Fish or Wildlife Permits) of this part or through a similar authorization.

(2) Paragraphs (a) and (b) of this section do not apply where compliance would create an imminent and serious threat to a person, vessel, or aircraft.

(3) Paragraphs (a) and (b) of this section do not apply when approaching to investigate a right whale entanglement or injury, or to assist in the disentanglement or rescue of a right whale, provided that permission is received from NMFS or a NMFS designee prior to the approach.

(4) Paragraphs (a) and (b) of this section do not apply to an aircraft unless the aircraft is conducting whale watch activities or is being operated for that purpose.

(5) Paragraph (b) of this section does not apply to the extent that a vessel is restricted in her ability to maneuver, and because of the restriction, cannot comply with paragraph (b) of this section.

# II. Requirements on operation around any large whale or sea turtle for purposes of ocean disposal at the CCDS and BBDS:

(a) Operational restrictions.

(1) Disposal operators must not approach within 500 yards (460m) of any large whale or 100 yards of any sea turtle with a vessel;

(2) Disposal operators must follow the avoidance measures described below:

(b) Avoidance Measures. Except as provided under paragraph (c) of this section, the following avoidance measure must be taken if within 500 yards (460m) of any large whale or 100 yards of any sea turtle:

(1) If underway, a vessel must steer a course away from the whale or sea turtle, and immediately leave the area at a slow safe speed;

(c) *Exceptions*. The following exceptions apply to this section, but any person who claims the applicability of an exception has the burden that proving that the exception is applicable:

(1) These requirements do not apply where compliance would create an imminent and serious threat to a person or vessel.

(2) These requirements do not apply when approaching to investigate a right whale entanglement or injury, or to assist in the disentanglement or rescue or a right whale, provided that permission is received from NMFS or a NMFS designee prior to the approach.

(3) Paragraph (b) of this section does not apply to the extent that a vessel is restricted in her ability to maneuver (as defined in 72 COLREGS, 33 CFR), and because of the restriction, cannot comply with paragraph (b) of this section.

### III. Requirements for release of dredged material at the CCDS and BBDS:

If threatened or endangered species of any kind (including whales and sea turtles) are sighted within 500 yards from the disposal point, operators must wait for the animals to leave the area or must use an alternative disposal point specified by the Corps of Engineers (NAE) within the boundary of the designated disposal site. If threatened or endangered species of any kind are sighted between 500 and 1500 yards from the disposal point, the observer shall note the animals behavior, relative position, and direction and speed of movement to determine if release of dredged material is likely to harass or endanger the animals. For example, whales actively feeding at or near the disposal point are more likely than resting whales to interact with released sediments. If the observer judges that disposal is likely to harass or endanger the animals, the observer shall inform the vessel captain. Disposal shall be delayed until the animals change their behavior or move away such that the observer judges that no danger to the animals will result from disposal. In the event that behavior and direction of movement is unpredictable, operators should use the alternative approved disposal point. In the presence of right whales, the most protective operational measures are advised.

#### IV. Other responsibilities of vessel operator/onboard observer (as appropriate)

(a) The observer is responsible for contacting NMFS' early warning system for the most recent information on right whale movements and locations prior to departure for the disposal site to check for the presence of whales.

(b) The observer should report all right whale sightings, noting location, to the early warning system at the end of the day.

(c) The accompanying contact list contains the information for who should be contacted in the event of any encounter with a large whale under any circumstance.



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

#### March 16, 2015

Programs and Project Management Division Civil Works/IIS Project Management Branch

Mark Murray-Brown, Section 7 Coordinator Protected Resources Division NOAA Fisheries 55 Great Republic Drive Gloucester, Massachusetts 01930-2298

RE: Maintenance and advance maintenance dredging of the Cape Cod Canal, Bourne and Sandwich, Massachusetts

Dear Mr. Murray-Brown:

I am writing to follow-up my letter to you dated February 10, 2015 and to followup recent discussions between Dr. Valerie Cappola and Mr. Zachary Jylkka concerning the subject US Army Corps of Engineers project and the North Atlantic right whale and its critical habitat.

In my February 10<sup>th</sup> letter, I described the nature of the proposed project in detail; I provided a copy of our draft Environmental Assessment (EA) and I requested your comments and concurrence with our preliminary determination that the proposed work will have no adverse impacts to endangered species. A copy of my February 10<sup>th</sup> letter is enclosed for your reference.

In subsequent discussions between Dr. Cappola and Mr. Jylkka, it was noted that the potential impacts to the right whale critical habitat were not adequately addressed in our draft EA. We have since updated our draft EA to include information pertaining to the right whale and its critical habitat. I have excerpted those sections from the draft EA and have enclosed them for your reference.

As noted in my previous letter, the material removed from the Cape Cod Canal may potentially be placed on Town Neck Beach (TNB), in Sandwich Massachusetts to restore a severely eroded section of the beach and to provide storm damage protection for the homes along this section of the beach. If the material is placed on TNB there should be no impacts to any current or proposed right whale critical habitat as placement of the dredged material will be within the intertidal habitat and on the beach above the mean high water mark.

Alternatively, if a non-Federal sponsor cannot be identified to share the cost for disposal of the dredged material on TNB then the Cape Cod Canal Disposal Site (CCCDS) would be used for the disposal of the dredged material. The CCCDS is a previously used open water disposal area located just northeast of the east entrance to the Canal in Cape Cod Bay. This site is located within the current and the proposed expanded North Atlantic Right Whale critical habitat. If the CCCDS is utilized for the disposal of dredged material from the Canal, vessel speed and inspector requirements will be incorporated into contract documents to reduce the risk of vessel collision with a whale as identified in the draft EA.

Based on our review of the newly proposed right whale critical habitat, we have determined that the proposed project will not jeopardize the continued existence of the species or result in the destruction or adverse modification of the proposed critical habitat, therefore, no conference is necessary.

We have made a determination that within the current right whale critical habitat, the potential placement of dredged material in the intertidal habitat at TNB or in the open water at the CCCDS is not likely to adversely affect the right whale or this critical habitat due to the localized and short-term effects of disposal. I request your concurrence with this determination.

As noted previously, my February 10<sup>th</sup> letter requested your comments and concurrence with our preliminary determination that the proposed work is not likely to adversely affect any listed species under NMFS jurisdiction. I request that you review the additional information provided herein and I request your concurrence with our determination. Additionally, please provide us with your comments in accordance with the Fish and Wildlife Coordination Act and any additional comments pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended, on any endangered or threatened species which would be impacted by the proposed work. I would appreciate your comments by April 1, 2015.

If you have any questions or require additional information, please feel free to contact me at (978) 318-8328 or Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067.

Sincerely,

Bill Kavanaugh

Bill Kavanaugh Project Manager

Enclosures Copy Furnished by email: Mr. Zachary Jylkka: zachary.jylkka@noaa.gov



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

February 10, 2015

Programs and Project Management Division Civil Works/IIS Project Management Branch

NOAA Fisheries ATTN: Mark Murray-Brown, Section 7 Coordinator Protected Resources Division 55 Great Republic Drive Gloucester, Massachusetts 01930-2298

Dear Mr. Murray-Brown:

I am writing to request your comments on USACE's proposal to perform maintenance dredging and advance maintenance dredging of the Cape Cod Canal (CCC) in Bourne and Sandwich, Massachusetts.

The authorized Federal Navigation Project (FNP) provides for a 600 feet long jetty and a 3000 feet long breakwater at the east end of the Canal; a channel, 32 feet deep and varying in width (i.e. from 500 – 700 feet) throughout its 17.5 mile length, and two mooring basins: the West Mooring Basin, 32 feet deep and the East Mooring Basin (EMB), 25 feet deep. A map depicting the FNP is enclosed for your reference.

The CCC connects Buzzards Bay and Cape Cod Bay. Use of the CCC saves mariners an average of 135 miles of coastwise travel while circumnavigating Cape Cod and the Nantucket shoals. Roughly 14,000 commercial and recreational vessels transit the 17.4 mile waterway each year. The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships and passenger ferries as well as recreational vessels. The FNP is part of the Intra-Coastal Waterway and is an integral segment of the corridor for petroleum products being delivered to the northeast region.

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the project. This combination creates hazardous conditions for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Shoaling in the main-ship channel consists of large sand wave formations. Recent hydrographic surveys indicate that shoaling has occurred in six areas of the project (see Enclosure 1) and the controlling depth in the Canal proper is now at 30' below Mean Lower Low Water (MLLW). The reduction in available depth is significant and has resulted in draft restrictions being placed on vessels transiting the Canal, tidal

delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor vessels in emergencies (e.g. icing). Further shoaling in the Canal may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod thereby significantly increasing the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas in the authorized, 32-feet deep by 500-feet wide, main-ship channel and the 25-feet deep EMB portions of the project. In order to extend the time between maintenance dredging events, advance maintenance is being proposed to reduce the sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 feet deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

A study is currently underway under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project to rebuild the dunes and beach berm (i.e. to protect the homes in the area) on a 2,500 foot long eroded section of Town Neck Beach in Sandwich (See Enclosure 2). Town Neck Beach has experienced increased erosion (currently estimated to be about 5 feet per year) due in large part to severe coastal storms such as Hurricane Sandy and more recently, Winter Storm Juno.

The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and for the potential beach nourishment. If the 204 study is completed in time to coincide with this maintenance dredging event, and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay any additional costs over and above the Federal base plan (i.e. dredging and placement of the material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach.

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the east entrance to the Cape Cod Canal. The CCCDS was last used for disposal of material dredged from the Canal in 1990.

Enclosed (on CD) is a copy of our draft EA for your reference. It is our preliminary determination that the proposed project is not likely to adversely affect any listed species under NMFS jurisdiction and I request your concurrence with this determination. I am also requesting your comments in accordance with the Fish and Wildlife Coordination Act and any additional comments pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended, on any endangered or threatened species which would be impacted by the proposed work. Please review the enclosed information and provide us with your comments by March 12, 2015.

Please feel free to contact me at (978) 318-8328 or Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067 if you have any questions or require additional information.

Sincerely,

Bill Ravanaugh

Bill Kavanaugh Project Manager

Enclosures

Copy Furnished: via email

Mr. Kevin Madley: <u>kevin.madley@noaa.gov</u> Ms. Alison Verkade: alison.verkade@noaa.gov



#### DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

April 3, 2015

# Programs and Project Management Division Civil Works/IIS Project Management Branch

Mr. Lou Chiarella, Assistant Regional Administrator For Habitat Conservation NOAA Fisheries 55 Great Republic Drive Gloucester, Massachusetts 01930-2298

Re: Cape Cod Canal Federal Navigation Project, Cape Cod Bay and Buzzards Bay, Massachusetts and Town Neck Beach Nourishment, Sandwich, MA.

Dear Mr. Chiarella:

I am writing in response to your March 20, 2015 letter which provided Essential Fish Habitat (EFH) Conservation Recommendations on USACE's proposal to perform maintenance dredging and advance maintenance dredging of the Cape Cod Canal (CCC). Those recommendations included:

- 1 The scope of the beach nourishment should be minimized to eliminate the placement of dredge material on all rocky habitats in the project vicinity. Alternative placement areas, such as east of the proposed placement area or landward of the rocky habitats should be pursued.
- 2 The potential for resuspended sediments to impact the existing eelgrass bed should be fully evaluated, and the proposed placement area modified to eliminate potential adverse impacts to the existing bed.

The overall project purpose is to provide coastal storm protection to the Town Neck Beach area, particularly the homes and infrastructure located along and behind Freeman Avenue. Placement of the material to either the east or west of the currently proposed location would not accomplish that project purpose nor would it likely demonstrate the positive Benefit-to-Cost Ratio needed to justify Federal participation. That being said, severe storms this winter have resulted in the loss of approximately 20 feet of beach berm and dunes along Town Neck Beach. Consequently, the waterward limit of the project is expected to shift landward slightly. Such a shift will not eliminate placement of material within the intertidal rocky habitat entirely, but it does reduce the project's overall impact to that resource. Placement of the material landward of the intertidal rocky would alter the engineered beach profile, thereby compromising the effectiveness of the sand placement. It should also be noted that placement of the material landward of the intertidal rocky habitat will not prevent sand from moving through that habitat due to natural erosive processes.

The winter of 2015 included a notably violent storm season. Storms such as Winter Storm "Juno" scoured out the rock areas on the western end of the project and decimated the dune system along the entire length of Town Neck Beach. Heavy wave action then rapidly pulled much of that material offshore and through the intertidal rocky habitat. In response to those substantial losses, on March 25, 2015, Dr. Valerie Cappola and Michael Riccio visited Town Neck Beach to assess the general conditions at Town Neck Beach and of the EFH resources in question. The following observations were made:

- On the Western end of the project area, only small amounts of sand were found in the intertidal rocky habitat. That sand was generally limited to areas that retain water and/or have the least amount of exposure during low tide.
- Within the center and eastern end of the project, where the beach berm contained more sand than the western end, sand and clay lost during Juno initially settled on the rocky habitat (pers. comm., Dave DeConto, Sandwich Dept. Natural Resources, 27 March 2015). Subsequent storms pulled most of that material offshore but more sand and clay remained within this section of intertidal and subtidal rocky habitats than at the western end.
- The sandy subtidal habit in the center region of the project, just seaward of the intertidal zone, contained enough sand to create sand waves. Areas directly seaward and westward of the coastal bank had clay mixed with the sandy sediments in the intertidal zone. Where there were areas of hard compressed clay sand mixture before the storm, now there are tracks with clay running seaward between the larger rocks in the intertidal and subtidal areas.
- Rocky areas that retained water or moisture during low tide contained healthy algae, snails and barnacles even after all of the sediment moved through the system during the winter storm season.
- Eelgrass beds were found in their previously identified locations, but the beds contained more sand than during a December 3, 2014 site visit. Eelgrass blades that remained submerged during low tide looked very healthy and green. Blades

that were exposed to the air were still attached to the rhizomes but were brown/black colored. The die back of leaves during the winter is not unexpected though, and finding healthy green blades after the winter storms supports our belief that the eelgrass can survive movement of sediment through the area.

We recognize that the project will result in temporary impacts to EFH by virtue of direct placement of sand on intertidal rocky habitat. However, the project area is an inherently dynamic system. Observations such as those stated above, support the notion that large amounts of sand and clay move through the intertidal zone at Town Neck Beach, naturally without significantly impacting the rocky habitat or eelgrass habitat. Therefore we do not believe the proposed placement of dredged material from the Cape Cod Canal on Town Neck Beach, as it is currently proposed, will have a significant negative impact on EFH. For those reasons we do not believe the conservation recommendations are appropriate or practicable when considering the project purpose.

Please feel free to contact the Project Manager, Bill Kavanaugh at (978) 318-8328 or Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067 if you have any questions or require additional information.

Sincerely,

Edward O'Donnell Chief, Navigation Section

Enclosures

Copy Furnished (via email): Ms. Alison Verkade: alison.verkade@noaa.gov Mr. Zachary Jylkka: zachary.jylkka@novv.gov Mr. Mel Cote: cote.mel@epamail.epa.gov



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

MAR 2 0 2015

Mr. Bill Kavanaugh Project Manager U.S. Army Corps of Engineers New England District 696 Virginia Road Concord, MA 01742-2751

# Re: Cape Cod Canal Federal Navigation Project (FNP), Cape Cod Bay and Buzzards Bay, Massachusetts and Town Neck Beach Nourishment, Sandwich, MA

Dear Mr. Kavanaugh:

We have reviewed the Essential Fish Habitat (EFH) Assessment and Draft Environmental Assessment (DEA) dated March 26, 2014, you prepared for the proposed maintenance dredging of the Federal Navigation Project (FNP) in the Cape Cod Canal, Cape Cod Bay and Buzzards Bay, Massachusetts, with proposed dredge material placement along Town Neck Beach in Sandwich, MA. The proposed dredging involves dredging approximately 150,000 cubic yards of material to be placed over a 15.49 acre area along a 2,500 linear foot section of Town Neck Beach in Sandwich, MA. In the event that dredge material cannot be placed at Town Neck Beach, the dredge material is proposed to be disposed of at the Cape Cod Canal Disposal Site. The proposed project includes advance maintenance dredging by hydraulic hopper dredge at six locations with an authorized dredge depth of -32 feet MLLW to -34 to -38 feet MLLW with a 2 foot allowable overdredge, and at the East Mooring Basin from -25 MLLW to -32 feet MLLW with a 2 foot allowable overdredge. The 15.49 acre beach nourishment disposal option includes the nourishment and creation of 10.77 acres of beach dunes and berms. The proposed 10.77 acre beach dune and berm creation includes conversion of 5.36 acres of intertidal habitat to beach dunes and berms with a net loss of 3.54 acres of intertidal habitat. An additional 2.21 acres of subtidal habitat will be directly impacted by the proposed nourishment activity, including a 1.82 acre conversion of the subtidal habitat to intertidal habitat. The proposed beach nourishment activities will result in the mean high waterline being relocated 50 to 150 feet seaward of the existing location. No mitigation is proposed for these activities. The dredge work is anticipated to occur over the fall of 2015 and spring of 2016.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act require Federal agencies to consult with one another on projects like this project. Because the project involves EFH, the consultation process is guided by the EFH regulatory requirements under 50 CFR 600.920, which mandates the preparation of EFH assessments and generally outlines your obligations. We are providing the following comments and recommendations for your consideration.



### **General Comments**

As described in the EFH assessment, the intertidal zone at Town Neck Beach is a mixture of sand and rocky habitats that transition into a gravel and cobble dominated subtidal zone with areas of scattered boulders. The benthic information you provided in the DEA describes the diverse invertebrate community structure and macroalgal coverage in the project area supported by the rocky habitat substrate. Intertidal and inshore subtidal mixed sand, gravel, cobble, and boulder habitats with added habitat complexity from invertebrate communities and macroalgal cover serve as important shelter and forage habitat for a variety of species including Atlantic cod, pollock, black sea bass, ocean pout, red hake, white hake, windowpane flounder, winter skate, little skate, striped bass, cunner, tautog, and scup. Atlantic herring deposit demersal eggs in 5 - 90 meters of water in areas with strong tidal currents on a variety of substrates, including rocks, gravel, and sand (Stevenson and Scott 2005).

The structural complexity of rocky habitats are important for fish in that they provide shelter and refuge from predators (Auster 1998; Auster and Langton 1999; NRC 2002; Stevenson et al. 2004). In addition, gravel and cobble provide a substrate for epibenthic growth which serves as additional refuge for juvenile fish and has been shown to significantly increase survivorship of juvenile cod over flat sand habitats (Lindholm et al. 1998 and 2001). It is well established that intertidal zones serve as areas of refuge from predation and foraging habitat for juvenile fish during periods of high tide (Helfman et al. 2009). Multiple managed fish species in the beach nourishment project vicinity have life history stages that are found in the intertidal zone including, Atlantic cod, pollock, ocean pout, red hake, white hake, and windowpane flounder. Of particular concern is the juvenile life history stage for Atlantic cod. The complexity of the existing resources at Town Neck Beach create a habitat optimal to support and increase survivorship for juvenile cod.

On August 1, 2014, we issued an update on the stock assessment for Gulf of Maine (GOM) Atlantic cod through 2013. The indicators of stock condition for GOM cod have declined or worsened in 2013, and the spawning stock biomass levels are estimated to be at 3 to 4 percent of the biomass target for maximum sustainable yield with biomass at all-time lows. The results of this stock assessment lead to the implementation of Emergency Gulf of Maine Cod Management Measures on November 13, 2014. Given the state of the GOM cod stock, it is essential to minimize adverse impacts to habitats that can support and increase survivorship of critical life stages for this stock.

In the EFH assessment, you provided a review of multiple papers that researched juvenile Atlantic cod habitat utilization. In your EFH assessment you stated that intertidal habitat use by juveniles was only found when temperatures were below 0°C, however Methven and Bajdik (1994) found the opposite, that juveniles were located in the intertidal zone when temperatures were above 0°C. Further, although Grant and Brown (1998) were unable to complete seining at two sample locations due to ice coverage during their February winter sampling events, they successfully obtained juvenile cod by seining waters with a temperature of -1.2°C at their other sample locations. As noted in your EFH assessment, juvenile Atlantic cod exhibit diel activity patterns utilizing intertidal habitats, and this activity pattern differs based on juvenile age. Age-0+ and age-1 Atlantic cod are found in greater numbers within the intertidal zone at night, and young-of-the-year (age-0) utilize intertidal areas more frequently found in the intertidal zone during the day (Methven and Bajdik 1994, Grant and Brown 1998, Anderson et al. 2007). This shift in diel activity pattern is also found in subtidal habitats where separation of spatial distribution patterns based on age has been recorded and is attributed to conspecific predation of age-0 juveniles by age-1+ juveniles (Grant and Brown 1998, Gotceitas and Brown 1993, Gotceitas et al. 1995 and 1997, Anderson et al. 2007, Theodorou 2013). Further, the studies documenting these diel shifts found significant spatial distribution and shoaling behavior differences in habitat use by juvenile cod based on habitat complexity (Grant and Brown 1998, Gotceitas and Brown 1998, Gotceitas and Brown 1993, Gotceitas et al. 1995, Anderson 2007). Each of the studies found that were cod more abundant and their spatial distribution was mediated under the threat of predation within complex rocky and vegetated habitats versus unvegetated sand and soft bottom habitats (Grant and Brown 1998, Gotceitas and Brown 1993, Gotceitas et al. 1995, and 1997, Anderson et al. 2007).

Multiple studies have demonstrated that despite the potential that juvenile cod may initially settle to the substrate indiscriminately, age-0+ juveniles are more abundant in complex habitats (e.g. rocky or vegetated habitats), whether this is due to active movement of post-settlement juvenile cod into complex habitats or due to higher survivorship rates in complex habitats is unknown (Lough et al., 1989, Colton 1978, Collette and Klein-MacPhee 2002). As noted in the EFH assessment, the mark-recapture study conducted by Grant and Brown (1998) found a level of site fidelity exhibited by the age-0+ juvenile cod sampled indicating that once settled into complex habitats have been well documented to significantly increase juvenile survivorship and mediate the spatial distribution of Atlantic cod under the threat of predation in comparison with unvegetated soft substrate habitats (Fraser et al. 1996, Gotceitas and Brown 1993, Lindholm et al. 1998 and 2001, Theodorou 2013).

The proposed beach nourishment activity would bury the rocky intertidal zone and a portion of the subtidal rocky habitat at Town Neck Beach, converting the existing complex rocky habitat to an unvegetated sand habitat. The Habitat Omnibus Amendment 2, for which the public review and comment period has been conducted and is expected to be implemented this year by the New England Fishery Management Council, includes an updated EFH text description for juvenile Atlantic cod that includes the intertidal zone and habitat attributes that increase juvenile survivorship. Based on the demonstrated utilization of complex intertidal and subtidal habitats by juvenile cod and increased survivorship in these habitat types, we do not concur with your determination that the proposed habitat conversion of the rocky intertidal and subtidal habitat to an unvegetated sand habitat would not have a significant adverse effect on Atlantic cod EFH. Alternatives to the filling of the rocky intertidal and subtidal habitat at the project location should be pursued.

As you described in the DEA, juvenile cod young of year were collected west and east of the canal opening into Cape Cod Bay adjacent to the proposed beach nourishment project site by Massachusetts DMF Inshore Trawl Surveys between 1978 and 1999 (Howe et al. 2002). A high relative abundance of age-0 juvenile cod per tow was obtained at these sample sites. Multiple sample locations west of the project site are illustrated to have obtained the highest mapped relative abundance category per tow (251-2500 fish per tow) for age-0 Atlantic cod (Howe et al. 2002). Very few sampling locations throughout the entire survey of Massachusetts waters were

illustrated to have captured such a high relative abundance of age-0 juvenile cod per tow (Howe et al. 2002).

Additionally, adjacent to the project location on the eastern side, multiple tows are illustrated to have obtained relative abundances in the range of 1-100 age-0 Atlantic cod per tow (Howe et al. 2002). Beginning on Page 1 of the Howe et al. (2002) report, the difficulties and caveats of the cod survey are described. It is noted that because of the diel activity pattern in juvenile Atlantic cod and gear limitations (e.g. mesh size, inability to sample hard substrates) the ability to adequately sample juvenile cod is limited by their daytime trawl survey methodology (Howe et al. 2002). As noted in the EFH assessment, no sample site was located in the nearshore, hard substrate habitat directly waterward of the beach nourishment site. Howe et al. (2002) further noted the gear impact study conducted by Methven and Schneider (1998) 92% of juvenile Atlantic cod caught by trawl survey methods were obtained during night trawls. As you note in the EFH assessment, the presence of juvenile cod at the beach nourishment site has not been directly studied. However, given the documented diel activity patterns of age-0 and age-1 discussed above and the caveats of the survey methodology discussed by Howe et al. (2002), in conjunction with the high age-0 juvenile cod catch rates at the trawl sites directly west and east of the beach nourishment site, it is highly likely that the intertidal and subtidal complex rocky habitat at the project location is supporting a juvenile cod population. Further, due to the habitat complexity of the rocky intertidal and subtidal habitat at the project site, the survivorship of a juvenile cod population at this site would be expected to be significantly higher at the project site than for populations occupying unvegetated soft sediment habitats. For these reasons, without an adequate finfish survey at the project location to assess the juvenile cod population, we do not concur with your determination that the loss of the rocky intertidal and subtidal habitat should not have a significant impact to the overall juvenile cod population in this region of Massachusetts. Given the current stock status of Atlantic cod in the Gulf of Maine, impacts to Atlantic cod EFH should be minimized to the greatest extent possible.

Additionally, in reviewing the provided plans, DEA, and EFH assessment, it is not clear if the provided 5.011 acre estimate of the rocky habitat that is proposed to be impacted are fully representative of the extent of the rocky habitat that will be impacted. The plans make a distinction between "rocky intertidal habitat,", "rocky subtidal," "gravel/small cobble (intertidal)," and "gravel/small cobble (subtidal)." The DEA and EFH assessment refer to the hard substrate impact from the proposed beach placement as "rocky intertidal" and "rocky subtidal" habitats, is not clear if this is inclusive of the gravel/cobble habitat conversions or not.

The eelgrass bed located waterward of the beach nourishment may also be impacted by increased turbidity and suspended sediments in the water column as a result of the expected longshore drift of the sediment proposed to be placed west of the bed. As is noted in the plans, DEA, and EFH assessment, the eelgrass bed is located in a tidepool formed by gravel and cobble dominated hooked shoal. The DEA and EFH assessment do not address the potential for the hooked shoal to capture and/or affect turbidity and sedimentation of resuspended sediment. Increased suspension of sediments and resulting turbidity has been shown to reduce eelgrass abundance (Duarte et al. 2005). Eelgrass may be adversely affected through light attenuation and burial or smothering resulting from turbidity and subsequent sedimentation (Johnson 2008; Deegan and

Buchsbaum 2005). Burial of eelgrass in as little as 2 to 4 centimeters of sand may result in decreased productivity and increased mortality.

Seagrasses provide important ecological services including fish and shellfish habitat, and shorebird feeding habitats, nutrient and carbon cycling, sediment stabilization, and biodiversity in tropical and temperate regions throughout the world (Fonseca et al., 1998; Orth et al., 2006). Although the eelgrass bed is relatively isolated and small in area, as discussed above, eelgrass also provides complex habitat that has been demonstrated to mediate survivorship and spatial distribution of juvenile Atlantic cod. Eelgrass has also been designated as a "Special Aquatic Site" by the US Environmental Protection Agency under Section 404(b)(1) of the Federal Clean Water Act, due to its important role within the marine ecosystem. Furthermore, the Mid-Atlantic Fishery Management Council has designated areas of submerged aquatic vegetation (SAV), when associated with EFH for juvenile and adult summer flounder, as a Habitat Area of Particular Concern (HAPC) under Amendment 13 of the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan.

# **Essential Fish Habitat Conservation Recommendations**

The project area has been designated as EFH under the MSA for multiple federally-managed species including Atlantic cod. Based on your review of juvenile cod literature, you determined that the loss of rocky intertidal habitat that would result from the proposed beach nourishment on Town Neck Beach would not have a significant impact to the overall juvenile cod population in that region of Massachusetts, and therefore no more than minimal impacts on Atlantic cod EFH would be expected. However, as described above, we have determined that the proposed project would have significant adverse effects on EFH through habitat conversion within the intertidal and subtidal rocky habitats to unvegetated sand habitats. We recommend pursuant to Section 305(b)(4)(A) of the MSA that you adopt the following EFH conservation recommendations:

- 1. The scope of the beach nourishment project should be minimized to eliminate the placement of dredge material on all rocky habitats in the project vicinity (gravel, cobble, boulder). Alternative placement areas, such as east of the proposed placement area or landward of the rocky habitats should be pursued.
- 2. The potential for resuspended sediments to impact the existing eelgrass bed should be fully evaluated, and the proposed placement area modified to eliminate potential adverse impacts to the existing bed.

Please note that Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to these EFH conservation recommendations, including a description of measures you adopt for avoiding, mitigating or offsetting the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us

over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effects pursuant to 50 CFR 600.920(k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(1) if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations.

#### **Endangered Species Act**

Our Protected Resources Division (PRD) is responsible for overseeing programs related to the Endangered Species Act (ESA). In accordance to section 7 of the ESA, you sent a consultation initiation letter regarding the proposed project to PRD dated February 10, 2015. At this time, consultation with PRD is ongoing. If you have any questions regarding ESA or the section 7 process, please contact Zach Jylkka at (978) 282-8467 or Zachary.Jylkka@Noaa.gov.

We look forward to continued coordination on this project. Please contact Alison Verkade at 978-281-6266 or <u>alison.verkade@noaa.gov</u> if you would like to discuss this further.

Louis A. Chiarella

Louis A. Chiarella Assistant Regional Administrator for Habitat Conservation

cc: Kevin Madley, PRD Zachary Jylkka, PRD Tom Nies, NEFMC David Preble, NEFMC Michelle Bachman, NEFMC Valerie Cappola, USACOE John Logan, MA DMF Kathryn Ford, MA DMF Ed Reiner, USEPA Ken Chin, MA DEP Robert Boeri, MA CZM

#### References

Auster, P.J. 1998. A conceptual model of the impacts of fishing gear on the integrity of fish habitats. Conservation Biology 12:1198-1203.

Auster, P.J. and R. Langton. 1999. The effects of fishing on fish habitat. American Fisheries Society Symposium 22:150-187.

Anderson, J. L., Laurel, B. J., and Brown, J. A. 2007. Diel changes in behaviour and habitat use by age-0 Atlantic cod (*Gadus morhua L.*) in the laboratory and field. Journal of Experimental Marine Biology and Ecology 351(1),:267-275.

Collette BB, Klein-MacPhee G, 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine. Washington, DC: Smithsonian Institution Press.

Colton, J. B. 1978. Principal spawning areas and seasons of the Atlantic cod (Gadus morhua) in the Gulf of Maine and Middle Atlantic Bight. US Natl. Mar. Fish. Serv., Northeast Fish. Cent. Woods Hole Lab. Ref, (78-66), 5.

Deegan, L.A. and Buchsbaum, R.N. 2005. The effect of habitat loss and degradation on fisheries. In: Buchsbaum, R., Pederson, J., Robinson, W.E., editors. The decline of fisheries resources in New England: evaluating the impact of overfishing, contamination and habitat degradation. Cambridge (MA): MIT Sea Grant College Program; Publication No. MITSG 05-5. p 67-96.

Duarte, C.M., Fourqurean, J.W., Krause-Jensen, D. and Olesen, B. 2005. Dynamics of seagrass stability and change. In A. W.D. Larkum et al. (eds) Seagrass Biology. Netherlands p. 271-294.

Fonseca MS, Kenworthy WJ, and Thayer GW. 1998. Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters. NOAA Coastal Ocean Program. Decision Analysis Series No. 12.

Fraser, S., Gotceitas, V., and Brown, J. A. 1996. Interactions between age-classes of Atlantic cod and their distribution among bottom substrates. Canadian Journal of Fisheries and Aquatic Sciences 53(2):305-314.

Grant, S. M., and Brown, J. A. 1998. Nearshore settlement and localized populations of age 0 Atlantic cod (*Gadus morhua*) in shallow coastal waters of Newfoundland. Canadian journal of fisheries and aquatic sciences 55(6):1317-1327.

Gotceitas, V., and Brown, J. A. 1993. Substrate selection by juvenile Atlantic cod (*Gadus morhua*): effects of predation risk. Oecologia 93(1): 31-37.

Gotceitas, V., Fraser, S., and Brown, J. A. 1995. Habitat use by juvenile Atlantic cod (*Gadus morhua*) in the presence of an actively foraging and non-foraging predator. Marine Biology 123(3):421-430.

Gotceitas, V., Fraser, S., and Brown, J. A. 1997. Use of eelgrass beds (*Zostera marina*) by juvenile Atlantic cod (*Gadus morhua*). Canadian Journal of Fisheries and Aquatic Sciences 54(6):1306-1319.

Helfman, G., Collette, B. B., Facey, D. E., and Bowen, B. W. 2009. The diversity of fishes: biology, evolution, and ecology. John Wiley & Sons.

Howe, A. B., Correia, S. J., Currier, T. P., King, J., and Johnston, R. 2002. Spatial distribution of ages 0 and 1 Atlantic cod (Gadus morhua) off the eastern Massachusetts coast, 1978–1999, relative to 'Habitat Area of Special Concern'. Massachusetts Division of Marine Fisheries Technical Report TR-12.

Johnson, M.R., Boelke, C., Chiarella, L.A., Colosi, P.D., Greene, K., Lellis-Dibble, K., Ludeman, H., Ludwig, M., McDermott, S., Ortiz, J., Rusanowsky, D., Scott, M., Smith, J. 2008. Impacts to marine fisheries habitat from nonfishing activities in the northeastern United States. NOAA Technical Memorandum NMFS-NE-209. Woods Hole, MA. 328 p.

Lindholm, J., P. J. Auster, and L. Kaufman. 1999. Habitat-mediated survivorship of juvenile (0-year) Atlantic cod (Gadus morhua). Marine Ecology Progress Series 180:247–255.

Lindholm, J., P.J. Auster, M. Ruth and L. Kaufman. 2001. Modeling the effects of fishing and implications for the design of marine protected areas: juvenile fish responses to variations in seafloor habitat. Conservation Biology 15: 424-437.

Lough, R. G., P. C. Valentine, D. C. Potter, P. J. Auditore, G. R. Bolz, J.D. Neilson, and R. I. Perry. 1989. Ecology and distribution of juvenile cod and haddock in relation to sediment type and bottom currents on eastern Georges Bank. Mar. Ecol. Prog. Ser. 56:1-12.

Methven, D.A., and C. Bajdik. 1994. Temporal variation in size and abundance sf juvenile Atlantis cod(Gadus morhara) at an inshore site off eastern Newfoundland. Can. 1. Fish. Aquat. Sci. 51 : 78-90.

Methven, D. A., and Schneider, D. C. 1998. Gear-independent patterns of variation in catch of juvenile Atlantic cod (Gadus morhua) in coastal habitats. Canadian journal of fisheries and aquatic sciences 55(6):1430-1442.

Natural Research Council. 2002. Effects of trawling and dredging on seafloor habitat. Washington, District of Columbia: National Academy Press; 136 p.

Stevenson D, Chiarella L, Stephan D, Reid R, Wilhelm K, McCarthy J, Pentony M. 2004. Characterization of the fishing practices and marine benthic ecosystems of the northeast US shelf, and an evaluation of the potential effects of fishing on essential habitat. NOAA Tech Memo NMFS NE 181; 179 p.

Stevenson, DK; Scott, ML. 2005. Atlantic herring, Clupea harengus, life history and habitat characteristics. NOAA Tech Memo NMFS-NE-192.

Theodorou, P., Snorrason, S. S., and Ólafsdóttir, G. Á. 2013. Habitat complexity affects how young of the year Atlantic cod Gadus morhua perceive predation threat from older conspecifics. Journal of fish biology 82(6):2141-2146.

•



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

February 10, 2015

Programs and Project Management Division Civil Works/IIS Project Management Branch

Mr. Lou Chiarella, Assistant Regional Administrator For Habitat Conservation NOAA Fisheries 55 Great Republic Drive Gloucester, Massachusetts 01930-2298

Dear Mr. Chiarella:

I am writing to request your comments and Essential Fish Habitat Conservation Recommendations on USACE's proposal to perform maintenance dredging and advance maintenance dredging of the Cape Cod Canal (CCC) in Bourne and Sandwich, Massachusetts.

The authorized Federal Navigation Project (FNP) provides for a 600 feet long jetty and a 3000 feet long breakwater at the east end of the Canal; a channel, 32 feet deep and varying in width (i.e. from 500 – 700 feet) throughout its 17.5 mile length, and two mooring basins: the West Mooring Basin, 32 feet deep and the East Mooring Basin (EMB), 25 feet deep. A map depicting the FNP is enclosed for your reference.

The CCC connects Buzzards Bay and Cape Cod Bay. Use of the CCC saves mariners an average of 135 miles of coastwise travel while circumnavigating Cape Cod and the Nantucket shoals. Roughly 14,000 commercial and recreational vessels transit the 17.4 mile waterway each year. The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships and passenger ferries as well as recreational vessels. The FNP is part of the Intra-Coastal Waterway and is an integral segment of the corridor for petroleum products being delivered to the northeast region.

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the project. This combination creates hazardous conditions for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Shoaling in the main-ship channel consists of large sand wave formations. Recent hydrographic surveys indicate that shoaling has occurred in six areas of the project (see Enclosure 1) and the controlling depth in the Canal proper is now at 30' below Mean Lower Low Water (MLLW). The reduction in available depth is significant

and has resulted in draft restrictions being placed on vessels transiting the Canal, tidal delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor vessels in emergencies (e.g. icing). Further shoaling in the Canal may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod thereby significantly increasing the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas in the authorized, 32-feet deep by 500-feet wide, main-ship channel and the 25-feet deep EMB portions of the project. In order to extend the time between maintenance dredging events, advance maintenance is being proposed to reduce the sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 feet deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. The majority of the advance maintenance dredging will take place within the prism of the sand-waves (i.e. in the vertical dimension). The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

A study is currently underway under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project to rebuild the dunes and beach berm (i.e. to protect the homes in the area) on a 2,500 foot long eroded section of Town Neck Beach in Sandwich (See Enclosure 2). Town Neck Beach has experienced increased erosion (currently estimated to be about 5 feet per year) due in large part to severe coastal storms such as Hurricane Sandy and more recently, Winter Storm Juno.

The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and for the potential beach nourishment. If the 204 study is completed in time to coincide with this maintenance dredging event, and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay any additional costs over and

above the Federal base plan (i.e. dredging and placement of the material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach.

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the east entrance to the Cape Cod Canal. The CCCDS was last used for disposal of material dredged from the Canal in 1990.

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act as amended by the Sustainable Fisheries Act of 1996, I am forwarding herewith a copy of our Essential Fish Habitat (EFH) Assessment for the proposed action, and request that you provide us with your EFH Conservation Recommendations. Additionally, I am requesting your comments in accordance with the Fish and Wildlife Coordination Act. Enclosed is a copy of the Draft Environmental Assessment (on Compact Disc) for your reference. Please review the enclosed information and provide us with your comments by March 12, 2015.

Please feel free to contact me at (978) 318-8328 or Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067 if you have any questions or require additional information.

Sincerely,

Bill Kovanangl

Bill Kavanaugh Project Manager

Enclosures

Copy Furnished: via email

Ms. Alison Verkade: <u>alison.verkade@noaa.gov</u> Mr. Kevin Madley: <u>kevin.madley@noaa.gov</u>



March 12, 2015

William Kavanaugh Project Manager U.S. Army Corps of Engineers New England District Programs/Project Management Division 696 Virginia Road Concord, Massachusetts 01742-2751

Dear Mr. Kavanaugh:

Thank you for your letter dated February 10, 2015, requesting the U.S. Environmental Protection Agency (EPA) to review and comment on the proposed maintenance dredging and advanced maintenance dredging of the Cape Cod Canal in Bourne and Sandwich, Massachusetts, pursuant to its responsibilities under sections 176(c) and 309 of the Clean Air Act (CAA).

EPA has reviewed the Environmental Assessment and other information on this project that you provided. Based upon our review and understanding of how the project will be dredged and disposed, and the associated impact, we find the project meets the requirements of Section 176(c) and 309 of the CAA. However, we encourage the Corps to monitor the two eelgrass meadows adjacent to the near shore placement site to determine if there are any impacts. EPA would be happy to consult with you on a monitoring design.

Please contact Phil Colarusso of my staff at (617) 918-1506 if you have any questions or require additional information.

Sincerely,

Milli P. Cut. J

Melville P. Coté, Jr., Chief Ocean and Coastal Protection Section



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

February 10, 2015

Programs and Project Management Division Civil Works/IIS Project Management Branch

U.S. Environmental Protection Agency ATTN: Mr. Mel Cote, Chief Water Quality Unit Region I 5 Post Office Square - Suite 100 Boston, Massachusetts 02109-3912

#### Dear Mr. Cote:

I am writing to request your comments on USACE's proposal to perform maintenance dredging and advance maintenance dredging of the Cape Cod Canal (CCC) in Bourne and Sandwich, Massachusetts.

The authorized Federal Navigation Project (FNP) provides for a 600 feet long jetty and a 3000 feet long breakwater at the east end of the Canal; a channel, 32 feet deep and varying in width (i.e. from 500 – 700 feet) throughout its 17.5 mile length, and two mooring basins: the West Mooring Basin, 32 feet deep and the East Mooring Basin (EMB), 25 feet deep. A map depicting the FNP is enclosed for your reference.

The CCC connects Buzzards Bay and Cape Cod Bay. Use of the CCC saves mariners an average of 135 miles of coastwise travel while circumnavigating Cape Cod and the Nantucket shoals. Roughly 14,000 commercial and recreational vessels transit the 17.4 mile waterway each year. The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships and passenger ferries as well as recreational vessels. The FNP is part of the Intra-Coastal Waterway and is an integral segment of the corridor for petroleum products being delivered to the northeast region.

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the project. This combination creates hazardous conditions for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Shoaling in the main-ship channel consists of large sand wave formations. Recent hydrographic surveys indicate that shoaling has occurred in six areas of the project (see Enclosure 1) and the controlling depth in the Canal proper is now at 30' below Mean Lower Low Water (MLLW). The reduction in available depth is significant

and has resulted in draft restrictions being placed on vessels transiting the Canal, tidal delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor vessels in emergencies (e.g. icing). Further shoaling in the Canal may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod thereby significantly increasing the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas in the authorized, 32-feet deep by 500-feet wide, main-ship channel and the 25-feet deep EMB portions of the project. In order to extend the time between maintenance dredging events, advance maintenance is being proposed to reduce the sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 feet deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

A study is currently underway under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project to rebuild the dunes and beach berm (i.e. to protect the homes in the area) on a 2,500 foot long eroded section of Town Neck Beach in Sandwich (See Enclosure 2). Town Neck Beach has experienced increased erosion (currently estimated to be about 5 feet per year) due in large part to severe coastal storms such as Hurricane Sandy and more recently, Winter Storm Juno.

The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and for the potential beach nourishment. If the 204 study is completed in time to coincide with this maintenance dredging event, and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay any additional costs over and above the Federal base plan (i.e. dredging and placement of the

material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach.

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the east entrance to the Cape Cod Canal. The CCCDS was last used for disposal of material dredged from the Canal in 1990.

A copy of our draft EA covering this proposal is enclosed (on CD) and one has also been sent directly to Ms. Olga Guza-Pabst. We are requesting that you review this proposal relative to your responsibility under Section 176c and 309 under the Clean Air Act and provide your comments. We would appreciate your comments by March 12, 2015.

Please feel free to contact me at (978) 318-8328 or Dr. Valerie Cappola, the Environmental Resources Team Member at (978) 318-8067 if you have any questions or require additional information.

Sincerely,

Bill Koranay

Bill Kavanaugh Project Manager

Enclosures

Copy Furnished w/encls:

Ms. Olga Guza-Pabst 1 Hawk Drive Salem, New Hampshire 03079 Guza-Pabst.Olga@epa.gov

Copy Furnished w/o encls: Mr. Ed Reiner, Wetlands Protection Unit; <u>reiner.ed@epa.gov</u> Mr. Phil Colarusso; colarusso.phil@epa.gov April 3, 2015

Karen Kirk Adams



Chief, Permitting & Enforcement Regulatory Division **The Commonwealth of Massachusetts** US Army Corps of Engineerem Francis Galvin, Secretary of the Commonwealth 696 Virginia Road Concord MA 01742-2751 Massachusetts Historical Commission

RE: Town of Sandwich Dune and Beach Reconstruction Project, Town Neck Beach, Sandwich, EEA No. 15213, MHC# RC.56195 and Cape Cod Canal Dredging, Sandwich and Bourne, MHC #RC.6130.

Dear Ms. Adams:

Staff of the Massachusetts Historical Commission (MHC), office of the State Historic Preservation Officer, have reviewed the Project Notification Form (PNF) and project plans submitted by the Woods Hole Group for the Town of Sandwich Dune and Beach Restoration Project at Town Neck Beach, received by the MHC on March 17, 2015.

The information submitted indicates that the town has not yet determined the source of the entirety of material to be used for the Town Neck Beach project. The information received by the MHC indicates that one potential source of sand for the project is dredged accumulated sediments from the Cape Cod Canal Dredging Project, previously reviewed by the MHC as a separate project. The use of dredged material of accumulated sediments from the Cape Cod Canal for the Town Neck Beach project is unlikely to affect any significant historic and archaeological resources.

If other sources of sand are proposed, then, as the MHC previously commented on June 27, 2014, please have a USGS topographic map that clearly shows the boundaries of the area(s) from which the sand is to be sourced, submitted to the MHC.

The information submitted to the MHC also indicates that the Town of Sandwich wishes to have flexibility to implement aspects of the project over several years, as sand sources and funding become available. The MHC has no objection. As sources for sand are identified, the locations and boundaries of the proposed sand sources should be indicated on USGS topographic maps, and provided to the MHC for review and comment.

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), Massachusetts General Laws, Chapter 9, Sections 26-27C (950 CMR 71), and MEPA (301 CMR 11). If you have questions or require additional information, please contact me at this office.

Sincerely,

Edward L. Bell Deputy State Historic Preservation Officer Massachusetts Historical Commission

xc: Kate Atwood, USACOE
Secretary Matthew Beaton, EEA, attn. Rick Bourré, MEPA Office
DEP-SERO
Victor T. Mastone, MBUAR
Douglas Lapp, Town of Sandwich
George Dunham, Sandwich Town Manager
Susan James, Sandwich Board of Selectmen
William L. Burbank, Sandwich Planning Board
Mark Galkowski, Sandwich Deparment of Natural Resources
Sandwich Historical Commission
Beth Hays, Woods Hole Group, Inc.

220 Morrissey Boulevard, Boston, Massachusetts 02125 (617) 727-8470 • Fax: (617) 727-5128 www.sec.state.ma.us/mhc Town of Sandwich

THE OLDEST TOWN ON CAPE COD

April 1, 2015



SANDWICH HISTORICAL COMMISSION 16 Jan Sebastian Drive, Sandwich, MA 02563 Phone: 508 833 8001 Fax: 508 833 8006 E-mail: planning@townofsandwich.net

U. S. Army Corps of Engineers New England District 696 Virginia Road Concord, MA 01742-2751 Attn: Michael Riccio

Re: Public Comment on Maintenance Dredging and advance maintenance dredging of the federal navigation project in the Cape Cod Canal Bourne and Sandwich, Massachusetts with beneficial use of the dredged sand as beach-fill on Town Neck Beach, Sandwich, Massachusetts.

Dear Mr. Riccio,

Thank you for taking the time to visit Sandwich and to inform the Sandwich Historical Commission on the process for the Army Corps of Engineer's proposed Cape Cod Canal dredging. We are pleased to be considered a consulting party and would like to share our comments regarding this project.

We support the placement of sand from the upcoming dredging of the canal onto Town Neck beach to help with the erosion issue caused by the canal jetties. However, we do also wish to stress that the Historical Commission is very concerned that continued interruption of long shore sediment caused by the jetties is putting our historic properties in jeopardy of damage due to flooding. It is our understanding that the Army Corp of Engineers has begun a Section 111 Study looking at the effect of the Canal Jetties on Sandwich's shoreline. We would like to also be considered a consulting party for the Section 111 study and we hope that the Corp will include our National Register Historic Districts in the considered impact area.

The erosion on our beaches has caused harm to area businesses that rely on tourists to visit our beaches. Over the years, as our beaches have become increasingly rocky, Sandwich has invested in branding itself as a cultural destination. Our historic downtown was recently designated a Massachusetts Cultural District. Our historic properties are vital to our history, our tourism, and our identity.

Thank you for considering our comments.

Sincerely, THE HONE NOUSE David Schrader Chair, Sandwich Historical Commission



The COMMONWEALTH OF MASSACHUSETTS BOARD OF UNDERWATER ARCHAEOLOGICAL RESOURCES EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS 251 Causeway Street, Suite 800, Boston, MA 02114-2136 Tel. (617) 626-1200 Fax (617) 626-1240 Web Site: www.mass.gov/czm/buar/index.htm

February 3, 2015

Mr. Michael Riccio U. S. Army Corps of Engineers New England District 696 Virginia Road Concord, MA 01742-2751

RE: Cape Cod Canal Maintenance/Advanced Maintenance Dredging Project, Bourne and Sandwich, MA

Dear Mr. Riccio,

The staff of the Massachusetts Board of Underwater Archaeological Resources has reviewed the above referenced project's Public Notice dated February 2, 2015. We offer the following comments.

The Board has conducted a review of its files and secondary literature sources to identify known and potential submerged cultural resources in the proposed project area. No record of any underwater archaeological resources was found within the areas of proposed dredging. Based on the results of this review and given the nature of the proposed activities (exclusively maintenance dredging), the Board expects that this project is unlikely to impact submerged cultural resources.

However, should heretofore-unknown submerged cultural resources be encountered during the course of the project, the Board expects that the project's sponsor will take steps to limit adverse affects and notify the Board and the Massachusetts Historical Commission, as well as other appropriate agencies, immediately in accordance with the Board's Policy Guidance for the Discovery of Unanticipated Archaeological Resources (updated 9/28/06).

The Board appreciates the opportunity to provide these comments as part of the review process. Should you have any questions regarding this letter, please do not hesitate to contact me at the address above, by email at <u>victor.mastone@state.ma.us</u>, or by telephone at (617) 626-1141.

Sincerely,

Victor T. Mastone Director and Chief Archaeologist

/vtm

Cc: Brona Simon, MHC

Bob Boeri and Steve Mckenna, MCZM (via email attachment) Bettina Washington, WTGH/A (via email attachment) Ramona Peters, MWT (via email attachment)



The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth Massachusetts Historical Commission

January 30, 2015

William L. Burbank Chairman Planning Board Town of Sandwich 130 Main Street Sandwich, MA 02563

RE: Cape Cod Canal Dredging and Beach Nourishment, Sandwich, MA. MHC# RC.6130.

Dear Mr. Burbank:

Thank you for your letter of December 22, 2014 regarding the proposed project for Cape Cod Canal maintenance dredging and placement of dredge material on Town Beach and Spring Hill Beach in Sandwich.

The Massachusetts Historical Commission (MHC) recently received a copy of a letter regarding this project from the United States Army Corps of Engineers (Corps) to the Wampanoag Tribe of Gay Head (Aquinnah). A copy of that letter is enclosed.

The MHC recommends you write to the Corps with any comments about the project.

Thank you once again. If you have questions, please contact Alex Flick or myself at this office.

Sincerely,

Edward L. Bell Deputy State Historic Preservation Officer Massachusetts Historical Commission

Enclosure (Corps to WTGHA, 1/12/2015)

xc w/enclosure:

George Dunham, Sandwich Town Manager Susan James, Sandwich Board of Selectmen Mark Galkowski, Sandwich Department of Natural Resources Sandwich Historical Commission

xc w/o: Lawrence R. Oliver, USACOE, Attn: Kate Atwood

220 Morrissey Boulevard, Boston, Massachusetts 02125 (617) 727-8470 • Fax: (617) 727-5128 www.sec.state.ma.us/mhc December 22, 2014

RECEIVED DEC 23 2014 MASS. HIST. COMM

Ms. Brona Simon, State Archeologist 220 Morrissey Boulevard Boston, Massachusetts 02125

Subject: Sandwich National Historic Districts Threatened

Dear Ms. Simon:

1

I am writing today to seek your direct involvement on a critical local matter. Since the ACOE extended the Cape Cod Canal jetties in the 1950's there has been a consistent starvation of Sandwich beaches east of the Canal. Now that the Corps is in their home stretch of Section 204 and 111 studies, it appears the Town and Corps will reach a lasting agreement for beach nourishment and Habitat Protection from 2016 and beyond. Our needs in town are short term until the sand mitigation research, permitting and agreements are in place a year or so out.

As Planning Board Chairman, I have taken the necessary steps to start education and discussion of important issues that are intended to preserve our financial, cultural, and historical assets that are currently under near daily floods due to sea level rise, storm events, and moon tides. Jarvesville NHD and Town Hall Square NHD are the location of a stunning glass industry that employed over 1,000 people in the 19<sup>th</sup> Century and our seat of Government. They form the backbone of our tourist industry.

The locally approved Beach Management Plan (2013) calls for the reconfiguration of the Historic Inlet to Cape Cod Bay and the restoration of important Plover Nesting grounds. Apparently, the last few years, as the Inlet has grown 5X its normal size, the Plover Nesting has almost disappeared. In order to maintain a small Inlet opening to help limit sea water intrusion in our NHDs and buffering coastal marshes and rebuild an appropriate Nesting Habitat, we need action now. The voters of Sandwich hopefully will vote this winter on a Capital Exclusion of \$5 million dollars to provide funds to start resourceful work on the Inlet and Nesting Area. What we need is less overburden regarding depressed Habitat and more action to control near daily flooding of the public marsh land which threatens the National Historic Districts. I seek your early intervention to help Sandwich maintain its goals of our Local Comprehensive Plan.

Several years ago, your former office protecting Rare & Endangered Species and my firm (*Abbellire*) learned to co-exist as we permitted several Massachusetts golf developments. I respected your tenacity then, and commitment to essential
environmental restriction. I learned recently from Eric Johnson that you moved to your current position that is fundamental to saving our historic assets. I am hopeful we can forge new teamwork with other community officials to work together again to keep Sandwich's primary industry of tourism in place as we strengthen our own awareness of our NHD's and the thousands of people from all over the world who visit the community each and every year.

My very best for a safe and healthy Holiday Season!

Respectfully,

2

. An fring William L. Burbank,

CC: George Dunham, Town Manager Susan James, Member, Board of Selectmen Mark Galkowski, Department of Natural Resources





## Mashpee Wampanoag Tribe Section 106 Review Consultation Response Form

Project Docket Number:	Sandwich Town Beaches (Nourishment)
Consultant/Environmental Firm:	U.S. A.C.O.E.
Address or Location Description:	Town Neck Beach
City, State:	Sandwich, MA
Point of Contact	Lawrence R. Oliver

Response:

- We have no concerns related to the proposed project. MWT anticipates no adverse affects to our sites of cultural significance, by you or your client.
  - The MWT considers this project in compliance with the MWT's section 106 review process with agreed upon mitigations.
- This site will require the on-site presence of a Tribal Cultural Resource Monitor during ground disturbing activities. Contact the Compliance Review Supervisor with construction schedule.
- This project has the potential to have "adverse effects" to historic or cultural resources important to our tribe. We recommend the following actions:

These consultations satisfy compliance to the National Historic Preservation Act of 1966 and all relevant amendments including but not limited to section 106 and 36 CFR 800.

**Exception:** In the case that archeological resources or human remains are found during construction, you must immediately stop construction and notify us.

Ramona Peters, Compliance Review Supervisor

Ramona Peters, Compliance Review Supervisor Tribal Historic Preservation Department

- 16, 2014 Date

Mashpee Wampanoag Indian Tribal Council 483 Great Neck Rd South Mashpee, MA 02649 Phone: 508-477-0208 or 855-668-7423 Email: 106review@mwtribe.com



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

January 12, 2015

Engineering/Planning Division Evaluation Branch

Ms. Ramona Peters Tribal Historic Preservation Officer 766 Falmouth Rd. – Madaket Pl. Unit A3 Mashpee, Massachusetts 02649

Dear Ms. Peters:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment to consider beneficial use of dredged material from the Cape Cod Canal to reduce erosion at two town beaches in the town of Sandwich, Massachusetts (Figure 1). We would like your comments on the proposed beneficial use project.

The Cape Cod Canal is the widest sea-level canal in the world. It extends 17.4 miles across the narrow neck that joins Cape Cod to the mainland. It is in Bourne, about 50 miles south of Boston. The canal has a project depth of 32 feet below mean low water and includes various channels extending from Buzzards Bay through the canal itself. There are several mooring basins, jetties, breakwaters, a railroad bridge and two highway bridges that are considered part of the Cape Cod Canal. The canal celebrated its 100th birthday in 2014 and is a National Engineering Landmark.

The Cape Cod Canal provides safe and efficient passage for commercial and recreational vessels wishing to transit between Cape Cod Bay and Buzzards Bay. There are eight areas within the canal that typically shoal and require dredging on a regular basis. The next proposed dredging will produce approximately 150,000 cubic yards of clean sand. A hopper dredge will likely be used to dredge the shoal areas and then the material will be pumped out of the hopper and placed on Town Neck Beach and possibly Spring Hill Beach, down drift of the Cape Cod Canal east entrance in Sandwich (see enclosed plans and cross sections).

The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach, have a history of erosion due to storm events and sea level rise. Since 1906, erosion has occurred at an approximate rate of 2 to 3 feet per year and the rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. Several homes are in danger of being lost to the Bay (see enclosed photographs). The beaches are comprised of a mix of sand, gravel, and cobble with dunes.

NAE believes that the proposed maintenance dredging of the Cape Cod Canal will have no effect on historic properties. The canal is a manmade waterway which has been subject to repeated maintenance dredging in the past.

In addition, the creation of new dunes and placement of new sand seaward of the houses at Town Neck and Spring Hill Beaches should also have no effect on historic properties. The creation of new dunes and a new beach seaward of the houses on the beach will protect whatever resources may currently exist within the dunes and currently diminished beach. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

-Lawrence R. Oliver Chief, Ecosystem Restoration Project Section

Enclosures

Similar Letter Sent (w/ enclosures):

Ms. Bettina Washington Tribal Historic Preservation Officer Wampanoag Tribe of Gay Head (Aquinnah) 20 Black Brook Road Aquinnah, Massachusetts 02535

Ms. Brona Simon, Executive Director State Historic Preservation Officer Massachusetts Historical Commission Massachusetts Archives Building 220 Morrissey Boulevard Boston, Massachusetts 02125

Victor T. Mastone, Director Massachusetts Board of Underwater Archaeological Resources Executive Office of Energy and Environmental Affairs 251 Causeway Street, Suite 800 Boston, MA 02114-2136



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

January 12, 2015

Engineering/Planning Division Evaluation Branch

Victor T. Mastone, Director Massachusetts Board of Underwater Archaeological Resources Executive Office of Energy and Environmental Affairs 251 Causeway Street, Suite 800 Boston, Massachusetts 02114-2136

Dear Mr. Mastone:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment to consider beneficial use of dredged material from the Cape Cod Canal to reduce erosion at two town beaches in the town of Sandwich, Massachusetts (Figure 1). We would like your comments on the proposed beneficial use project.

The Cape Cod Canal is the widest sea-level canal in the world. It extends 17.4 miles across the narrow neck that joins Cape Cod to the mainland. It is in Bourne, about 50 miles south of Boston. The canal has a project depth of 32 feet below mean low water and includes various channels extending from Buzzards Bay through the canal itself. There are several mooring basins, jetties, breakwaters, a railroad bridge and two highway bridges that are considered part of the Cape Cod Canal. The canal celebrated its 100th birthday in 2014 and is a National Engineering Landmark.

The Cape Cod Canal provides safe and efficient passage for commercial and recreational vessels wishing to transit between Cape Cod Bay and Buzzards Bay. There are eight areas within the canal that typically shoal and require dredging on a regular basis. The next proposed dredging will produce approximately 150,000 cubic yards of clean sand. A hopper dredge will likely be used to dredge the shoal areas and then the material will be pumped out of the hopper and placed on Town Neck Beach and possibly Spring Hill Beach, down drift of the Cape Cod Canal east entrance in Sandwich (see enclosed plans and cross sections).

The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach, have a history of erosion due to storm events and sea level rise. Since 1906, erosion has occurred at an approximate rate of 2 to 3 feet per year and the rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. Several homes are in danger of being lost to the Bay (see enclosed photographs). The beaches are comprised of a mix of sand, gravel, and cobble with dunes.

NAE believes that the proposed maintenance dredging of the Cape Cod Canal will have no effect on historic properties. The canal is a manmade waterway which has been subject to repeated maintenance dredging in the past.

In addition, the creation of new dunes and placement of new sand seaward of the houses at Town Neck and Spring Hill Beaches should also have no effect on historic properties. The creation of new dunes and a new beach seaward of the houses on the beach, will protect whatever resources may currently exist within the dunes and currently diminished beach. We would appreciate your concurrence..

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

Zawrence R. Oliver Chief, Ecosystem Restoration Project Section

Enclosures

Similar Letter Sent (w/ enclosure):

Ms. Ramona Peters Tribal Historic Preservation Officer 766 Falmouth Rd. – Madaket Pl. Unit A3 Mashpee, MA 02649

Ms. Brona Simon, Executive Director State Historic Preservation Officer Massachusetts Historical Commission Massachusetts Archives Building 220 Morrissey Boulevard Boston, Massachusetts 02125

Ms. Bettina Washington Tribal Historic Preservation Officer Wampanoag Tribe of Gay Head (Aquinnah) 20 Black Brook Road Aquinnah, Massachusetts 02535



DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT 696 VIRGINIA ROAD CONCORD MA 01742-2751

January 12, 2015

Engineering/Planning Division Evaluation Branch

Ms. Bettina Washington Tribal Historic Preservation Officer Wampanoag Tribe of Gay Head (Aquinnah) 20 Black Brook Road Aquinnah, Massachusetts 02535

Dear Ms. Washington:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment to consider beneficial use of dredged material from the Cape Cod Canal to reduce erosion at two town beaches in the town of Sandwich, Massachusetts (Figure 1). We would like your comments on the proposed beneficial use project.

The Cape Cod Canal is the widest sea-level canal in the world. It extends 17.4 miles across the narrow neck that joins Cape Cod to the mainland. It is in Bourne, about 50 miles south of Boston. The canal has a project depth of 32 feet below mean low water and includes various channels extending from Buzzards Bay through the canal itself. There are several mooring basins, jetties, breakwaters, a railroad bridge and two highway bridges that are considered part of the Cape Cod Canal. The canal celebrated its 100th birthday in 2014 and is a National Engineering Landmark.

The Cape Cod Canal provides safe and efficient passage for commercial and recreational vessels wishing to transit between Cape Cod Bay and Buzzards Bay. There are eight areas within the canal that typically shoal and require dredging on a regular basis. The next proposed dredging will produce approximately 150,000 cubic yards of clean sand. A hopper dredge will likely be used to dredge the shoal areas and then the material will be pumped out of the hopper and placed on Town Neck Beach and possibly Spring Hill Beach, down drift of the Cape Cod Canal east entrance in Sandwich (see enclosed plans and cross sections).

The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach, have a history of erosion due to storm events and sea level rise. Since 1906, erosion has occurred at an approximate rate of 2 to 3 feet per year and the rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. Several homes are in danger of being lost to the Bay (see enclosed photographs). The beaches are comprised of a mix of sand, gravel, and cobble with dunes.

NAE believes that the proposed maintenance dredging of the Cape Cod Canal will have no effect on historic properties. The canal is a manmade waterway which has been subject to repeated maintenance dredging in the past.

In addition, the creation of new dunes and placement of new sand seaward of the houses at Town Neck and Spring Hill Beaches should also have no effect on historic properties. The creation of new dunes and a new beach seaward of the houses on the beach, will protect whatever resources may currently exist within the dunes and currently diminished beach. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

Lawrence R. Oliver Chief, Ecosystem Restoration Project Section

Enclosures

Similar Letter Sent (w/ enclosure):

Ms. Ramona Peters Tribal Historic Preservation Officer 766 Falmouth Rd. – Madaket Pl. Unit A3 Mashpee, MA 02649

Ms. Brona Simon, Executive Director State Historic Preservation Officer Massachusetts Historical Commission Massachusetts Archives Building 220 Morrissey Boulevard Boston, Massachusetts 02125

Victor T. Mastone, Director Massachusetts Board of Underwater Archaeological Resources Executive Office of Energy and Environmental Affairs 251 Causeway Street, Suite 800 Boston, MA 02114-2136



January 12, 2015

Engineering/Planning Division Evaluation Branch

Ms. Brona Simon, Executive Director State Historic Preservation Officer Massachusetts Historical Commission Massachusetts Archives Building 220 Morrissey Boulevard Boston, Massachusetts 02125

Dear Ms. Simon:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment to consider beneficial use of dredged material from the Cape Cod Canal to halt erosion at two town beaches in the town of Sandwich, Massachusetts (Figure 1). We would like your comments on the proposed beneficial use projects.

The Cape Cod Canal is the widest sea-level canal in the world. It extends 17.4 miles across the narrow neck that joins Cape Cod to the mainland. It is in Bourne, about 50 miles south of Boston. The canal has a project depth of 32 feet below mean low water and includes various channels extending from Buzzards Bay through the canal itself. There are several mooring basins, jetties, breakwaters, a railroad bridge and two highway bridges that are considered part of the Cape Cod Canal. The canal celebrated its 100th birthday in 2014 and is a National Engineering Landmark.

The Cape Cod Canal provides safe and efficient passage for commercial and recreational vessels wishing to transit between Cape Cod Bay and Buzzards Bay. There are eight areas within the canal that typically shoal and require dredging on a regular basis. The next proposed dredging will produce approximately 150,000 cubic yards of clean A hopper dredge will likely be used to dredge the shoal areas and then the material will be pumped out of the hopper and placed on Town Neck Beach and possibly Spring Hill Beach, down drift of the Cape Cod Canal east entrance in Sandwich (see enclosed plans and cross sections).

The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach, have a history of erosion due to storm events and sea level rise. Since 1906, erosion has occurred at an approximate rate of 2 to 3 feet per year and rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. Several homes are in danger of being lost to the Bay (see enclosed photographs). The beaches are comprised of a mix of sand, gravel, and cobble with dunes.

NAE believes that the proposed maintenance dredging of the Cape Cod Canal will have no affect on historic properties. The canal is a manmade engineering marvel which has been subject to repeated maintenance dredging in the past.

In addition, the creation of new dunes and placement of new sand seaward of the houses at Town Neck and Spring Hill Beaches should also have no affect on historic properties. The creation of new dunes and a new beach seaward of the houses on the beach will protect whatever resources may currently exist within the dunes and currently diminished beach. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

Lawrence R. Oliver Chief, Ecosystem Restoration Project Section

Enclosure

Similar Letter Sent (w/ enclosure):

Ms. Bettina Washington Tribal Historic Preservation Officer Wampanoag Tribe of Gay Head (Aquinnah) 20 Black Brook Road Aquinnah, Massachusetts 02535

Ms. Ramona Peters Tribal Historic Preservation Officer 766 Falmouth Rd. – Madaket Pl. Unit A3 Mashpee, MA 02649



Commonwealth of Massachusetts

# Division of Fisheries & Wildlife

Wayne F. MacCallum, Director

March 5, 2015

Christopher J. Barron Colonel, Corps of Engineers c/o Valerie A. Cappola, Ph.D. Department of the Army New England District, Corps of Engineers 696 Virginia Road Concord, MA 01742-2751

RE: Environmental Assessment & Finding of No Significant Impact Cape Cod Canal & Town Neck Beach Sandwich & Bourne, MA NHESP Tracking No. 08-25568

Dear Colonel Barron:

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife (Division) received the February 2015 Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for Cape Cod Canal Long Term Maintenance Dredging and Beneficial Use of Dredged Material for Beach Nourishment. The Division has the following comments.

As outlined within the EA, the project occurs within habitat for state and federally protected species, and specifically, the proposed nourishment will occur within *Priority* and *Estimated Habitat* for Least Tern (*Sternula antillarum*) and Piping Plover (*Charadrius melodus*). The Piping Plover is a Threatened species listed in accordance with the Massachusetts Endangered Species Act (MESA, MGL c131A) and its implementing regulations (321 CMR 10.00) and pursuant to the U.S. Endangered Species Act (ESA, 50 CFR 17.11).

The project proposes to conduct long-term maintenance dredging totaling approximately 150,000 cubic yards of beach compatible material from shoaled areas within Cape Cod Canal. The EA outlines the preferred disposal alternative as beneficial reuse on Town Neck Beach, Sandwich, MA. Beneficial use of beach compatible material is preferred over open water disposal (at CCCDS). The proposed dune and beach enhancement will serve to reduce vulnerability during coastal storm events and protect existing homes.

According to the information contained within the EA, all beach nourishment activities will occur outside of the nesting season of April 1 – August 31 for state-listed shorebirds. The proposed dune enhancement will be constructed with a 20' wide berm, 5H:1V slope and will be planted with beach grass for stabilization. A 55'- 65' wide beach with a slope no steeper than 10H:1V and without plantings will be constructed. As noted in the EA, as a result of the project, state-listed birds may be drawn to this area of improved habitat and thus, the Town of Sandwich has committed to ensure monitoring. Based on the

www.mass.gov/nhesp

timing restriction, design specifics and monitoring efforts for this project, the Division agrees with the ACOE Finding of No Significant Impact (FONSI).

The Division recognizes that beach nourishment is essential not only for recreation and infrastructure protection, but also for the long-term maintenance of habitat. In particular, nourishment is essential at Town Neck Beach as it no longer receives natural sources of sediment. The Division supports additional research for a long-term solution to better address sediment transport that has been blocked as a result of the Cape Cod Canal's north jetty (at Scusset Beach, Bourne).

If you have any questions about this letter, please contact Amy Hoenig, Endangered Species Biologist at <u>Amy.Hoenig@state.ma.us</u> or 508-389-6364. We appreciate the opportunity to comment on this project.

Sincerely,

French

Thomas W. French, Ph.D. Assistant Director

cc: Mark Galkowski, Sandwich Dept. Natural Resources Susi von Oettingen, USFWS



Paul J. Diodati Director

March 2, 2015

Ms. Karen Adams US Army Corps of Engineers 696 Virginia Road Concord, MA 01742 ATTN: Michael Riccio

Re: Cape Cod Canal Maintenance Dredging and Town Neck Beach Fill

Dear Mr. Riccio:

The Division of Marine Fisheries (*MarineFisheries*) has reviewed the Public Notice for the Army Corps of Engineers to perform maintenance dredging and advanced maintenance dredging in Cape Cod Canal in the Towns of Bourne and Sandwich and dispose of dredge material at the Cape Cod Bay Disposal Site or Town Neck Beach in the Town of Sandwich. Proposed dredge activity would remove approximately 150,000 cubic yards of sediment from six shoal areas. Existing marine fisheries resources at the dredge sites and proposed Town Neck Beach nourishment site and potential project impacts to these resources are outlined in the following paragraphs.

All of the dredge locations directly border mapped blue mussel (*Mytilus edulis*) habitat. The Onset Shoal dredge area also closely borders mapped quahog (*Mercenaria mercenaria*) habitat. The proposed Town Beach nourishment site contains mapped shellfish habitat for blue mussel and surf clam (*Spisula solidissima*). Waters within or adjacent to these project sites have habitat characteristics suitable for these species. Land containing shellfish is deemed significant to the interest of the Wetlands Protection Act (310 CMR 10.34) and the protection of marine fisheries.

The Onset Shoal dredge site also closely borders mapped eelgrass (*Zostera marina*) beds. Additional mapped eelgrass is identified to the west of the proposed Town Beach nourishment site adjacent to the south jetty of the Cape Cod Canal. Eelgrass beds were also identified near the middle and east end of the proposed Town Neck Beach nourishment site during surveys performed by the Woods Hole Group in 2014. Eelgrass provides one of the most productive habitats for numerous marine species [1,2]. Eelgrass has declined in Massachusetts by approximately 20% in the past decade, an estimated 3 acres of eelgrass lost per year [3].

The shoreline of Hog Island bordering the Onset Shoal dredge site is a mapped horseshoe crab (*Limulus polyphemus*) spawning beach. Horseshoe crabs deposit their eggs in the upper intertidal regions of sandy beaches from late spring to early summer during spring high tides [4]. Adult crabs congregate in deep waters such as channel areas during the day while waiting to move on to the beaches at night to spawn. The eggs hatch approximately two to four weeks later. Recent stock assessments show a decline in horseshoe crab abundance in the New England region [5].

*MarineFisheries* has identified productive lobster (*Homarus americanus*) habitat in the subtidal waters adjacent to Town Neck Beach. This habitat mainly consists of cobble bottom and clay banks.

## Commonwealth of Massachusetts Division of Marine Fisheries

251 Causeway Street, Suite 400 Boston, Massachusetts 02114 (617) 626-1520 fax (617) 626-1509



Charles D. Baker Governor Karyn E. Polito Lieutenant Governor Matthew A. Beaton Secretary George N. Peterson, Jr. Commissioner Mary-Lee King Deputy Commissioner The Cape Cod Canal and Herring (Monument) River system provide habitat for alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*). *MarineFisheries* has placed a ban on river herring (alewife and blueback herring) harvest due to population declines [6]. Habitat impacts should be minimized to aid recovery of these species.

MarineFisheries offers the following comments for your consideration:

## Dredging

- The Onset Shoal portion of the dredging project should be staged to maintain a minimum 25 meter (i.e., approximately 75 foot) buffer between the top of the dredge slope and bordering eelgrass beds.
- *MarineFisheries* recommends a time of year (TOY) restriction on the Onset Shoal portion of the dredging project of **May 1 to June 30** to minimize impacts to staging adult horseshoe crabs preparing to spawn on the bordering nesting beach.

## Fill (Town Neck Beach)

- If Town Neck Beach is selected as the fill site for the Canal dredge material, *MarineFisheries* has the following comments:
  - The Draft EA notes that "All identified eelgrass is seaward of any sand placement and would not be directly impacted by the disposal of sandy dredged material." While the proposed nourishment area does not directly overlie eelgrass, the seaward edge of this area closely borders two identified beds. Recent studies indicate that as little as 2 to 4 cm of sand burial can result in 70 to 90% mortality of eelgrass [7,8]. *MarineFisheries* recommends a minimum buffer of 25 meters (i.e., approximately 75 feet) to minimize turbidity and smothering impacts on these beds. Reducing the seaward extent of the nourishment area will also act to limit impacts to subtidal lobster habitat.
  - *MarineFisheries* recommends a time of year (TOY) restriction on beach nourishment activity of May 1 to November 1 to protect shorezone and juvenile fishes [9].

Questions regarding this review may be directed to John Logan in our New Bedford office at (508) 990-2860 ext. 141.

Sincerely,

Paul J. Diodati Director

cc: Sandwich Conservation Commission Bourne Conservation Commission Timothy Mullen, Bourne Shellfish Constable Christopher Boelke & Alison Verkade, NMFS Ken Chin, DEP Robert Boeri, CZM Ed Reiner, EPA Jerry Moles, Tom Shields, Neil Churchill, Kathryn Ford, Eileen Feeney, Christian Petitpas, DMF

#### **References**

- 1. Jackson EL, Rowden AA, Attrill MJ, Bossey SJ, Jones MB (2001) The importance of seagrass beds as a habitat for fishery species. Oceanography and Marine Biology: an Annual Review 39: 269-303.
- 2. Heck KL, Jr., Carruthers TJB, Duarte CM, Hughes AR, Kendrick G, et al. (2008) Trophic transfers from seagrass meadows subsidize diverse marine and terrestrial consumers. Ecosystems 11: 1198-1210.
- 3. Costello CT, Kenworthy WJ (2011) Twelve-year mapping and change analysis of eelgrass (*Zostera marina*) areal abundance in Massachusetts (USA) identifies statewide declines. Estuaries and Coasts 34: 232-242.
- 4. Barlow Jr. RB, Powers MK, Howard H, Kass L (1986) Migration of *Limulus* for mating: relation to lunar phase, tide height, and sunlight. Biological Bulletin 171: 310-329.
- ASMFC Horseshoe Crab Stock Assessment Subcommittee (2009) Stock assessment report no. 09-02 (supplement
   A) of the Atlantic States Marine Fisheries Commission horseshoe crab stock assessment for peer review.
   113 p.
- 6. Taylor K, Hendricks M, Patterson C, Winslow S (2009) Review of the Atlantic States Marine Fisheries Commission fishery management plan for shad and river herring (*Alosa* spp.). October, 2009. Washington, D.C.
- 7. Cabaço S, Santos R, Duarte CM (2008) The impact of sediment burial and erosion on seagrasses: a review. Estuarine, Coastal and Shelf Science 79: 354-366.
- 8. Mills KE, Fonseca MS (2003) Mortality and productivity of eelgrass *Zostera marina* under conditions of experimental burial with two sediment types. Marine Ecology Progress Series 255: 127-134.
- Evans NT, Ford KH, Chase BC, Sheppard J (2011) Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts. Massachusetts Division of Marine Fisheries Technical Report, TR-47.

PD/JL/sd



Advocacy Department Six Beacon Street, Suite 1025 • Boston, Massachusetts 02108 tel 617.962.5187 • fax 617.523.4183 • email jclarke@massaudubon.org

March 3, 2015

Michael Riccio, Engineering/Planning Division U.S. Army Corps of Engineers New England District 696 Virginia Road Concord, MA 01742-2751

Via Email: <u>nae-pn-nav@usace.army.mil</u>

## Re: <u>Maintenance Dredging of the Federal Navigation Project in the Cape Cod Canal,</u> <u>Bourne and Sandwich, Massachusetts, with Beneficial Use on Town Neck Beach,</u> <u>Sandwich, Massachusetts</u>

Dear Mr. Riccio:

Mass Audubon offers the following comments on this proposed dredging project. The project proposal involves removing approximately 150,000 cubic yards of sand and gravel material from the Cape Cod Canal navigational channel and East Mooring Basin. Beneficial re-use of suitable clean material from the dredging as nourishment for a 2,500 foot long section of Town Neck Beach in Sandwich is being considered as an alternative to the historic approach of aquatic disposal. Mass Audubon generally supports the beneficial re-use of suitable dredge material for beach nourishment as a preferable option to off-shore water based disposal. This is also consistent with the recommendations of the draft recommendations of the Massachusetts Coastal Erosion Commission, of which I am a gubernatorial appointee (*Strategy #5: Improve the use of sediment resources for beach and dune nourishment and restoration*).

Town Neck Beach is subject to high rates of erosion due to a combination of natural and artificial causes. The jetties associated with the Cape Cod Canal alter natural sediment movements and reduce the availability of sediment to the beach. Using material from the channel dredging to nourish the beach would help maintain the beach's form and functions including storm damage protection, habitat for coastal waterbirds, and recreation.

Town Neck Beach contains areas of habitat for the Piping Plover, a federally- and state-listed threatened species. Least Terns, a state-listed species of special concern, also nests on the eastern end of Town Neck Beach. Mass Audubon's Coastal Waterbird Program has provided bird monitoring and protection services to the Town of Sandwich on this beach since the 1990s. We would be interested in working with the Town to continue and formalize this longstanding partnership.

The project notice indicates that dunes reconstructed with nourished material from the dredging would be immediately planted with dune grass. It should be noted that the U.S. Fish and Wildlife Service and the Massachusetts Natural Heritage and Endangered Species Program have standards and guidelines for beach nourishment within rare coastal waterbird breeding habitat. Detailed plans for the work should address both the interests of beach stabilization and rare species habitat.

Sincerely,

hy. flat

John J. Clarke Director of Public Policy and Government Relations

cc:

Susi von Oettingen, USFWS Jon Regosin, NHESP Mark Galkowski, Sandwich DNR

Mass Audubon works to protect the nature of Massachusetts for people and wildlife. Together with more than 100,000 members, we care for 35,000 acres of conservation land, provide school, camp, and other educational programs for 225,000 children and adults annually, and advocate for sound environmental policies at local, state, and federal levels. Founded in 1896 by two inspirational women who were committed to the protection of birds, Mass Audubon has grown to become a powerful force for conservation in New England. Today we are respected for our science, successful advocacy, and innovative approaches to connecting people and nature. Each year, our statewide network of wildlife sanctuaries welcomes nearly half a million visitors of all ages, abilities, and backgrounds and serves as the base for our work. To support these important efforts, call 800-AUDUBON (283-8266) or visit www.massaudubon.org.

Protecting the Nature of Massachusetts



Department of the Army US Army Corps of Engineers New England District 696 Virginia Road Concord MA 01742-2751

April 20, 2015

Engineering Planning Division CENAE-EP

Alphonse & Bridget Galdes 1 Douglas Road Lexington, MA 02420

Dear Mr. and Mrs. Galdes:

I am writing you in response to your comment letter regarding the maintenance dredging of the Cape Cod Canal. In addition to your general support for the placement of dredged sand on the Sandwich beaches, you specifically expressed your desire for the Corps to include Spring Hill Beach in our current proposal. Spring Hill Beach was initially identified as a potential placement area during the plan formulation process. However, when considering the limited amount of sand being removed from the Canal and the coastal processes that influence the system as a whole, we ultimately found Town Neck Beach to be the most appropriate placement area for this particular dredging effort.

We understand that both beaches would benefit greatly from the direct placement of sand but unfortunately the Canal only provides a very limited amount of material. Because sand in this system migrates along the shoreline in a west-to-east direction, sand placed at the westernmost location is expected to benefit the longest stretch of shoreline. While this is likely not the answer you had hoped for, I would stress that our efforts to address coastal storm protection in the town of Sandwich are ongoing. We are currently developing a study for this area that will focus on determining the extent to which the canal jetties interrupt natural sand migration, and that seeks to identify potential larger scale, long-term solutions. We will engage the public early and often as that study progresses in order to incorporate everyone's needs as best we can.

If you have any additional questions regarding this letter or our ongoing efforts in Sandwich, please feel free to reach me via mail, phone or e-mail. My telephone number is (978) 318-8685 and my e-mail address is michael.s.riccio@usace.army.mil.

Thank you for your comments and your understanding of the challenges associated with this dynamic coastal system.

Sincerely,

Michael S. Riccio Project Manager Engineering/Planning Division

## and a second second

Alphonse & Bridget Galdes 1 Douglas Road Lexington MA 02420-2315

U.S. Army Corps of Engineers and the second second

Re: Cape Code Canal Dredging

Dear Mr Riccio

We are the owners of 106 Salt Marsh Road in Sandwich, which is adjacent to Cape Cod Canal, and hence impacted by the proposed Cape Cod Canal dredging project.

I am writing to strongly to support the dredging of the Cape Cod Canal, and the use of the resulting sand as beach fill for Town Neck beach in Sandwich. This project is long overdue, as Town Neck Beach and the nearby beach of Spring Hill have been systematically starved of sand by the Cape Cod Canal jetty, such that both beaches have suffered tremendous beach erosion over the past few years. These two beaches form a barrier reef for a historical Salt Marsh (Old Harbor) which is in danger of being permanently flooded by the sea as the beaches erode

We would also like to urge the Army Corp of Engineers to include Spring Hill beach in the proposed beach fill, as this beach is just south of Town Neck beach, and forms part of the same ecosystem, bordering the Salt Marsh, and has shown as much erosion as Town Neck beach. Re-nourishing Town Neck Beach alone will not be sufficient to protect the Salt Marsh.

We thank you in advance for your consideration.

Sincerely Brdfel Greeks

Alphonse & Bridget Galdes



Department of the Army US Army Corps of Engineers New England District 696 Virginia Road Concord MA 01742-2751

April 20, 2015

Engineering Planning Division CENAE-EP

Lynne I. Gourley P.O. Box 225 East Sandwich, MA 02537

#### Dear Ms. Gourley:

I am writing you in response to your comment letter regarding the maintenance dredging of the Cape Cod Canal. In addition to your general support for the placement of dredged sand on the Sandwich beaches, you specifically expressed your desire for the Corps to include Spring Hill Beach as part of our current proposal. Spring Hill Beach was initially identified as a potential placement area during the plan formulation process. However, when considering the limited amount of sand being removed from the Canal and the coastal processes that influence the system as a whole, we ultimately found Town Neck Beach to be the most appropriate placement area for this particular dredging effort.

We understand that both beaches would benefit greatly from the direct placement of sand but unfortunately the Canal only provides a very limited amount of material. Because sand in this system migrates along the shoreline in a west-to-east direction, sand placed at the westernmost location is expected to benefit the longest stretch of shoreline. While this is likely not the answer you had hoped for, I would stress that our efforts to address coastal storm protection in the town of Sandwich are ongoing. We are currently developing a study for this area that will focus on determining the extent to which the canal jetties interrupt natural sand migration, and that seeks to identify potential larger scale, long-term solutions. We will engage the public early and often as that study progresses in order to incorporate everyone's needs as best we can.

If you have any additional questions regarding this letter or our ongoing efforts in Sandwich, please feel free to reach me via mail, phone or e-mail. My telephone number is (978) 318-8685 and my e-mail address is michael.s.riccio@usace.army.mil.

Thank you for your comments and your understanding of the challenges associated with this dynamic coastal system.

Sincerely,

Michael S. Riccio Project Manager Engineering/Planning Division

Attention: Michael Riccio

Dear Sir,

This e-mail is in response to the public notification, dated 2/2/15, regarding the Federal Navigation project in the Cape Cod Canal.

I support the much needed distribution of dredged sand onto the beaches of Town Neck in Sandwich, Mass. This area is being starved of sand due to the construction of the canal, interfering with the natural flow.

My one concern is that it appears that Spring Hill Beach in East Sandwich, originally was included as an additional site for the dredged materials, but is not included now. This area has been decimated due to a lack of natural sand as well.

What are the plans to remedy this area? Is it possible to include Spring Hill Beach?

Thank you,

Lynne I. Gourley P.O. Box 225 E. Sandwich, Mass. 02537



Department of the Army US Army Corps of Engineers New England District 696 Virginia Road Concord MA 01742-2751

April 20, 2015

Engineering Planning Division CENAE-EP

Patricia Priestly 112 Salt Marsh Road East Sandwich, MA 02537

Dear Ms. Priestley:

I am writing you in response to your comments regarding the maintenance dredging of the Cape Cod Canal. First and foremost I'm sorry to hear about the loss of dune around your foundation. I know this winter storm season was particularly damaging. In your e-mail, you specifically expressed your concern that Spring Hill Beach was being overlooked in our current proposal. Spring Hill Beach was in fact identified as a potential placement area during the plan formulation process. However, when considering the limited amount of sand being removed from the Canal and the coastal processes that influence the system as a whole, we ultimately found Town Neck Beach to be the most appropriate placement area for this particular dredging effort.

We understand that both beaches would benefit greatly from the direct placement of sand but unfortunately the Canal only provides a very limited amount of material. Because sand in this system migrates along the shoreline in a west-to-east direction, sand placed at the westernmost location is expected to benefit the longest stretch of shoreline. While this is likely not the answer you had hoped for, I would stress that our efforts to address coastal storm protection in the town of Sandwich are ongoing. We are currently developing a study for this area that will focus on determining the extent to which the canal jetties interrupt natural sand migration, and that seeks to identify potential larger scale, long-term solutions. We will engage the public early and often as that study progresses in order to incorporate everyone's needs as best we can.

If you have any additional questions regarding this letter or our ongoing efforts in Sandwich, please feel free to reach me via mail, phone or e-mail. My telephone number is (978) 318-8685 and my e-mail address is michael.s.riccio@usace.army.mil.

Thank you for your comments and your understanding of the challenges associated with this dynamic coastal system.

Sincerely,

Michael S. Riccio Project Manager Engineering/Planning Division

On Tue, Feb 3, 2015 at 4:43 PM, p priestley <saltybikehhi@gmail.com> wrote:

Dear Army Corps of Engineers,

As a homeowner on Salt Marsh Road in East Sandwich I am very concerned that Spring Hill Beach appears to be overlooked. This is the third year in a row that I have lost the dune. This year is the worst, with the dune being stripped from half of the very foundation of the house. We are in desperate need of some "shoring" up (get it?).

I would greatly appreciate your attention in this matter. sincerely patricia priestley 112 salt marsh road



Department of the Army US Army Corps of Engineers New England District 696 Virginia Road Concord MA 01742-2751

April 20, 2015

Engineering Planning Division CENAE-EP

Eric Holmgren, Janet Holmgren and Jonathan Cluett 114 Salt Marsh Road East Sandwich, MA 02537

#### Dear Eric, Janet and Jonathan:

I am writing you in response to your comment letter regarding the maintenance dredging of the Cape Cod Canal. You specifically expressed your desire for the Corps to include Spring Hill Beach in our current proposal. We appreciate that this year's winter storm season was particularly damaging and in fact, Spring Hill Beach was initially identified as a potential placement area. However, when considering the limited amount of sand being removed from the Canal and the coastal processes that influence the system as a whole, we found Town Neck Beach to be the most appropriate placement area for this particular dredging effort.

We understand that both beaches would benefit greatly from the direct placement of sand but unfortunately the Canal only provides a very limited amount of material. Because sand in this system migrates along the shoreline in a west-to-east direction, sand placed at the westernmost location is expected to benefit the longest stretch of shoreline. While this is likely not the answer you had hoped for, I would stress that our efforts to address coastal storm protection in the town of Sandwich are ongoing. We are currently developing a study for this area that will focus on determining the extent to which the jetties interrupt natural sand migration, and that seeks to identify potential larger scale, longterm solutions. We will engage the public early and often as that study progresses in order to incorporate everyone's needs as best we can.

If you have any additional questions regarding this letter or our ongoing efforts in Sandwich, please feel free to reach me via mail, phone or e-mail. My telephone number is (978) 318-8685 and my e-mail address is michael.s.riccio@usace.army.mil.

Thank you for your comments and your understanding of the challenges associated with this dynamic coastal system.

Sincerely,

Michael S. Riccio Project Manager Engineering/Planning Division

Army Corps of Engineers, New England District 696 Virginia Road Concord, MA 01742-2751 Attn: Michael Riccio (email:nae-pn-nav@usace.atmy.mil)

## Re: Erosion Mitigation - Spring Hill Beach Sandwich, MA

To Whom It May Concern:

We own a house on 114 Salt Marsh rd in East Sandwich, MA on Spring Hill Beach. This letter serves as a request for the Army Corps of Engineers to consider action towards erosion mitigation on Spring Hill Beach.

During Hurricane Nemo, 3 years ago our 25-foot dune on Spring Hill beach eroded 20 feet in width and we also lost considerable dune height. Since this storm we have had to re-nourish the dunes every year at considerable cost. This was a privately funded effort by most of the houses on the northern end of salt marsh road closest to the spring hill conservation land.

Unfortunately despite our re-nourishing efforts, the subsequent winters have <sup>\*\*</sup>further eroded the dunes and have consequently threatened the foundation of our house along with most of the other houses on spring hill beach. A few houses are even condemned and may need to be demolished.

We are aware that the Army Corps of Engineers are planning a dredge project on Town Neck Beach. It is obvious that the Cape Cod Canal has hindered sand migration along beaches south of the canal. Houses along Spring Hill Beach have suffered just as much as Town Neck Beach as a result of the erosion.

The erosion of spring hill beach not only threatens the house owners, but Sandwich town via the Sandwich tidal inlet system and the spring hill conservation Land. We greatly appreciate you considering spring hill beach as part of your erosion mitigation plan.

Sincerely,

J cleiest)

Eric Holmgren Janet Holmgren Jonathan Cluett Owners of 114 Salt Marsh Rd. E. Sandwich, MA



Department of the Army US Army Corps of Engineers New England District 696 Virginia Road Concord MA 01742-2751

April 20, 2015

Engineering Planning Division CENAE-EP

Finn Maguire 16 Liberty Street Sandwich, MA 02563

Dear Mr. Maguire:

I am writing you in response to your comment letter regarding the maintenance dredging of the Cape Cod Canal. In addition to your general support for the redistribution of dredged sand along the Sandwich beaches, you specifically mentioned the jetties' role in exacerbating erosion. While the Section 204 study is focused primarily on the 2015/2016 dredging effort, I would offer the following insight regarding our ongoing efforts to address coastal storm protection in the town of Sandwich.

We have recently been authorized to conduct a feasibility study for the mouth of the canal pursuant to Section 111 of the River and Harbor Act of 1968. Section 111 authorizes the Corps to investigate shore damage prevention or mitigation caused by Federal navigation projects. This study will focus on determining the extent to which the jetties interrupt natural sand migration, as well as seek to identify potential larger scale, long-term solutions. As soon as we have completed the Section 204 study this year, we will switch efforts to the Section 111 study. We will engage the public early and often as that study progresses in order to incorporate everyone's needs as best we can.

If you have any additional questions regarding this letter or our ongoing efforts in Sandwich, please feel free to reach me via mail, phone or e-mail. My telephone number is (978) 318-8685 and my e-mail address is michael.s.riccio@usace.army.mil.

Thank you for your comments and your understanding of the challenges associated with this dynamic coastal system.

Sincerely,

Michael S. Riccio Project Manager Engineering/Planning Division

Dear Mr. Riccio:

I'm writing to express my strong approval of your plan to redistribute dredged sand from the Cape Cod Canal onto Town Neck Beach in Sandwich.

I'm a resident of Sandwich Village, and my family walks to Town Neck Beach quite often. The recent breach of the beach during a blizzard has ruined kid-friendlyBoardwalk Beach on the backside of the dunes, has cut off popular Mill Creek, and threatens to reshape flood zones in a frightening prospect for many residents of the area.

It's clear to me that the jetty at Scusset beach has starved Town Neck of its natural sand deposits and put the beach and many homes in harm's way. This dredging and redistribution will help patch this terrible problem. I hope that the jetty issue can soon be addressed as well.

Thank you for your time and attention to this matter,

Finn Maguire 16 Liberty St Sandwich MA 02563

#### **Riccio, Michael S NAE**

From: Sent: To: Subject: Riccio, Michael S NAE Monday, April 20, 2015 12:15 PM 'Todd Shepard' RE: [EXTERNAL] Canal Dredging (UNCLASSIFIED)

Classification: UNCLASSIFIED Caveats: NONE

Good Morning Mr. Shepard,

First and foremost I'm sorry to hear about your cottage. It's a shame that longstanding homes are falling victim to severe erosion. I'd also add my apologies for the delayed response. Keeping this project moving along on such an aggressive schedule has been a full time job and then some. We did receive your comments though, and they were included in our decision making process as soon as they reached our inbox. I'd offer the following explanation for where the Corps stands in terms of Spring Hill Beach and would welcome any additional comments or questions you might have:

Spring Hill Beach was initially identified as a potential placement area for the sand being dredged from the Cape Cod Canal this fall/winter. However, when considering the limited amount of sand being removed from the Canal and the coastal processes that influence the system as a whole, we found Town Neck Beach to be the most appropriate placement area for this particular dredging effort.

We understand that both beaches would benefit greatly from the direct placement of sand but unfortunately the Canal only provides a very limited amount of material. Because sand in this system migrates along the shoreline in a west-to-east direction, sand placed at the westernmost location is expected to benefit the longest stretch of shoreline. While this is likely not the answer you had hoped for, I would stress that our efforts to address coastal storm protection in the town of Sandwich are ongoing. We are currently developing a study for this area that will focus on determining the extent to which the canal jetties interrupt natural sand migration, as well as identifying potential larger scale, long-term solutions. We will engage the public early and often as that study progresses in order to incorporate everyone's needs as best we can.

If you have any additional questions regarding this respose or our ongoing efforts in Sandwich, please feel free to reach me via mail, phone or e-mail. My telephone number is (978) 318-8685 and my e-mail address is <u>michael.s.riccio@usace.army.mil</u>.

Thank you for your comments and your understanding of the challenges associated with this dynamic coastal system.

1

Michael S. Riccio U.S. Army Corps of Engineers E/P Project Manager Phone: 978.318.8685 Fax: 978.318.8303

-----Original Message-----From: Todd Shepard [mailto:todddshepard@gmail.com] Sent: Sunday, March 01, 2015 7:51 AM To: nae-pn-nav, NAE Subject: [EXTERNAL] Canal Dredging

From:	Todd Shepard
То:	<u>nae-pn-nav, NAE</u>
Subject:	[EXTERNAL] Canal Dredging
Date:	Sunday, March 01, 2015 7:52:10 AM

I am unsure how to make a comment concerning the placement of sand from the upcoming canal dredging. Our family owns a 100 year old cottage that was recently condemned after Storm Juno. The neglect of Spring Hill beach due to the Geddy that was constructed has led to significant beach erosion and loss to our property. Action now is necessary to prevent further deterioration though it may be too late for our family cottage. Please advise if I need to do something more to express my concern.

Todd Shepard 860-930-3606

Sent from my iPad



US Army Corps of Engineers ® New England District **Public Notice** 

696 Virginia Road Concord, MA 01742-2751 In Reply Refer to: Mr. Michael Riccio <u>nae-pn-nav@usace.army.mil</u> Engineering/Planning Division Date: February 2, 2015 Comment Period Closes: March 3, 2015

### **30 DAY PUBLIC NOTICE**

## MAINTENANCE DREDGING AND ADVANCE MAINTENANCE DREDGING OF THE FEDERAL NAVIGATION PROJECT IN THE CAPE COD CANAL BOURNE AND SANDWICH, MASSACHUSETTS WITH BENEFICIAL USE OF THE DREDGED SAND AS BEACH-FILL ON TOWN NECK BEACH, SANDWICH, MASSACHUSETTS

Interested parties are hereby notified under the provisions of the National Environmental Policy Act (NEPA) (Title 33, Parts 335-338 of the Code of Federal Regulations) and Section 404 of the Clean Water Act of 1977 (P.L. 95-17) that the U.S. Army Corps of Engineers (USACE), New England District, plans to perform work in the navigable waters of this District. The work involves maintenance dredging and advance maintenance dredging of the Federal Navigation Project (FNP) in the Cape Cod Canal, Bourne and Sandwich, Massachusetts and is authorized in accordance with the River and Harbor Acts of 1935, 1945, and 1958. Attachment 1 lists pertinent laws, regulations, and directives.

<u>Authorized Federal Project Description</u>: The Cape Cod Canal is a toll-free, open-to-all, waterway that connects Buzzards Bay and Cape Cod Bay. The project is used by both commercial and recreational vessels and eliminates the need to transit around Cape Cod; a distance of approximately 135 miles, and a more hazardous route. The authorized FNP provides for a 600-foot long jetty and a 3,000-foot long breakwater, both at the east end of the Canal; a channel 32-feet deep at Mean Lower Low Water (MLLW) throughout its 17.5 mile length and two mooring basins; the West Mooring Basin, 32-feet deep at MLLW at the west end; and the East Mooring Basin (EMB), 25-feet deep at MLLW at the Canal.

<u>Character and Purpose of Work</u>: The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas (~ 54.4 acres) in the authorized, 32-feet deep by 500-feet wide, main-ship channel and the 25-feet deep EMB portions of the project (see Attachment 2). Shoaling in the main-ship channel consists of large sand wave formations. These formations cause draft restrictions, tidal delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor these vessels in emergencies (e.g. icing). Further shoaling in the Canal proper may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod, thereby significantly increasing the risk profile of these vessels, especially during the winter months. In order to extend the time between maintenance

dredging events, advance maintenance will be performed to reduce the sand wave shoals to the depth of the surrounding environment. The six shoal areas in the authorized 32 feet deep mainship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep East Mooring Basin will be dredged to -34 feet MLLW (includes 2 feet allowable over-depth). The dredged material will either be beneficially used as beach-fill on an eroded portion of Town Neck Beach in Sandwich (see Attachment 3) or, alternatively, shall be placed at the previously used open water Cape Cod Canal Disposal Site (CCCDS) in Cape Cod Bay. The proposed work will be performed by a hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

**Disposal Areas:** A study is currently ongoing under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project as beach-fill on a 2,500 foot long eroded section of Town Neck Beach in Sandwich. Town Neck Beach is adjacent to the south breakwater at the eastern end of the Canal. The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and the potential beach nourishment. If the Section 204 study is completed in time to coincide with this maintenance dredging event and the study results in a positive benefit/cost ratio, then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay 100 percent of any additional costs over and above the Federal base plan (i.e. dredging and placement of the material at the CCCDS) to have material placed on Town Neck Beach.

For placement on Town Neck Beach, a hopper dredge would utilize pump-off capability to refluidize the dredged material with seawater and discharge the slurry of water and dredged material onto the beach through a pipeline connection moored off the beach. The pipeline terminus would be either a moored, floating tie-in, or, mounted on a barge and spudded down a short distance offshore in water of sufficient depth to accommodate the draft of the dredging vessel.

Work on Town Neck Beach would likely consist of the following: Heavy equipment would be used to form-up toe dikes in the immediate area of the discharge using some existing beach material and some dredged material. The toe dikes would help contain the slurry as it is discharged and would minimize loss of material to the surf. The same heavy equipment would be used to spread the discharged material on the beach to roughly form the elevations and slopes specified for the beach berm, dune, and seaward slope of the beach. As discharge and spreading progresses along the beach-fill area, the toe dikes and pipeline would be extended. Portable lights may be used to enable work to proceed at night to expedite the work and further minimize loss of material to the surf during construction. Finish grading to the specified elevations and slopes would be accomplished using the same heavy equipment following completion of all placement on the beach, if not already accomplished by the contractor or by natural forces during placement. Where new dunes are created, the dune crest and slopes will be planted with American Beach Grass as soon as practicable after the construction of the dune is completed. Use of Town Neck Beach for the placement of dredged material from the Cape Cod Canal maintenance dredging project is contingent upon the availability of non-Federal funding as mentioned above and upon successful coordination with the Federal and state environmental resource agencies.

Alternatively, the Cape Cod Canal Disposal Site would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the Cape Cod Canal Buoy #1. The center is located at 41° 49'N, 70° 25'W. The CCCDS is a previously used disposal site, last used for disposal of material from the Canal in 1990.

The material to be dredged has undergone physical testing. Based on this data and a review of historical data and a lack of potential sources of contaminants, it is our determination that the material is acceptable for placement on Town Neck Beach or disposal at the Cape Cod Canal Disposal Site.

Additional Information: Additional information on the proposed project may be obtained from Mr. Michael Riccio, Planning Division at the return address shown, by email at nae-pn-nav@usace.army.mil or telephone number (978) 318-8685.

Coordination: The proposed work has, or will be coordinated with the following agencies:

#### Federal:

U.S. Environmental Protection Agency U.S. Fish and Wildlife Service National Marine Fisheries Service

<u>Commonwealth of Massachusetts</u>: Massachusetts Office of Coastal Zone Management Massachusetts Natural Heritage Program Massachusetts Department of Environmental Protection Massachusetts Historic Preservation Office Massachusetts Board of Underwater Archaeological Resources

<u>Tribal Nations</u>: Mashpee Wampanoag Tribe Wampanoag Tribe of Gay Head (Aquinnah)

#### Local:

Town of Sandwich, Town Manager Town of Sandwich, Department of Natural Resources

**Environmental Impacts**: An Environmental Assessment (EA) for the maintenance dredging of the Cape Cod Canal is being prepared and will be available for review upon request. I have made a preliminary determination that an Environmental Impact Statement for the proposed maintenance dredging is not required under the provisions of the National Environmental Policy Act of 1969. This determination will be reviewed in light of facts submitted in response to this notice.

**Federal Consistency with the Massachusetts Coastal Zone Management Program**: I find that maintenance dredging of the authorized navigation project in the Cape Cod Canal is consistent, to the maximum extent practicable, with the applicable management programs established as a result of the Coastal Zone Management Act of 1972. The dredging and placement/disposal operations will be conducted, to the maximum extent practicable, in a manner that is consistent with the approved management program.

#### **Other Information:**

a. Local Sponsor: Town of Sandwich

b. <u>Non-Federal Dredging</u>: No private or non-Federal dredging work is being proposed in conjunction with the proposed work.

c. <u>Previous Dredging</u>: The last time the Canal was dredged was in 2010 when 106,000 cubic yards of material were dredged from the channel and the East Mooring Basin and used as cap material for the Boston Harbor confined aquatic disposal cells.

d. <u>Alternative Placement Areas/Methods</u>: Alternative placement areas and methods have been considered as part of this proposal. Alternative placement options considered include: open-water disposal (at CCCDS), nearshore placement, upland placement, and beach placement (beneficial use). USACE favors using the beach placement option because it is environmentally-sound; it keeps clean sediments in the littoral system and it conveys sand to a beach that has significantly eroded. However, if the Section 204 study is not completed in time to coincide with this maintenance dredging event (or does not result in a positive benefits/cost ratio) or, in the event that the necessary non-Federal funding is not available to place material on the beach, then the material will be placed at the CCCDS.

e. <u>Endangered Species</u>: It is our preliminary determination that no threatened or endangered species will be adversely impacted by the proposed project. The town of Sandwich will be responsible for monitoring of piping plovers on Town Neck Beach. USACE will consult with the National Marine Fisheries Service and the United States Fish and Wildlife Service to ensure that the proposed activity will not significantly affect any species or critical habitat designated as endangered or threatened pursuant to the Endangered Species Act of 1973 (87 Stat. 844).

f. <u>Floodplain Management</u>: In accordance with Executive Order 11988, the Corps of Engineers has determined that the proposed work will not contribute to negative impacts or damages caused by floods.

g <u>Cultural Resources</u>: The proposed work consists of maintenance dredging of the FNP in previously dredged areas. This proposal, including use of the beach placement area or CCCDS is being coordinated with the Massachusetts Historic Preservation Office and tribes. In the past they have determined that the work will not adversely affect any cultural or archaeological features or resources.

h. <u>Essential Fish Habitat Assessment</u>: It has been determined that the project may have a temporary adverse effect on Essential Fish Habitat (EFH). The project site is contained within areas designated as EFH as defined by the Magnuson-Stevens Fishery Conservation and Management Act and amended by the Sustainable Fisheries Act of 1996 for Federally-managed fish species. The U.S. Army Corps of Engineers has assessed the effects that the project is likely to have on EFH and has determined that they will be short-term and localized and that there will be no significant impacts on the designated fisheries resources. USACE will consult with the National Marine Fisheries Service to ensure that any potential impacts will be minimized.

<u>Additional Requirements</u>: A request will be sent to the Massachusetts Office of Coastal Zone Management for the State's concurrence with our determination of Federal consistency with the State's approved Coastal Zone Management Program. A request will also be sent to the Massachusetts Department of Environmental Protection for a Water Quality Certification in accordance with Section 401 of the Clean Water Act, 33 U.S.C. § 1341, which requires that the work comply, to the maximum extent practicable, with State or interstate requirements to control the discharge of dredged or fill material.

The decision whether to perform the work will be based on an evaluation of the probable impact of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, will be balanced against its reasonably foreseeable detriments. All factors, which may be relevant to the proposal, will be considered; among these are conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use classification, and the welfare of the people.

Any person who has an interest that may be affected by the dredging and disposal of this dredged material may request a public hearing. The request must be submitted in writing to the District Engineer within the comment period of this notice and must clearly set forth the interest that may be affected and the manner in which the interest may be affected by this activity.

Please bring this notice to the attention of anyone you know to be interested in this project. Comments are invited from all interested parties and should be directed to the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751, ATTN: Michael Riccio; or emailed to <u>nae-pn-nav@usace.army.mil</u> within 30 days of this notice.

ZJANZOIS

Date

Attachments

Christopher J. Barron Colonel, Corps of Engineers District Engineer
# Attachment 1

# PERTINENT LAWS, REGULATIONS, AND DIRECTIVES

Clean Air Act, as amended (42 U.S.C. 7401 et. seq.)

Clean Water Act, as amended (33 U.S.C. 1251 et. seq.)

Coastal Barrier Resources Act, as amended (16 U.S.C. 3501 et seq.)

Coastal Zone Management Act of 1972 (16 U.S.C. 1456)

Code of Federal Regulation, Title 33, Parts 335 through 338

Endangered Species Act of 1973 as amended (16 U.S.C. 1531 et seq.)

Estuary Protection Act (16 U.S.C. 1221 et. seq.)

Federal Water Project Recreation Act, as amended (16 U.S.C. 460L-12 et. seq.)

Fish and Wildlife Coordination Act (16 U.S.C. 661-667e)

Fish and Wildlife Act of 1956 (16 U.S.C. 742a, et. seq.)

Land and Water Conservation Fund Act of 1965, as amended (16 U.S.C. 460L et. seq.)

Magnuson-Stevens Fishery Conservation and Management Act as amended by the

Sustainable Fisheries Act of 1996 (16 U.S.C. 1801 et seq.)

Migratory Marine Game-Fish Act (16 U.S.C. 760c-760g)

National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347)

National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.)

Executive Order 11988, Floodplain Management, 24 May 1977

Executive Order 11990, Protection of Wetlands, 24 May 1977

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority

Populations and Low Income Populations, 11 February 1994

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Ricks, 21 April 1997

Water Resources Development Act of 1992, Section 204 (as amended), Beneficial Uses of Dredged Material

Attachment 2



Map of Cape Cod Canal Federal Navigation Project

Page 7 of 8



# Attachment 3

Map of Proposed Placement/Disposal Sites



September 3, 2014

Engineering/Planning Division Evaluation Branch

Mr. Tom Chapman U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, New Hampshire 03301

Dear Mr. Chapman:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) and a Planning Aid Letter from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project specifically with regards to the Fish and Wildlife Coordination Act and the Endangered Species Act. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (<u>Lawrence.R.Oliver@usace.army.mil</u>), or Dr. Valerie Cappola, at (978) 318-8067 (<u>Valerie.A.Cappola@usace.army.mil</u>) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Ms. Susi VonOettingen: Susi\_vonOettingen@fws.gov Ms. Maria Tur: Maria Tur@fws.gov



September 3, 2014

Engineering/Planning Division Evaluation Branch

Mark Murray-Brown Section 7 Coordinator Protected Resources Division NOAA National Marine Fisheries Service 55 Great Republic Drive Gloucester, Massachusetts 01930

Dear Mr. Murray-Brown,

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project specifically with regards to the Fish and Wildlife Coordination Act and the Endangered Species Act. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

イawrence R. Oliver Project Manager

Enclosure

From:	Alison Verkade - NOAA Affiliate
To:	Cappola, Valerie A NAE
Cc:	reiner.ed@epa.gov; amy.coman@state.ma.us; Robert.Boeri@state.ma.us; stephen.mckenna@state.ma.us; jim.mahala@state.ma.us; dweeden@mwtribe.com; eileen.feeney@state.ma.us; mark.murray-brown@noaa.gov; Tom Chapman@fws.gov; vonOettingen, Susi; Maria Tur@fws.gov; Bettina@wampanoagtribe.net; Carolyn Mostello (carolyn.mostello@state.ma.us); gdunham@townofsandwich.net; Oliver, Lawrence R NAE
Subject:	[EXTERNAL] Re: Cape Cod Canal-Sandwich 204 Project (UNCLASSIFIED)
Date:	Friday, October 03, 2014 9:59:54 AM

Hi Valerie,

NMFS comments are as discussed on site. To protect high complexity EFH (intertidal and subtidal gravel, cobble, boulder), the placement of fill should be restricted to the area above MHW to the greatest extent possible. No fill should not be placed in existing rocky habitat. In areas where intertidal rocky substrate is not present, placement of fill in the intertidal zone should be graded to prevent transport to subtidal rocky habitat during both typical and storm conditions.

If you have any questions, please let me know.

Thank you, Alison

On Thu, Sep 25, 2014 at 4:38 PM, Cappola, Valerie A NAE <Valerie.A.Cappola@usace.army.mil> wrote:

Classification: UNCLASSIFIED Caveats: NONE

During the coordinated site visit we agreed to send a plan of the proposed project. Attached is a generalized plan (projectfootprint\_limitedScope.pdf) that includes the footprint of the project taken from the larger project devised by the Town. Our project footprint will probably be slightly larger than shown since the figure is for 141,000 cubic yards and we expect to place approximately 150,000 cubic yards of material along 2,000 to 2,500 feet of beach. The file Town Neck Beach Characteristics.pdf shows a generalized cross section (figure was provided at the site visit).

Currently our survey crew is working at the site to collect updated beach profile data that will be used to develop our design.

Please don't forget to send your comments concerning the proposed project.

Thank you, Valerie

\*\*\*\*

Valerie A Cappola, PhD Marine Ecologist

Environmental Resources Section US Army Corps of Engineers 696 Virginia Rd Concord, MA 01742

(Phone) 978-318-8067 (Fax) 978-318-8650 valerie.a.cappola@usace.army.mil

Classification: UNCLASSIFIED

Caveats: NONE

--

Alison T. Verkade NOAA-NMFS Affiliate Greater Atlantic Regional Fisheries Office Habitat Conservation Division 55 Great Republic Drive Gloucester, MA 01930 978-281-9266 alison.verkade@noaa.gov



September 3, 2014

Engineering/Planning Division Evaluation Branch

Mr. Lou Chiarella NOAA Fisheries Service Northeast Regional Office Habitat Conservation Division 55 Great Republic Drive Gloucester, Massachusetts 01930

Dear Mr. Chiarella:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project specifically with regards to the Essential Fish Habitat recommendations as required under the Magnuson-Stevens Fishery Conservation and Management Act amendments and the Fish and Wildlife Coordination Act. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (<u>Lawrence.R.Oliver@usace.army.mil</u>), or Dr. Valerie Cappola, at (978) 318-8067 (<u>Valerie.A.Cappola@usace.army.mil</u>) if you have any guestions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Ms. Alison Verkade: <u>alison.verkade@noaa.gov</u>



September 3, 2014

Engineering/Planning Division Evaluation Branch

Ms. Jackie Leclaire Wetlands Protection Unit U.S EPA New England, Region 1 5 Post Office Square - Suite 100 Boston, Massachusetts 02109-3912

Dear Ms. Leclaire:

The U.S. Army Corps of Engineers (Corps), New England District (NAE) and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Mr. Ed Reiner: reiner.ed@epa.gov



September 3, 2014

Engineering/Planning Division Evaluation Branch

Mr. Mel Cote USEPA Region 1 - New England 5 Post Office Square Mail Code: OEP06-1 Boston, Massachusetts 02109-3912

Dear Mr. Cote:

The U.S. Army Corps of Engineers (Corps), New England District (NAE) and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project specifically with regards to your responsibility under Section 176c and 309 under the Clean Air Act. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Ms. Olga Guza-Pabst: <u>Guza-Pabst.Olga@epa.gov</u>



September 3, 2014

Engineering/Planning Division Evaluation Branch

Mr. Robert Boeri The Massachusetts Office of Coastal Zone Management 251 Causeway Street, Suite 800 Boston, Massachusetts 02114-2138

Dear Mr. Boeri:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

/Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Mr. Steve Mckenna: <u>stephen.mckenna@state.ma.us</u>



Commonwealth of Massachusetts Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

DEVAL L. PATRICK Governor MAEVE VALLELY BARTLETT Secretary

> DAVID W. CASH Commissioner

OCT - 7 2014

Lawrence R. Oliver US Army Corps of Engineers New England District 696 Virginia Road Concord, Massachusetts 01742-2751 RE: SANDWICH—Wetlands Town Neck Beach Beneficial Use of Dredged Material

Dear Mr. Oliver:

The Department of Environmental Protection is in receipt of your letter dated September 3, 2014, requesting preliminary comments on the proposed beneficial use of dredged material from the Cape Cod Canal. Specifically, the Army Corps of Engineers (ACOE) plan to dredge approximately 150,000 CY of beach compatible sediment from the Cape Cod Canal and place that sediment directly on Town Neck Beach in Sandwich. The Department strongly supports the proposed beneficial use of dredged material on Town Neck Beach in Sandwich for the following reasons.

Town Neck Beach is situated on Cape Cod Bay and is located immediately downdrift of the jetties at the eastern end of the Cape Cod Canal. These jetties interfere with the natural flow of sediment along the shoreline. As a result, Town Neck Beach is sediment starved and erosion has threatened both private and public properties.

In order to mitigate ongoing coastal erosion, the Department supports the use of dredged sediments for beach nourishment purposes. In the Department's opinion, the proposed use of dredged material as beach nourishment would enhance coastal beach and dune resource areas, reduce vulnerability of coastal storms for adjacent private and municipal properties and restore critical habitat for state and federally listed shorebirds.

For your information, the Department has enclosed a copy of our MEPA comments for the recently filed Environmental Notification Form (ENF) for the Town of Sandwich Dune and Beach Reconstruction Project. If you have any questions concerning this matter please contact Jim Mahala at (508) 946-2806.

Very truly yours,

Elijabett a. Koulskeron

¥

Elizabeth A. Kouloheras Bureau of Resource Protection

K/JM Enclosure

ŧ

cc: Sandwich Conservation Commission

George H. Dunham, Sandwich Town Manager



Commonwealth of Massachusetts Executive Office of Energy & Environmental Affairs

# Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

#### DEVAL L. PATRICK Governor

MAEVE VALLELY BARTLETT Secretary

> DAVID W. CASH Commissioner

July 23, 2014

Maeve Vallely Bartlett, Secretary of Environment and Energy Executive Office of Environmental Affairs ATTN: MEPA Office 100 Cambridge Street, Suite 900 Boston, MA 02114

RE: SANDWICH – ENF Review EOEEA #15213 – Town of Sandwich Dune and Beach Reconstruction Project, Town Neck Beach and Vicinity

Dear Secretary Bartlett,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Environmental Notification Form (ENF) for the proposed dune and beach reconstruction project to be located at Town Neck Beach and vicinity, Sandwich, Massachusetts (EOEEA #15213). The project proponent provides the following information for the project:

"The Town has developed a project that will extend along 5,000 linear feet of Sandwich Town Beach. The width and elevation of the dunes will be increased and the beach berm will be extended to push mean high water seaward by more than 100 feet. The project will reduce vulnerability to coastal storms, flooding, erosion, and sea level rise for over 600 properties, including a number of critical facilities and municipal properties, and will also strengthen natural ecosystems for the benefit of fish and wildlife. The eastern end of the project area is utilized as nesting habitat by state and federally listed shorebirds. Through careful design (dune and beach slopes between 10:1 and 20:1), this area will be restored to meet the unique habitat requirements for these birds, and to increase the overall area and quality of habitat for these shorebirds. The extensive salt marsh ecosystem located landward of the project area will receive added protection through the completion of this project, preserving the functions of nursery and foraging habitat for fish, shellfish and birds, water quality protection, storm water storage, and recreation. Permits listed in the ENF to be sought for the project include the following: MassDEP Chapter 91 Waterways Permit MassDEP 401 Water Quality Certification

MassCZM Consistency Determination"

This information is available in alternate format. Call Michelle Waters-Ekanem, Diversity Director, at 617-292-5751. TDD# 1-866-539-7622 or 1-617-574-6868 MassDEP Website: www.mass.gov/dep

## Wetlands and Waterways Program Comments

The Southeast Regional Office, Wetlands and Waterways Program have reviewed the abovereferenced Expanded Environmental Notification Form (EENF) and have the following comments. The project proposes beach nourishment along a 5,000 linear foot stretch of shoreline on Sandwich Town Beach. As stated in the EENF, the purpose of the project is to mitigate ongoing coastal erosion caused by the construction of the Cape Cod Canal jetties which interfere with the natural flow of sediment along the shoreline. The proposed project would enhance coastal beach and dune resource areas, reduce vulnerability of coastal storms for adjacent private and municipal properties and restore critical habitat for state and federally listed shorebirds.

Specifically, the project proposes the placement of approximately 388,000 cubic yards (cy) of beach compatible sediments along the shoreline. The width and elevation of the dunes will be increased and the beach berm will be extended to push mean high water (MHW) seaward by more than 100 feet.

As stated in the EENF, sources of sediment to restore the beach/dune system are being identified, investigated and will be permitted under a separate effort. Whatever the source, nourishment materials must be clean sediments of a grain size compatible with that on the existing beach in accordance with 310 CMR 10.27 (5) and MassDEP's Beach Nourishment Guide to Best Management Practices for Projects in Massachusetts.

The eastern end of Town Neck Beach is a barrier beach on the north side of Cape Cod bordering Cape Cod Bay. The Massachusetts Office of Coastal Zone Management has mapped this area as Barrier Beach unit Sd-4. Town Neck Beach also provides habitat to several federal and statelisted endangered shorebird species and is mapped by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) as estimated and priority habitat.

According to the EENF, the proposed work would occur on coastal beach, coastal dune, barrier beach, rocky intertidal shore, land under the ocean, land containing shellfish and within land subject to coastal storm flowage.

Although the proponents seek to complete the proposed project in its entirety, it is stated in the EENF that it is possible that the project will be constructed in phases over multiple years as sand sources and funding become available. A key goal of the project is the current and future beneficial re-use of Cape Cod Canal dredged material. It is anticipated that a long-term source of sand can be derived from future maintenance dredging projects at the eastern end of the Cape Cod Canal.

The Department finds that the EENF demonstrates that the no action alternative would result in continued erosion along Town Neck Beach. The Department finds that the EENF's alternative analysis demonstrates the need for a substantial nourishment effort to restore Town Neck Beach for both storm damage prevention and bird habitat enhancement purposes. The Department concurs with the selection of the preferred alternative (Alternative #4) since it provides the maximum shore protection, enhances rare shorebird habitat, includes both a coastal beach and dune nourishment component while minimizing impacts to Rocky Intertidal Shores.

2

As previously stated, Town Neck Beach is mapped as estimated and priority habitat by the NHESP. The Wetlands Protection Act Regulations (310 CMR 10.37) state that if a proposed project is found by the issuing authority to alter a resource area which is part of the habitat of state-listed species, such project shall not be permitted to have any short or long term adverse effects on the habitat of the local population of that species. Additionally, 310 CMR 10.27(7), 10.28(6), 10.29(4) state that no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species.

The Department notes that the project design along the eastern end of the project area includes gentle beach and dune slopes and no planting of dune vegetation in order to satisfy the unique habitat requirements for shorebirds. To enhance the dune restoration aspects of the project, the Department recommends beach grass plantings along some portion of the barrier beach if it is determined to be consistent with recommendations of NHESP. The NHESP program, however, will make the final determination whether the project satisfies the no short or long-term adverse effect standard pursuant to the Wetlands Protection Act.

The EENF describes the presence of Rocky Intertidal Shores along the western portion of the project area. It appears that the EENF has utilized the MASS GIS wetland data layer to delineate the presence and extent of Rocky Intertidal Shores. The Department would recommend that the proponent field verify the delineation of Rocky Intertidal Shores.

The presence of Rocky Intertidal Shores limits the extent to which nourishment (sand) can be directly placed along the beach due to compatibility issues. It is likely, however, that the observed Rocky Intertidal Shore has become exposed over time due to ongoing erosion as a result of the interruption of sediment flow by the Cape Cod Canal jetties. To further enhance the storm damage prevention interest, the Department would recommend a more robust nourishment effort along the western end of the project area, including a wider coastal beach. Any re-design of the nourishment project along the western end could incorporate a mix of sand and cobble to ensure sediment compatibility. The proponent should consult with MDMF to determine the feasibility of additional nourishment at the western end of the project area.

The Department notes that the sediment sampling program was conducted in August 2001. Given the amount of time elapsed since the sampling was conducted, the Department would recommend an up-date. This information is essential to demonstrate sediment compatibility pursuant to 310 CMR 10.27 (5).

Since the proposed project exceeds a mandatory Environmental Impact Report (EIR) MEPA threshold, the proponent is seeking a waiver from that requirement. As stated in the EENF, the basis for the waiver request is that beach and dune nourishment have been conducted in the past without damage to the environment, the project will enhance degraded coastal beach and dune resource areas, reduce vulnerability of coastal storms and flooding for adjacent properties and restore critical shorebird habitat.

The Department strongly supports beach nourishment as a method to reduce the vulnerability of storm damage and flooding on private and municipal properties. The Department also supports the

3

proponent's request for a waiver from a mandatory EIR for this project. Any remaining project details can be addressed through the normal permitting process.

4

This proposal will require an Order of Conditions under the Wetlands Protection Act and a Chapter 91 permit from the Department. The proposal will be classified as a water-dependent use in accordance with the Waterways Regulations at 310 CMR 9.12.

While the majority of the beach nourishment will be performed on the Town owned beach, the proposed limit of work will extend onto 11 privately owned parcels. In accordance with the Waterways Regulations at 310 CMR 9.40(4)(a), if the source of the beach nourishment material comes from a publicly-funded dredging project, the Chapter 91 Permit would require the Proponent to secure easements for public access below the existing high water mark from each of the property owners.

#### Construction Activities - EPA

The project construction activities may disturb one or more acres of land and therefore, may require a NPDES Stormwater Permit for Construction Activities. The proponent can access information regarding the NPDES Stormwater requirements and an application for the Construction General Permit at the EPA website: <u>http://cfpub.epa.gov/npdes/stormwater/cgp.cfm</u>

# Bureau of Waste Site Cleanup

Based upon the information provided, the Bureau of Waste Site Cleanup (BWSC) searched its databases for disposal sites and release notifications that may have occurred within and around the proposed project area. A disposal site is a location where there has been a release to the environment of oil and/or hazardous material that is regulated under M.G.L. c. 21E, and the Massachusetts Contingency Plan [MCP – 310 CMR 40.0000].

The proposed project involves restoration of 5,000 feet of Sandwich Town Beach. The restoration will extend mean high water seaward more than 100 feet. There are five listed disposal sites located within one mile of the proposed project area. Four of the sites have been closed under the MCP, and require no further response actions. Note that one of the closed sites, Release Tracking Number (RTN) 4-13525, was closed under a Temporary Solution, and requires continued reporting under the MCP. This site is located approximately one mile west-southwest of the proposed project area.

One open site, RTN 4-413, is located approximately 0.9-miles southwest of the proposed project area at 182 Route 6A in Sandwich. Continued response actions are required under the MCP prior to site closure.

There are no other listed disposal sites located at or within one mile of the proposed project area. The MCP compliance status of these and other BWSC disposal sites may be viewed using the BWSC Waste Sites/Reportable Release Lookup at:

http://public.dep.state.ma.us/SearchableSites2/Search.aspx

The Project Proponent is advised that if oil and/or hazardous material are identified during the implementation of this project, notification pursuant to the Massachusetts Contingency Plan (310

CMR 40.0000) must be made to MassDEP, if necessary. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render appropriate opinions. The LSP may evaluate whether risk reduction measures are necessary or prudent if contamination is present. The BWSC may be contacted for guidance if questions arise regarding cleanup.

# Proposed s. 61 Findings

The "Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form" may indicate that this project requires further MEPA review and the preparation of an Environmental Impact Report. Pursuant to MEPA Regulations 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

The MassDEP Southeast Regional Office appreciates the opportunity to comment on this proposed project. If you have any questions regarding these comments, please contact Sharon Stone at (508) 946-2846.

Very truly yours,

AZ MULI

Jonathan E. Hobill, Regional Engineer, Bureau of Resource Protection

JH/SS

Cc: DEP/SERO

ATTN: Philip Weinberg, Regional Director

David Johnston, Deputy Regional Director, BRP Maria Pinaud, Deputy Regional Director, BWP Millie Garcia-Serrano, Deputy Regional Director, BWSC Brenda Chabot, Deputy Regional Director, ADMIN Elizabeth Kouloheras, Chief, Wetlands and Waterways James Mahala, Wetlands Program David Hill, Waterways Program Richard Keith, Chief, Municipal Services Pamela Truesdale, Municipal Services Leonard Pinaud, Chief, Site Management Allen Hemberger, Site Management Sandwich Conservation Commission



September 3, 2014

Engineering/Planning Division Evaluation Branch

Ms. Elizabeth Kouloheras Massachusetts Department of Environmental Protection Southeast Regional Office 20 Riverside Drive Lakeville, Massachusetts 02347

Dear Ms. Kouloheras:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Mr. Ken Chin: Ken.Chin@state.ma.us



September 3, 2014

Engineering/Planning Division Evaluation Branch

Mr. Paul Diodati, Director Division of Marine Fisheries 251 Causeway Street, Suite 400 Boston, Massachusetts 02114

Dear Mr. Diodati:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Ms. Eileen Feeney: <u>eileen.feeney@state.ma.us</u>



September 3, 2014

Engineering/Planning Division Evaluation Branch

Ms Mary B. Griffin, Commissioner Department of Fish and Game 251 Causeway St, Suite 400 Boston, Massachusetts. 02114-2152

Dear Ms Griffin:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project specifically with regards to the Fish and Wildlife Coordination Act. Comments in support of the project as presented are also requested.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure

Copies Furnished: Mr. Jason Zimmer: <u>Jason.Zimmer@state.ma.us</u>

<u>Coman, Amy (MISC)</u>
Cappola, Valerie A NAE
Oliver, Lawrence R NAE
[EXTERNAL] RE: Cape Cod Canal-Sandwich 204 Project (UNCLASSIFIED)
Friday, October 10, 2014 1:32:46 PM

Good Afternoon, Valerie -

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife reviewed the information provided for the proposed 150,000 cubic yards of beneficial reuse on Town Neck resulting from the ACOE dredge within Cape Cod Canal. Based on a review of the preliminary plans, including the proposed slope and project footprint, the NHESP anticipates that impacts to the state- and federally-listed Piping Plover (Charadrius melodus) can be avoided through appropriate protection measures. In addition to the proposed minimum 1V:10H slope and location of the nourishment, the placement of material should occur during the September 1 - March 31 timeline. This will avoid disturbance during the April 1 - August 31 nesting and breeding period for the Piping Plover. The newly nourished areas may become more attractive to Piping Plovers and state-listed species of terns, thus an NHESP-approved monitoring and protection plan should be developed for this location.

The NHESP is interested in reviewing, and commenting on, the information that will be provided within the Environmental Assessment. We appreciate the opportunity to coordinate and comment on this project. If you have any questions, please contact Amy Coman Hoenig, Endangered Species Biologist at amy.coman@state.ma.us or 508-389-6364.

Sincerely,

Amy (Coman) Hoenig

Endangered Species Review Biologist Natural Heritage & Endangered Species Program MA Division of Fisheries & Wildlife ADDRESS - 1 Rabbit Hill Road, Westborough, MA 01581 tel: 508.389.6364 fax: 508.389.7890 www.mass.gov/nhesp

-----Original Message-----

From: Cappola, Valerie A NAE [mailto:Valerie.A.Cappola@usace.army.mil]

Sent: Thursday, September 25, 2014 4:38 PM

To: reiner.ed@epa.gov; alison.verkade@noaa.gov; Coman, Amy (FWE); Boeri, Robert (EEA); McKenna, Steve (EEA); Mahala, Jim (DEP); dweeden@mwtribe.com; Feeney, Eileen (FWE); mark.murraybrown@noaa.gov; Tom\_Chapman@fws.gov; vonOettingen, Susi; Maria\_Tur@fws.gov; Bettina@wampanoagtribe.net; Mostello, Carolyn (FWE); gdunham@townofsandwich.net Cc: Oliver, Lawrence R NAE Subject: Cape Cod Canal-Sandwich 204 Project (UNCLASSIFIED)

Classification: UNCLASSIFIED Caveats: NONE

During the coordinated site visit we agreed to send a plan of the proposed project. Attached is a generalized plan (projectfootprint\_limitedScope.pdf) that includes the footprint of the project taken from the larger project devised by the Town. Our project footprint will probably be slightly larger than shown since the figure is for 141,000 cubic yards and we expect to place approximately 150,000 cubic yards of material along 2,000 to 2,500 feet of beach. The file Town Neck Beach Characteristics.pdf shows a generalized cross section (figure was provided at the site visit).

Currently our survey crew is working at the site to collect updated beach profile data that will be used to develop our design.

Please don't forget to send your comments concerning the proposed project.

Thank you, Valerie \*\*\*\*

Valerie A Cappola, PhD Marine Ecologist

Environmental Resources Section US Army Corps of Engineers 696 Virginia Rd Concord, MA 01742

(Phone) 978-318-8067 (Fax) 978-318-8650 valerie.a.cappola@usace.army.mil

Classification: UNCLASSIFIED Caveats: NONE



September 3, 2014

Engineering/Planning Division Evaluation Branch

Mr. Thomas French Division of Fisheries and Wildlife 100 Hartwell Street, Suite 230 West Boylston, Massachusetts 01583

Dear Mr. French:

The U.S. Army Corps of Engineers (Corps), New England District (NAE) and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) from your agency within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (<u>Valerie.A.Cappola@usace.army.mil</u>) if you have any questions about this project.

Sincerely,

Ławrence R. Oliver Project Manager

Enclosure



September 3, 2014

Engineering/Planning Division Evaluation Branch

Ms. Ramona Peters Tribal Historic Preservation Officer Mashpee Wampanoag Tribe 766 Falmouth Rd- Madaket Pl. Unit A3 Mashpee, Massachusetts 02649

Dear Ms. Peters:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (Lawrence.R.Oliver@usace.army.mil), or Dr. Valerie Cappola, at (978) 318-8067 (Valerie.A.Cappola@usace.army.mil) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure


#### Mashpee Wampanoag Tribe Section 106 Review Consultation Response Form

Project Docket Number:	Sandwich Town Beaches (Nourishment)
Consultant/Environmental Firm:	U.S. A.C.O.E.
Address or Location Description:	Town Neck Beach
City, State:	Sandwich, MA
Point of Contact	Lawrence R. Oliver

Response:

- We have no concerns related to the proposed project. MWT anticipates no adverse affects to our sites of cultural significance, by you or your client.
  - The MWT considers this project in compliance with the MWT's section 106 review process with agreed upon mitigations.
- This site will require the on-site presence of a Tribal Cultural Resource Monitor during ground disturbing activities. Contact the Compliance Review Supervisor with construction schedule.
- This project has the potential to have "adverse effects" to historic or cultural resources important to our tribe. We recommend the following actions:

These consultations satisfy compliance to the National Historic Preservation Act of 1966 and all relevant amendments including but not limited to section 106 and 36 CFR 800.

**Exception:** In the case that archeological resources or human remains are found during construction, you must immediately stop construction and notify us.

Ramona Peters, Compliance Review Supervisor

Ramona Peters, Compliance Review Supervisor Tribal Historic Preservation Department

- 16, 2014 Date

Mashpee Wampanoag Indian Tribal Council 483 Great Neck Rd South Mashpee, MA 02649 Phone: 508-477-0208 or 855-668-7423 Email: 106review@mwtribe.com



September 3, 2014

Engineering/Planning Division Evaluation Branch

Ms. Bettina Washington Tribal Historic Preservation Officer Wampanoag Tribe of Gay Head (Aquinnah) 20 Black Brook Rd. Aquinnah, Massachusetts 02535

Dear Ms. Washington:

The U.S. Army Corps of Engineers (Corps), New England District and the town of Sandwich, would like to formally invite a member of your staff to a coordinated site visit in Sandwich, Massachusetts, on Tuesday, September 16, 2014 (details below). We will be meeting to discuss a study to consider the beneficial use of dredged material from the Cape Cod Canal in the town of Sandwich, Massachusetts, under our program for beneficial uses of dredged material (Section 204 of the Water Resources Development Act of 1992, as amended). The purpose of this letter and site visit is to obtain your comments on the proposed project. A location map is enclosed to aid you in your review.

The town of Sandwich is located on Cape Cod, on the southwestern shore of Cape Cod Bay, in Barnstable County. The beaches in the town of Sandwich, including Town Neck Beach and Spring Hill Beach have a history of erosion due to storm events and sea level rise. Since 1906 erosion has occurred at an approximate rate of 2-3 feet per year and this rate appears to have accelerated in recent years. These beaches are exposed to the full northern fetches of Cape Cod Bay. The beaches are currently comprised of a mix of sand, gravel, and cobble with dunes. The beaches are down drift of the Cape Cod Canal east entrance.

The Cape Cod Canal provides safe and efficient passage for commercial and recreational vessels wishing to transit between Cape Cod Bay and Buzzards Bay. There are eight areas within the canal that typically shoal and require dredging on a regular basis. The next dredging will produce approximately 150,000 cubic yards of clean sand. Due to the fast currents within the canal, a hopper dredge will be used to dredge the shoal areas and then the material will be pumped out of the hopper and placed on the Sandwich Beaches.

USACE will be preparing an Environmental Assessment (EA) and Clean Water Act, Section 404(b)(1) evaluation and obtaining a Water Quality Certificate to address impacts to the environment from the beneficial use of the canal dredged material.

The Corps is planning a coordinated site visit with interested state and federal agencies, town officials and non-governmental organizations. The purpose of the meeting will be to explain the proposed project and to elicit agency concerns and suggestions. Your agency's participation at this meeting would be appreciated. We will meet at the Town Neck Beach parking lot on Wood Ave, Sandwich, Massachusetts on Tuesday, September 16, 2014 at 10 am rain or shine.

We are requesting written preliminary comments on the proposed project (which will be described in more detail during the site visit) within 30 days of the meeting. Comments should include any concerns that need to be addressed during the planning of the proposed project.

We look forward to your contribution towards this project. Please feel free to contact me at (978) 318-8347 (<u>Lawrence.R.Oliver@usace.army.mil</u>), or Dr. Valerie Cappola, at (978) 318-8067 (<u>Valerie.A.Cappola@usace.army.mil</u>) if you have any questions about this project.

Sincerely,

Lawrence R. Oliver Project Manager

Enclosure



Sandwich Section 204 Study Area – Town Neck Beach and Spring Hill Beach



Meeting Site for Coordinated Site Visit

## **APPENDIX B - GRAIN SIZE CURVES**

# CANAL GRAIN SIZE 1996 AND 2001



<u>TEST</u>	А	В	С	D
DEPTH,FT.(REC.)	Surface	Surface	Surface	Surface
VISUAL CLASSIFICATION	Light Brown- Grey Sand(SP)	Light Brown- Grey Sand(SP)	Light Brown- Grey Sand(SP)	Light Brown- Grey Sand(SP)
GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)	0.3000 0.3800 0.2506	0.3200 0.3900 0.2570	0.3100 0.3900 0.2500	0.3100 0.3800 0.2509
SOIL CLASS/ DOMINANT	SP	SP	SP	SP
NORMAL/BIMODAL	N	N	N	N
<pre>% GRAVEL(RETAINED #4 US STD SEIVE)</pre>	<1	<1	<1	<1
<pre>% COARSE SAND(PASS #4 SEIVE,RETAINED #10 SEIVE)</pre>	<1	<1	<1	<1
<pre>% MEDIUM SAND(PASS #10 SEIVE RETAINED #40 SEIVE)</pre>	17	18	20	17
<pre>% FINE SAND(PASS #40 SEIVE RETAINED #200 SEIVE)</pre>	82	81	79	82
<pre>% FINES(SILT/CLAY) PASS #200 SEIVE)</pre>	<1	<1	<1	<1
· · · · · · · · · · · · · · · · · · ·				
	<u> </u>	1		<u> </u>

ł

TEST	Е	F	G	Н
DEPTH,FT.(REC.)	Surface	Surface	Surface	Surface
VISUAL CLASSIFICATION	Light Brown- Grey Sand(SP)	Light Brown- Grey Sand(SP)	Light Brown- Grey Sand(SP)	Light Brown- Grey Sand(SP)
GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)	0.3200 0.4000 0.2609	0.3300 0.4300 0.2655	0.3300 0.4300 0.2664	0.3100 0.3900 0.2497
SOIL CLASS/ DOMINANT	SP	SP	SP	SP
NORMAL/BIMODAL	N	N	N	N
<pre>% GRAVEL(RETAINED #4 US STD SEIVE)</pre>	<1	<1	<1	<1
<pre>% COARSE SAND(PASS #4 SEIVE,RETAINED #10 SEIVE)</pre>	<1	1	1	<1
<pre>% MEDIUM SAND(PASS #10 SEIVE RETAINED #40 SEIVE)</pre>	22	27	25	20
% FINE SAND(PASS #40 SEIVE RETAINED #200 SEIVE)	77	71	73	79
<pre>% FINES(SILT/CLAY) PASS #200 SEIVE)</pre>	<1	<1	<1	1
	ļ			

<u>TEST</u>	Í	M	N	R
DEPTH, FT. (REC.)	Surface	Surface	Surface	Surface
VISUAL CLASSIFICATION	Light Brown- Grey Sand (SP)	Light Brown-tan Sand(SP	Light Brown-Tan Sand(SP)	Light Brown- Grey Sand(SP)
GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)	0.2900 0.3700 0.2296	0.5400 0.6600 0.4300	0.6100 0.7600 0.4920	0.6200 0.8600 0.4688
SOIL CLASS/ DOMINANT	SP	SP	SP	SP
NORMAL/BIMODAL	N	N	N	N
<pre>% GRAVEL(RETAINED #4 US STD SEIVE)</pre>	<1	<1	<1	10
<pre>% COARSE SAND(PASS #4 SEIVE,RETAINED #10 SEIVE)</pre>	<1	<1	<1	8
<pre>% MEDIUM SAND(PASS #10 SEIVE RETAINED #40 SEIVE)</pre>	15	77	87	62
<pre>% FINE SAND(PASS #40 SEIVE RETAINED #200 SEIVE)</pre>	84	22	12	19
<pre>% FINES(SILT/CLAY) PASS #200 SEIVE)</pre>	<1	<1	<1	<1
·				

1.1

· \*

TEST	S	Т	U	V
DEPTH, FT. (REC.)	Surface	Surface	Surface	Surface
VISUAL CLASSIFICATION	Light Brown- Grey Sand (SP)	Light Brown- Grey Sand (SP)	Light Brown- Grey Sand (SP)	Light Brown- Grey Sand(SP)
GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)	0.2200 0.2900 0.1816	0.5800 0.7900 0.4281	0.2800 0.3500 0.2294	0.2800 0.3500 0.2270
SOIL CLASS/ DOMINANT	SP	SP	SP	SP
NORMAL/BIMODAL	N	N	N	N
<pre>% GRAVEL(RETAINED #4 US STD SEIVE)</pre>	<1	5	<1	<1
<pre>% COARSE SAND(PASS #4 SEIVE,RETAINED #10 SEIVE)</pre>	<1	7	<1	<1
<pre>% MEDIUM SAND(PASS #10 SEIVE RETAINED #40 SEIVE)</pre>	6	64	10	12
<pre>% FINE SAND(PASS #40 SEIVE RETAINED #200 SEIVE)</pre>	93	23	89	87
<pre>% FINES(SILT/CLAY) PASS #200 SEIVE)</pre>	1	1	<1	<1
			· _ · · · · · · · · · · · · · · · · · ·	

"

TEST	W	Х	Y	Z
DEPTH, FT. (REC.)	Surface	Surface	Surface	Surface
VISUAL CLASSIFICATION	Light Brown-Tan Sand(SP)	Light Brown-Tan Sand(SP)	Light Brown- Grey Sand(SP)	Light Brown- Grey Sand(SP)
GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)	0.5900 0.7700 0.4524	0.5900 0.7600 0.4640	0.4400 0.6100 0.2982	0.4500 0.6200 0.3037
SOIL CLASS/ DOMINANT	SP	SP	SP	SP
NORMAL/BIMODAL	N	N	N	N
% GRAVEL(RETAINED #4 US STD SEIVE)	4	4	<1	<1
<pre>% COARSE SAND(PASS #4 SEIVE,RETAINED #10 SEIVE)</pre>	1	2	3	3
<pre>% MEDIUM SAND(PASS #10 SEIVE RETAINED #40 SEIVE)</pre>	76	76 .	50	52
<pre>% FINE SAND(PASS #40 SEIVE RETAINED #200 SEIVE)</pre>	18	18	46	44
<pre>% FINES(SILT/CLAY) PASS #200 SEIVE)</pre>	<1	<1	<1	1

.

TEST	AA	BB	СС	DD
DEPTH, FT. (REC.)	Surface	Surface	Surface	0.0-0.6'
VISUAL CLASSIFICATION	Medium Brown- Grey Sand(SP)	Medium Brown- Grey Sand(SP)	Medium Brown- Grey Sand(SP)	Dark Brown- Grey Sand w/Silt (SP-SM)
GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)	0.3000 0.3900 0.2312	0.2900 0.3800 0.2236	0.2900 0.3800 0.2213	0.1700 0.2200 0.1354
SOIL CLASS/ DOMINANT	SP	SP	SP	SP-SM
NORMAL/BIMODAL	N	N	N	N
<pre>% GRAVEL(RETAINED #4 US STD SEIVE)</pre>	<1	<1	<1	<1
<pre>% COARSE SAND(PASS #4 SEIVE,RETAINED #10 SEIVE)</pre>	2	3	2	<1
<pre>% MEDIUM SAND(PASS #10 SEIVE RETAINED #40 SEIVE)</pre>	18	16	17	6
<pre>% FINE SAND(PASS #40 SEIVE RETAINED #200 SEIVE)</pre>	79	80	80 .	82
<pre>% FINES(SILT/CLAY) PASS #200 SEIVE)</pre>	1	1	1	12

DEPTH, FT. (REC.)Surface0.0-0.75'VISUAL CLASSIFICATIONDark Brown-Grey Silty Sand (SM)Light Brown-Tan Sand w/ Gravel (SP)GRAIN SIZE CURVE: Med (50% finer) Q1 (75% finer) Q3 (25% finer)0.1700 0.12431.160 0.5669SOIL CLASS/ DOMINANTSMSPNORMAL/BIMODALNN% GRAVEL (RETAINED #4 US STD SEIVE)<120% MEDIUM SAND (PASS #10 SEIVE)544% MEDIUM SAND (PASS #40 SEIVE)544	TEST	HH	II	
VISUAL CLASSIFICATIONDark Brown-Grey Silty Sand (SM)Light Brown-Tan Sand w/ Gravel(SP)GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)0.1700 0.12001.160 0.4.440 0.5669SOIL CLASS/ DOMINANTSMSPNORMAL/BIMODAL #4 US STD SEIVE)NN% COARSE SAND(PASS #10 SEIVE, RETAINED #10 SEIVE, RETAINED #40 SEIVE)544% MEDIUM SAND(PASS #40 SEIVE)544	DEPTH, FT. (REC.)	Surface	0.0-0.75′	
GRAIN SIZE CURVE: Med (50% finer) Q1 (75% finer) Q3 (25% finer)       0.1700       1.160         Q3 (25% finer)       0.1243       0.5669         SOIL CLASS/ DOMINANT       SM       SP         NORMAL/BIMODAL       N       N         % GRAVEL (RETAINED #4 US STD SEIVE)       <1	VISUAL CLASSIFICATION	Dark Brown-Grey Silty Sand (SM)	Light Brown-Tan Sand w/ Gravel(SP)	
SOIL CLASS/ DOMINANTSMSPNORMAL/BIMODALNN& GRAVEL(RETAINED #4 US STD SEIVE)<1	GRAIN SIZE CURVE: Med(50% finer) Q1(75% finer) Q3(25% finer)	0.1700 0.2200 0.1243	1.160 4.440 0.5669	
NORMAL/BIMODALNN% GRAVEL (RETAINED #4 US STD SEIVE)<1	SOIL CLASS/ DOMINANT	SM	SP	
% GRAVEL (RETAINED #4 US STD SEIVE)<1	NORMAL/BIMODAL	N	N	
% COARSE SAND(PASS #4 SEIVE, RETAINED #10 SEIVE)       <1	<pre>% GRAVEL(RETAINED #4 US STD SEIVE)</pre>	<1	21	
% MEDIUM SAND(PASS       5       44         #10 SEIVE RETAINED       44         #40 SEIVE)       44	<pre>% COARSE SAND(PASS #4 SEIVE,RETAINED #10 SEIVE)</pre>	<1	20	
2 FINE SAND (DASS 92 15	<pre>% MEDIUM SAND(PASS #10 SEIVE RETAINED #40 SEIVE)</pre>	5	44	
#40 SEIVE RETAINED     15       #200 SEIVE)     15	<pre>% FINE SAND(PASS #40 SEIVE RETAINED #200 SEIVE)</pre>	82	15	
<pre>% FINES(SILT/CLAY) 13 &lt;1 PASS #200 SEIVE)</pre>	<pre>% FINES(SILT/CLAY) PASS #200 SEIVE)</pre>	13	<1	

5



۳<u>\_</u>۱







.-.









. · · ·













....

:



6.4



- -



ê



a da





. 1

. A





 $\gamma_{i}$








GeoTesting Express, Inc. • Boxborough, MA • (978) 635-0424 • Fax (978) 635-0266

The construction of the second state of the se

Tue Jun 19 06:28:44 2001

٩ .

. .

----

11

2

Page : 1

GEOTECHNICAL LABORATORY TEST DATA

Project : No. 41095	. k	D/1
Project No. : GTX-3469	Depth :	Filename : Ti
Boring No. :	Test Date : 06/13/01	Tested by . MP
Sample No. : Tube 1	Test Method : ASTM D 422	Checked by : NE
Location :		Checked by ; bbi
And Annusianian Man Make	·	

Soil Description : Wet, light brown sand Remarks : ---

			FINE SIEVE SET		
Sieve	Sieve O	penings	Weight	Cumularive	Davagana
Mesh	Inches	Millimeters	Retained (gm)	Weight Retained (gm)	Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	0.65	0.65	200
#10	0.079	2.00	2.20	2 85	100
#20	0.033	0.84	105.27	108 13	98
#40	0.017	0.42	43.05	151 17	29
#60	0.010	0.25	0.06	151 22	0
#100	0.006	0.15	0.03	151 26	U
#200	0.003	0.07	0.01	151.20	0
Pan			0.28	151.27	0
Total Dr	y Weight o	f Sample = 161	.22		U

Pan Total Dry Weight of Sample = 161.22

D85 : 1.6981 mm D60 : 1.2433 mm D50 : 1.0975 mm D30 : 0.8552 mm D15 : 0.6023 mm D10 : 0.5330 mm

Soil Classification ASTM Group Symbol : SP ASTM Group Name : Poorly graded sand AASHTO Group Symbol : A-1-b(0) AASHTO Group Name : Stone Fragments, Gravel and Sand

GeoTesting Express, Inc. • Boxborough, MA • (978) 635-0424 • Fax (978) 635-0266



GeoTesting Express, Inc. • Boxborough. MA • (978) 635-0424 • Eav (978) 635-0266

and the second second

Tue Jun 19 06:28:44 2001

GEOTECHNICAL LABORATORY TEST DATA

Protect : No. 41095 Protect No. : GTX-3465 Boring No. : Sample No. : Tube 2 Location : Sill Description : Wet, light brown	Depth :* Test Date : 06/13/01 Test Method : ASTM D 422 sand	Filename : T2 Elevation : Tested by : NB Checked by : JDT
Remarks :	sand	

		1	INE SIEVE SET		
Sieve	Sieve O	penings	Weight	Cumularius	
Mesh	lnches	Millimeters	Retained (gm)	Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	
#10	0.079	2.00	0.42	0.00	100
#20	0.033	0.84	7 40	0.42	100
#40	0 017	0 4 7	2.00	3.10	98
#10	0.020	0.42	00.12	69.22	45
+00	0.010	0.25	55.87	125.09	1
#100	0.006	0.15	0.40	125 49	-
#20::	0.003	0.07	0 14	125.49	1
Pan			2.23	. 125.63	1
			1.33	176 96	

Total Dry Weight of Sample = 136.6

D85 : C.7113 mm D60 : 0.5097 mm 25/ : 0.4461 mm D30 : 0.3499 mm D15 : 0.2932 mm 01 : C.2764 mm

Soil Classification

ASTM Group Sympol	:	SP
ASTM Group Name	:	Poorly graded sand
AASHTO Group Symbol	:	h-1-b(0)
AASHTO Group Name	:	Scone Fragments, Gravel and Sand

GeoTesting Express, Inc. • Boxborough, MA • (978) 635-0424 • Fax (978) 635-0266



GeoTesting Express, Inc. · Boxborough. MA · (978) 635-0424 · Eav (978) 635-0266

Tue Jun 19 05:28:44 2001

• . ---

-

7

Page : 1

GEOTECHNICAL LABORATORY TEST DATA

Protect . No 41095	1.5	
Project No. : GTX-3465	Depth :	Filename : T3
Boring Nc. :	.Test Date : 05/13/01	Elevation :
Sample No. : Tube 3	Test Method : ASTM D 473	Tested by : NB
Location :	······································	Cnecked by : JDT
Soil Description . Wet light	brown and	

Soil Description : Wet, light brown sand Remarks : ---

Sieve	Sieve O	penings	Weight	Cumul at inc	
Mesh	Inches	Millimeters	Recained (gm)	Weight Retained	Finer
					(3)
5.5"	0.500	12.70	0.00		
6.375"	0.374	9.51	5.80	0.00	100
#-1	0.187	4.75	7.10	5.80	97
#10	0.075	2.00	7.10	12.90	93
#20	0.033	0.84	10.45	23.35	87
#40	0 017	0.42	143.55	166.93	9
#60	0.010	0.42	16.83	183.81	0
#100	0.010	0.25	0.09	183.90	0
#200	0.006	0.15	0.00	183.90	0
#200	0.003	0.07	0.04	183 84	0
Pan			0.29	194 22	U

Total Dry Weight of Sample = 193.9

D85 : 1.9490 mm D60 : 1.4761 mm D50 : 1.3208 mm D30 : 1.0575 mm D15 : 0.8951 mm

D10 : 0.8467 mm

#### Soil Classification

ASTM Group Symbol	:	SP
ASTM Group Name	:	Poorly graded sand
AASHTO Group Symbol	:	A-1-b(0)
AASHTO Group Name	:	Stone Fragments, Gravel and Sand

GeoTesting Express, Inc. • Boxborough, MA • (978) 635-0424 • Fax (978) 635-0266



.

# CAPE COD CANAL DISPOSAL SITE GRAIN SIZE 2006



Figure B-1. Map of grab samples taken at the Cape Cod Canal Disposal Site and 3 reference samples.

## GeoTesting

express a subsidiary of Geocomp Corporation 1145 Massachusetts Avenue Boxborough, MA 01719 9786350424 Tel 978 635 0266 Fax

Geotechnical Test Report October 14, 2006

## GTX-6995 Cape Cod Canal Disposal Project

Cape Cod Bay, MA

Prepared for: US Army Corp of Engineers





Sieve Name	Sieve Size,	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 Inch	12.70	85		
3/8 inch	9.51	77		
#4	4.75	69		
#10	2.00	58		
#20	0.84	46		
#40	0.42	36		
#60	0.25	24		
#100	0.15	13		
#200	0.074	8		
	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0378	7	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	0.0238	5		
	0.0137	5		
	0.0095	3		
	0.0068	3	+	
	0.0048	3	1	
	0.0034	2	1	
	0.0016	1		1

Coef	ficients
D <sub>85</sub> =12.6662 mm	D <sub>30</sub> =0.3228 mm
D <sub>60</sub> =2.2646 mm	D <sub>15</sub> =0.1621 mm
D <sub>50</sub> =1.0935 mm	D <sub>10</sub> =0.0985 mm
Cu =22.991	C <sub>c</sub> =0.467
Class	ification
ASTM N/A	
AASHTO Stone Fragm	nents, Gravel and Sand
(A-1-b (0))	
Sand/Gravel Particle S	est Description hape : ANGULAR
Sand/Gravel Hardness	: HARD









ConTrating	Client: Project:	US Army C	Corp of Engineer	rs S			
Geolesting	Location:	Cape Cod I	Bay, Ma	5501		Project No:	GTX-6995
evhies2	Boring ID:			Sample Type:	bag	Tested By:	sam
a subsidiary of Geocomp Corporation	Sample ID:	CCB SITE	4	Test Date:	10/03/06	Checked By:	mcm
	Depth :			Test Id:	98463		
	Test Comm	ent:					
	Sample Des Sample Cor	scription: mment:	Wet, very dark	gray silty san	d		



















Georestina			CH	AIN OF CUSTODY
express		1145 Massachusetts Avenue	2662 Holcor	mb Bridge Road Suite 310
a subsidiary of Geocomp Corporation		Boxborough, MA 01/19 978-635-0424 Phone	770-645-65	75 Phone
Sales Order No.: GTX No.:		978-635-0266 Fax	770-645-65	70 Fax
Commany Name: US Army Corps	of Enginee	. P.	Analysis	
Address: 696 Vivginia Rol	Sample Type	Container Type		
Concerce I my alty C	2. Geosvnthetic	2. Bag		
Contact: Varevie cappala e ward. arm	4.m.) 3. Rock	3. Jar		
Phone Number: 978-318- 8-06 7	4. Concrete 5. Other	4. Tube 5. Roll		
Project Name: Cape Cod Bay Conad Disp	posed sudiment	22.2		
Project Number:				
Project Location: Cape Cod Bay MB	olina Sample	20 20		
Identification Size Type Date	Time Type			Comments
Kr & CIL   level - 1 aug	Grab	2		
	( rat	5		
110 SIL 2 100 100 100	(orn b)			
HID CASE TO CASE AND CASE	(crat)	>		
114 Site S 1.0 - 9/4	yon			
The second secon	Krah	>		
	Cover 1			
CDFF SILE 3 load hac 9/4	(grab)	>		
Relinquished By:	Date:	Received By:	Date: Time	Turn-Around Time Requested:
, incurished Rv:	Time: Date:	Received By:	Date:	No. of Business Days:
· fa policiphilli	Time:		Time:	Special Instructions:
vished By:	Date: Time:	Received By:	Time:	
<u>`</u> A:		www.geotesting.com		

`

## TOWN NECK BEACH SANDWICH, MA GRAIN SIZE 2001 AND 2014

Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

### Sample: 1

				1	Sand Only	
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	0.75	0.75	1.19	1.19	1.19	1.19
-1	2.17	1.42	2.25	3.44	2.25	3.44
0	18.73	16.56	26.23	29.66	26.23	29.66
1	54.18	35.45	56.15	85.81	56.15	85.81
2	63.12	8.94	14.16	99.97	14.16	99.97
3	63.14	0.02	0.03	100.00	0.03	100.00
4	63.14	0.00	0.00	100.00	0.00	100.00

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000			

Wt Coarse	63.1400
Wt Fine	0.0000
Total Wt	63.1400

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	0.00	-3.50	0.00	-3.80	14.43	0.00
-2	1.19	-2.50	-2.97	-2.80	7.84	9.31
-1	2.25	-1.50	-3.37	-1.80	3.24	7.28
0	26.23	-0.50	-13.11	-0.80	0.64	16.76
1	56.15	0.50	28.07	0.20	0.04	2.26
2	14.16	1.50	21.24	1.20	1.44	20.41
3	0.03	2.50	0.08	2.20	4.84	0.15
4	0.00	3.50	0.00	3.20	10.24	0.00
Silt	0.00	6.00	0.00	5.70	32.50	0.00
Clay	0.00	9.00	0.00	8.70	75.70	0.00
TOTAL	100.00		29.93			56.17

Total Sample	[	Mean =	0.30		Variance =	0.56
				E	Sample SD =	0.75
Coarse Only	100.0000		29.9335			56.1729
		Mean =	0.30		Variance =	0.56
		and the appropriate of the second		E	Sand SD =	0.75
Gravel	Sand	Silt	Clay	Total		
3.4	96.6	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
T	100.0	0.0	0.0	100.0		

Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

## Sample: 2

Phi					Sand Only	
	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	2.19	2.19	4.57	4.57	4.57	4.57
-1	4.00	1.81	3.78	8.36	3.78	8.36
0	32.31	28.31	59.14	67.50	59.14	67.50
1	46.81	14.50	30.29	97.79	30.29	97.79
2	47.87	1.06	2.21	100.00	2.21	100.00
3	47.87	0.00	0.00	100.00	0.00	100.00
4	47.87	0.00	0.00	100.00	0.00	100.00

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000		and the second	

Wt Coarse	47.8700
Wt Fine	0.0000
Total Wt	47.8700

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	0.00	-3.50	0.00	-3.22	10.35	0.00
-2	4.57	-2.50	-11.44	-2.22	4.92	22.50
-1	3.78	-1.50	-5.67	-1.22	1.48	5.61
0	59.14	-0.50	-29.57	-0.22	0.05	2.81
1	30.29	0.50	15.15	0.78	0.61	18.53
2	2.21	1.50	3.32	1.78	3.18	7.03
3	0.00	2.50	0.00	2.78	7.74	0.00
4	0.00	3.50	0.00	3.78	14.30	0.00
Silt	0.00	6.00	0.00	6.28	39.47	0.00
Clay	0.00	9.00	0.00	9.28	86.16	0.00
TOTAL	100.00		-28.21			56.48

Total Sample		Mean =	-0.28	-	Variance =	0.56
				Ŀ	Sample SD =	0.75
Coarse Only	100.0000		-28.2118			56.4811
		Mean =	-0.28		Variance =	0.56
		anan alamat daram kagan.		C	Sand SD =	0.75
Gravel	Sand	Silt	Clay	Total		
8.4	91.6	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
[	100.0	0.0	0.0	100.0		

#### GEO/PLAN Associates Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

### Sample: 3

Phi					Sand Only	
	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	1.41	1.41	2.61	2.61	2.61	2.61
-1	7.55	6.14	11.36	13.97	11.36	13.97
0	40.65	33.10	61.23	75.19	61.23	75.19
1	53.25	12.60	23.31	98.50	23.31	98.50
2	54.04	0.79	1.46	99.96	1.46	99.96
3	54.06	0.02	0.04	100.00	0.04	100.00
4	54.06	0.00	0.00	100.00	0.00	100.00

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000	a construction of the second second second	determine the second	

Wt Coarse	54.0600
Wt Fine	0.0000
Total Wt	54.0600

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	0.00	-3.50	0.00	-3.10	9.60	0.00
-2	2.61	-2.50	-6.52	-2.10	4.40	11.48
-1	11.36	-1.50	-17.04	-1.10	1.20	13.68
0	61.23	-0.50	-30.61	-0.10	0.01	0.58
1	23.31	0.50	11.65	0.90	0.81	18.98
2	1.46	1.50	2.19	1.90	3.62	5.29
3	0.04	2.50	0.09	2.90	8.42	0.31
4	0.00	3.50	0.00	3.90	15.23	0.00
Silt	0.00	6.00	0.00	6.40	40.99	0.00
Clay	0.00	9.00	0.00	9.40	88.40	0.00
TOTAL	100.00		-40.23			50.32

Total Sample	[	Mean =	-0.40		Variance =	0.50
				L	Sample SD =	0.71
Coarse Only	100.0000		-40.2331			50.3224
	Г	Mean =	-0.40		Variance =	0.50
				Ľ	Sand SD =	0.71
Gravel	Sand	Silt	Clay	Total		
14.0	86.0	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
	100.0	0.0	0.0	100.0		

GEO/PLAN Associates Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

#### Sample: 4

					Sand Only	
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	7.10	7.10	12.21	12.21	12.21	12.21
-1	15.48	8.38	14.41	26.61	14.41	26.61
0	51.92	36.44	62.64	89.26	62.64	89.26
1	57.84	5.92	10.18	99.43	10.18	99.43
2	58.17	0.33	0.57	100.00	0.57	100.00
3	58.17	0.00	0.00	100.00	0.00	100.00
4	58.17	0.00	0.00	100.00	0.00	100.00

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000		and the second se	

Wt Coarse	58.1700
Wt Fine	0.0000
Total Wt	58.1700

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	0.00	-3.50	0.00	-2.72	7.43	0.00
-2	12.21	-2.50	-30.51	-1.72	2.98	36.32
-1	14.41	-1.50	-21.61	-0.72	0.53	7.57
0	62.64	-0.50	-31.32	0.28	0.08	4.74
1	10.18	0.50	5.09	1.28	1.63	16.55
2	0.57	1.50	0.85	2.28	5.18	2.94
3	0.00	2.50	0.00	3.28	10.73	0.00
4	0.00	3.50	0.00	4.28	18.28	0.00
Silt	0.00	6.00	0.00	6.78	45.90	0.00
Clay	0.00	9.00	0.00	9.78	95.55	0.00
TOTAL	100.00		-77.51			68.11

Total Sample	[	Mean =	-0.78	G	Variance = Sample SD =	0.68 0.83
Coarse Only	100.0000		-77.5056			68.1092
	L	Mean =	-0.78]	C	Sand SD =	0.68
Gravel	Sand	Silt	Clay	Total		
26.6	73.4	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
	100.0	0.0	0.0	100.0		

Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

## Sample: 5

					Sand Only	
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	0.00	0.00	0.00	0.00	0.00	0.00
-1	0.01	0.01	0.02	0.02	0.02	0.02
0	2.72	2.71	6.26	6.28	6.26	6.28
1	34.01	31.29	72.26	78.55	72.26	78.55
2	43.23	9.22	21.29	99.84	21.29	99.84
3	43.30	0.07	0.16	100.00	0.16	100.00
4	43.30	0.00	0.00	100.00	0.00	100.00

#### ----All weights in grams----

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
and the subscription of the second		Disp. Wt	0.0000			

Wt Coarse	43.3000
Wt Fine	0.0000
Total Wt	43.3000

Phi	VA/# %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	Xeo	X sq
-3	0.00	-3 50	0.00	-4 15	17 25	0.00
-2	0.00	-2.50	0.00	-3.15	9.94	0.00
-1	0.02	-1.50	-0.03	-2.15	4.64	0.11
0	6.26	-0.50	-3.13	-1.15	1.33	8.32
1	72.26	0.50	36.13	-0.15	0.02	1.69
2	21.29	1.50	31.94	0.85	0.72	15.27
3	0.16	2.50	0.40	1.85	3.41	0.55
4	0.00	3.50	0.00	2.85	8.10	0.00
Silt	0.00	6.00	0.00	5.35	28.59	0.00
Clay	0.00	9.00	0.00	8.35	69.67	0.00
TOTAL	100.00		65.31			25.95
Total Sample		Mean =	0.65		Variance =	0.26
			an a	· [	Sample SD =	0.51
Coarse Only	100.0000		65.3118			25.9465
and the second se		Mean =	0.65		Variance =	0.26
				ſ	Sand SD =	0.51

Gravel	Sand	Silt	Clay	Total
0.0	100.0	0.0	0.0	100.0
· · · · ·	Condl	Citt	Claul	Tatal
F	Sand	Silt	Clay	Total

Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

## Sample: 6

					Sand Only	
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	4.91	4.91	9.42	9.42	9.42	9.42
-1	14.85	9.94	19.08	28.50	19.08	28.50
0	43.05	28.20	54.12	82.61	54.12	82.61
1	51.87	8.82	16.93	99.54	16.93	99.54
2	52.11	0.24	0.46	100.00	0.46	100.00
3	52.11	0.00	0.00	100.00	0.00	100.00
4	52.11	0.00	0.00	100.00	0.00	100.00

20

#### ----All weights in grams----

Sand

100.0

Silt 0.0

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000	and the second date of the participation of the second date of the sec		

Wt Coarse	52.1100
Wt Fine	0.0000
Total Wt	52.1100

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	0.00	-3.50	0.00	-2.80	7.84	0.00
-2	9.42	-2.50	-23.56	-1.80	3.24	30.50
-1	19.08	-1.50	-28.61	-0.80	0.64	12.19
0	54.12	-0.50	-27.06	0.20	0.04	2.18
1	16.93	0.50	8.46	1.20	1.44	24.40
2	0.46	1.50	0.69	2.20	4.84	2.23
3	0.00	2.50	0.00	3.20	10.24	0.00
4	0.00	3.50	0.00	4.20	17.65	0.00
Silt	0.00	6.00	0.00	6.70	44.90	0.00
Clay	0.00	9.00	0.00	9.70	94.10	0.00
TOTAL	100.00		-70.07			71.50
Total Sample	1	Mean =	-0.70		Variance =	0.72
		****			Sample SD =	0.85
Coarse Only	100.0000		-70.0729			71.5033
		Mean =	-0.70		Variance =	0.72
				' E	Sand SD =	0.85
Gravel	Sand	Silt	Clav	Total		
28.5	71.5	0.0	0.0	100.0		

Clay 0.0 Total 100.0

Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

## Sample: 7

					Sand Only	
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	0.00	0.00	0.00	0.00	0.00	0.00
-1	0.14	0.14	0.28	0.28	0.28	0,28
0	4.63	4.49	9.11	9.39	9.11	9.39
1	39.72	35.09	71.18	80.57	71.18	80.57
2	49.10	9.38	19.03	99.59	19.03	99.59
3	49.30	0.20	0.41	100.00	0.41	100.00
4	49.30	0.00	0.00	100.00	0.00	100.00

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000			

Wt Coarse	49.3000
Wt Fine	0.0000
Total Wt	49.3000

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	0.00	-3.50	0.00	-4.10	16.82	0.00
-2	0.00	-2.50	0.00	-3.10	9.62	0.00
-1	0.28	-1.50	-0.43	-2.10	4.42	1.25
0	9.11	-0.50	-4.55	-1.10	1.21	11.05
1	71.18	0.50	35.59	-0.10	0.01	0.74
2	19.03	1.50	28.54	0.90	0.81	15.36
3	0.41	2.50	1.01	1.90	3.60	1.46
4	0.00	3.50	0.00	2.90	8.40	0.00
Silt	0.00	6.00	0.00	5.40	29.14	0.00
Clay	0.00	9.00	0.00	8.40	70.53	0.00
TOTAL	100.00		60.16			29.86

Total Sample	[	Mean =	0.60		Variance =	0.30
				L	Sample SD =	0.55
Coarse Only	100.0000		60.1623			29.8598
11000000	[	Mean =	0.60		Variance =	0.30
				C	Sand SD =	0.55
Gravel	Sand	Silt	Clay	Total		
0.3	99.7	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
	100.0	0.0	0.0	100.0		

Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

## Sample: 8

-						y
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	7.73	7.73	9.79	9.79	9.79	9.79
-2	12.54	4.81	6.09	15.88	6.09	15.88
-1	20.96	8.42	10.66	26.55	10.66	26.55
0	22.81	1.85	2.34	28.89	2.34	28.89
1	61.96	39.15	49.58	78.47	49.58	78.47
2	77.84	15.88	20.11	98.58	20.11	98.58
3	78.96	1.12	1.42	100.00	1.42	100.00
4	78.96	0.00	0.00	100.00	0.00	100.00

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000			

Wt Coarse	78.9600
Wt Fine	0.0000
Total Wt	78,9600

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	9.79	-3.50	-34.26	-3.42	11.69	114.40
-2	6.09	-2.50	-15.23	-2.42	5.85	35.63
-1	10.66	-1.50	-16.00	-1.42	2.01	21.45
0	2.34	-0.50	-1.17	-0.42	0.18	0.41
1	49.58	0.50	24.79	0.58	0.34	16.77
2	20.11	1.50	30.17	1.58	2.50	50.31
3	1.42	2.50	3.55	2.58	6.66	9.45
4	0.00	3.50	0.00	3.58	12.83	0.00
Silt	0.00	6.00	0.00	6.08	36.99	0.00
Clay	0.00	9.00	0.00	9.08	82.47	0.00
TOTAL	100.00		-8.16			248.42

Total Sample	N	lean =	-0.08		Variance =	2.48
				E	Sample SD =	1.58
Coarse Only	100.0000		-8.1560			248.4229
	IN	lean =	-0.08		Variance =	2.48
				Ľ	Sand SD =	1.58
Gravel	Sand	Silt	Clay	Total		
26.5	73.5	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
Γ	100.0	0.0	0.0	100.0		

GEO/PLAN Associates Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

### Sample: 9

					Sand Only	
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	0.00	0.00	0.00	0.00	0.00	0.00
-2	0.00	0.00	0.00	0.00	0.00	0.00
-1	0.00	0.00	0.00	0.00	0.00	0.00
0	4.12	4.12	7.97	7.97	7.97	7.97
1	40.20	36.08	69.83	77.80	69.83	77.80
2	51.49	11.29	21.85	99.65	21.85	99.65
3	51.66	0.17	0.33	99.98	0.33	99.98
4	51.67	0.01	0.02	100.00	0.02	100.00

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000		and the second second second second	and the second se

Wt Coarse	51.6700
Wt Fine	0.0000
Total Wt	51.6700

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	0.00	-3.50	0.00	-4.15	17.19	0.00
-2	0.00	-2.50	0.00	-3.15	9.90	0.00
-1	0.00	-1.50	0.00	-2.15	4.60	0.00
0	7.97	-0.50	-3.99	-1.15	1.31	10.47
1	69.83	0.50	34.91	-0.15	0.02	1.49
2	21.85	1.50	32.78	0.85	0.73	15.94
3	0.33	2.50	0.82	1.85	3.44	1.13
4	0.02	3.50	0.07	2.85	8.15	0.16
Silt	0.00	6.00	0.00	5.35	28.67	0.00
Clay	0.00	9.00	0.00	8.35	69.79	0.00
TOTAL	100.00		64.59			29.18

Total Sample	[	Mean =	0.65		Variance =	0.29
				L	Sample SD =	0.54
Coarse Only	100.0000		64.5926			29.1847
		Mean =	0.65		Variance =	0.29
				C	Sand SD =	0.54
Gravel	Sand	Silt	Clay	Total		
0.0	100.0	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
	100.0	0.0	0.0	100.0		

Sediment Grain Size Analysis Client: Woods Hole Group Project: Sandwich Town Beach Batch No. 1 Date: August 2001

## Sample: 10

					Sand Only	
Phi	Cum Wt	Total Wt	% Wt	Cum %	% Wt	Cum %
-3	6.70	6.70	8.67	8.67	8.67	8.67
-2	11.08	4.38	5.66	14.33	5.66	14.33
-1	11.26	0.18	0.23	14.56	0.23	14.56
0	20.15	8.89	11.50	26.06	11.50	26.06
1	66.45	46.30	59.88	85.94	59.88	85.94
2	77.18	10.73	13.88	99.82	13.88	99.82
3	77.32	0.14	0.18	100.00	0.18	100.00
4	77.32	0.00	0.00	100.00	0.00	100.00

è

Phi	Total Wt	Bkr Wt	Corr. Wt	Wt Fract	% Wt	Bk No.
Silt	0.0000	0.0000	0.0000	0.0000	0.0000	
Clay	0.0000	0.0000	0.0000	0.0000	0.0000	
		Disp. Wt	0.0000			

Wt Coarse	77.3200
Wt Fine	0.0000
Total Wt	77.3200

Phi	Wt %	Phi Mid Pt	Wt % Mid Pt	Mid Pt - Mean (=X)	X sq	X sq Wt %
-3	8.67	-3.50	-30.33	-3.51	12.29	106.53
-2	5.66	-2.50	-14.16	-2.51	6.28	35.58
-1	0.23	-1.50	-0.35	-1.51	2.27	0.53
0	11.50	-0.50	-5.75	-0.51	0.26	2.95
1	59.88	0.50	29.94	0.49	0.24	14.60
2	13.88	1.50	20.82	1.49	2.23	30.97
3	0.18	2.50	0.45	2.49	6.22	1.13
4	0.00	3.50	0.00	3.49	12.21	0.00
Silt	0.00	6.00	0.00	5.99	35.93	0.00
Clay	0.00	9.00	0.00	8.99	80.89	0.00
TOTAL	100.00		0.62			192.27
Total Sample	1	Mean =	0.01		Variance =	1.92
				ſ	Sample SD =	1.39

Coarse Only	100.0000		0.6208			192.2750
	[	Mean =	0.01		Variance =	1.92
				C	Sand SD =	1.39
Gravel	Sand	Silt	Clay	Total		
14.6	85.4	0.0	0.0	100.0		
Г	Sand	Silt	Clay	Total		
	100.0	0.0	0.0	100.0		

0.001 ~ Sample 1 Silt or Clay 0.01 -Sandwich Town Beach 200 0.1 100 Sample 1 Fine 60 40 Sand Medium 20 10 Coarse 4 **GEO/PLAN Associates** 101 Fine Gravel Coarse 100 Cobb -0 100--06 10-80--02 -09 50-40-20-30 Percent passing by weight (or mass)

Sandwich Town Beach

Page 1

0.001 \* Sample 2 • Silt or Clay 0.01 -Sandwich Town Beach 200 0.1 100 Sample 2 Fine 60 40 Sand Medium 2 10 Coarse 4 **GEO/PLAN Associates** 10 Fine Gravel Coarse 100 Cobb -06 0 50-20-100-80--02 -09 40-30-10-Percent passing by weight (or mass)

Sandwich Town Beach

Page 1

0.001 \* Sample 4 Silt or Clay 0.01 Sandwich Town Beach 200 0.1 100 Sample 4 Fine 60 40 Sand Medium 20 10 Coarse 4 **GEO/PLAN Associates** 10 Fine Gravel Coarse 100 Cobbl -0 10-100-20-- 06 40-80 20 60 50 30-Percent passing by weight (or mass)

Sandwich Town Beach

Page 1
0.001 Sample 5 Silt or Clay 0.01 -Sandwich Town Beach 200 0.1 100 Sample 5 Fine 60 40 Sand Medium 20 9 Coarse **GEO/PLAN Associates** 20 Fine Gravel Coarse 100 Cobb 0 100--06 80--02 -09 50-40-20-10-30-Percent passing by weight (or mass)

Sandwich Town Beach

0.001 \*\* Sample 6 Silt or Clay 0.01 Sandwich Town Beach 200 0.1 -100 Sample 6 Fine 09 40 Sand Medium 50 10 Coarse **GEO/PLAN Associates** E Q Fine Gravel Coarse 100 Cobb -06 100-10-0 80--01 50-20-60-30-40 Percent passing by weight (or mass)

Sandwich Town Beach

0.001 \*\* Sample 7 . Silt or Clay 0.01 Sandwich Town Beach 200 0.1 -100 Sample 7 Fine 09 40 Sand Medium 20 9 Coarse 4 **GEO/PLAN Associates** EEE 10 Fine Gravel Coarse ----100 Cobbl 100--06 10 -02 10-80-20--09 50-40-30-Percent passing by weight (or mass)

Sandwich Town Beach

Sandwich Town Beach



0.001 \*\* Sample 9 Silt or Clay 0.01 -Sandwich Town Beach 200 0.1 100 Sample 9 Fine 60 40 Sand Medium 20 9 Coarse **GEO/PLAN Associates** E 9 Fine Gravel Coarse E 100 Cobb 100--06 80--01 -09 50-40-0 30-20-10-Percent passing by weight (or mass)

Sandwich Town Beach

Sandwich Town Beach



## APPENDIX C- SUITABILITY DETERMINATION

#### CENAE-R-PT-MAS

#### 23 October 2014

#### Memorandum Thru:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch Red M Lad

Digitally signed by LADD.RUTH.M.1228556242 DN: c=US, o=U.S. Government, ou=DoD, ou=PK, ou=USA, cn=LADD.RUTH.M.1228556242 Date: 2014.10.23 12:04:43 -04:00

**For:** William M. Kavanaugh, Project Manager, CENAE-PP-P-N Valerie S. Cappola, Project Manager, CENAE-EP-VE

**Subject:** Suitability Determination for Cape Cod Canal FNP, Sandwich and Bourne, Massachusetts.

#### 1. Summary:

Based on an evaluation of the data that characterize the material proposed to be dredged, this memorandum addresses the suitability of that material for disposal as proposed in accordance with applicable regulations. The Marine Analysis Section (MAS) finds that the data provide sufficient information to satisfy the evaluation and testing requirements of the appropriate regulations. These sediments are suitable for unconfined open water disposal on Town Point Beach, Sandwich and at the Cape Cod Canal Disposal Site (CCCDS), as proposed.

#### 2. **Project Description:**

The CENAE is proposing to dredge a total area of approximately 54.4 acres in Sandwich and Bourne, Massachusetts to depths ranging from -32' to -38' MLLW, plus 2' overdredge. These depths are greater than the project depths and will provide advance maintenance dredging. A total of approximately 169,000 cu. yds. of material will be removed. This project has the following discrete sections:

South Breakwater Shoal,	6.67 acres,	-38' plus 2',	9,315 cy;
East Mooring Basin, Channel Shoal,	2.56 acres,	-38' plus 2',	7,880 cy;
East Mooring Basin, Basin Shoal,	22.3 acres,	-32' plus 2',	110,295 cy;
East Sagamore Shoal, East of the Bridge,	6.64 acres,	-34' plus 2',	6,429 cy;
West Sagamore Shoal, West of the Bridge,	8.21 acres,	-37' plus 2',	24,172 cy; and
Onset Shoal,	7.98 acres,	-37' plus 2',	11,117 cy.

The CENAE proposes to mechanically dredge and dispose of this material at the Cape Cod Canal Disposal Site or on Town Point Beach, Sandwich, between the HTL and MLLW. These areas were not all dredged at the same time in the past; the most recent one was dredged in 2010.

The Cape Cod Canal Disposal Site is a 1 nautical mile diameter circle with its center at 41° 49' N, 70° 25' W. CCCDS has been used periodically for disposal of material dredged from the Canal and other projects. The depths at CCCDS range from -72' to -79' MLW. The Town Point Beach is located on Cape Cod Bay, south of the eastern mouth of the Cape Cod Canal.

SUBJECT: Suitability Determination for Cape Cod Canal FNP, Sandwich and Bourne, Massachusetts.

## 3. Sampling and Testing:

The various shoals and sections of the Canal have been sampled and their sediments analyzed for grain size many times in recent years. Specifically, in 1972, 1977, 1988, 1989, 1996, 1999 and 2001. Although each section wasn't sampled in every year, all have several samples from several years. The samples range from <1% fines to 5% fines. One sample in the East Mooring Basin Channel Shoal was identified as "gray, gravelly fine sandy clay" and one sample site in the West Sagamore Shoal was identified as "HARD BOTTOM" and gave no sediment sample. See the attached tables for details.

The Town Point Beach was sampled in 2001 by the Woods Hole Group. All samples were sand and gravel with 0.0% fines.

# 4. Regulations governing the determination of the suitability of dredged material for open-water disposal:

The disposal of dredged material seaward of the high tide line in **Cape Cod Bay** is regulated under Section 404 of the Clean Water Act (CWA). Subpart G of the Section 404(b)(1) guidelines (40 CFR Section 230.60 and 230.61) describes the procedures for determining the suitability of this material for open-water disposal, including any relevant testing that may be required.

40 CFR 230.60 General Evaluation of Dredged or Fill Material

(a) This subsection states that further testing may not be necessary if it could be determined with the evaluation under paragraph (b) that the sediment is not a carrier of contaminants. Dredged or fill material is most likely to be free from pollutants when it is composed primarily of sand, gravel or other naturally occurring inert material.

The project sediments have been sampled many times in the past 32 years. Each time, the sediments were found to be predominantly sands and gravels. This is explicable, as the only sources of fill are sand and gravel brought into the Canal from either end by the currents. The tidal current in the Canal can reach 5.2 mph. This current works to keep fine materials from settling out and accumulating.

Based upon our Tier 1 review, the proposed dredge sediment is primarily sand and gravel in an area of high current and evaluation under paragraph (b) below indicates the material is not a carrier of contaminants. Therefore, this subsection does apply.

(b) This subsection states that the site should be evaluated to determine whether it is sufficiently removed from sources of pollution. These factors

SUBJECT: Suitability Determination for Cape Cod Canal FNP, Sandwich and Bourne, Massachusetts.

include records of spills or potential routes of contamination, like outfall pipes. Larry Davis, the Canal manager, reports that there have been no recent spills in or around the Canal. There are storm water outlets all along the canal. As the Canal is a man-made, excavated waterbody, any material excavated from below the project depth is parent material laid down by the last glaciations and is sufficiently removed from sources of contamination. We have no reason to believe that these sediments are carriers of contaminants.

(c) This subsection states that further testing may not be necessary if certain conditions and circumstances make it unlikely that the dredged material would degrade the disposal site. For the project to meet this exclusion, the material to be dredged and the material at the disposal site must be adjacent to each other and composed of the same materials and subject to the same sources of contaminants. The South Jetty Shoal is adjacent to the Town Point Beach and my review of topographic maps and aerial photographs suggests that the shoal and beach consists of sands from the same source. Therefore, this exclusion applies to this project.

(d) This subsection states that further testing may not be necessary if the material to be dredged is constrained, both to reduce contamination within the disposal site and to prevent transport of contaminants beyond the boundaries of the disposal site. As such constraints in handling are not proposed, this subsection does not apply.

40 CFR 230.61 Chemical, Biological and Physical Evaluation and Testing

(a) This subsection describes the purpose of Part 230.61 and does not give any criteria for the evaluation of sediments.

(b) This subsection states that dredged material may be excluded from testing for water column effects and benthic bioassays if it is determined, by evaluation under 40 CFR Part 230.60, that the likelihood of contamination is acceptably low. Such testing is not needed, as it was determined, based on evaluation under Part 230.60(b), that the likelihood of contamination is low.

(c) This subsection states that an inventory of the concentrations of the contaminants of concern would aid in an environmental assessment of the impact of their disposal on the designated disposal site. Such testing is not needed, as it was determined, based on evaluation under Part 230.60(b), that the likelihood of contamination is low.

CENAE and the federal agencies did not think an analysis of biological community structure was needed for this project.

(d) This subsection states the importance of the disposal of dredged materials on the characteristics of the physical substrate. MAS determined that the likelihood of physical effects from the disposal of the dredged material at the disposal site should be minimal. Although some benthic marine organisms will be buried by the disposal of the project materials, the disposal site should be rapidly re-colonized.

5. Copies of the above mentioned data and of the draft suitability determination were sent to the State DEP, US EPA, and US F&WS for their review. The EPA responded to say that they concur with the determination and recommended that the disposal be at the Town Beach. No response was received from the F&WS within the 10-day response period so their concurrence may be assumed.

6. If you have any questions, please contact me at (978) 318-8660 or phillip.w.nimeskern@usace.army.mil.

PHILLIP W. NIMESKERN Project Manager, Marine Analysis Section

## South Breakwater Shoal

Date	Sample	% Fines	
1988	1	1	CENAE
1999	1		Woods Hole Group
1999	2		Woods Hole Group
2001	1	0	BSC Group
2001	2	1	BSC Group
2001	3	0	BSC Group

## East Mooring Basin, Channel Shoal

Date	Sample	% Fines	
1972	GE-10	<1	CENAE
1972	GE-11	<1	CENAE
1977	GE-6	Gray, gravelly fine	CENAE
		sandy clay	
1988	5	<1	CENAE

East Mooring Basin, Basin Shoal

Date	Sample	% Fines	
1972	GE-12	<1	CENAE
1972	GE-13	<1	CENAE
1979	GE-3	<1	CENAE
1988	3	1	CENAE
1988	4	<1	CENAE
1988	6	5	CENAE
1989	А	1	CENAE
1989	В	<1	CENAE
1989	С	1	CENAE
1989	D	1	CENAE
1989	E	2	CENAE
1989	F	1	CENAE
1996	А	<1	CENAE
1996	В	<1	CENAE
1996	С	<1	CENAE
1996	D	<1	CENAE
1996	Е	<1	CENAE

SUBJECT: Suitability Determination for Cape Cod Canal FNP, Sandwich and Bourne, Massachusetts.

1996	F	<1	CENAE
1996	G	<1	CENAE
1996	Н	1	CENAE
1996	Ι	<1	CENAE

East Sagamore Shoal,

Date	Sample	% Fines	
1977	GE-5	<1	CENAE
1988	9	<1	CENAE

West Sagamore Shoal

Date	Sample	% Fines	
1972	GE-9	<1	CENAE
1988	10	<1	CENAE
1988	11	HARD BOTTOM	NO SAMPLE
			CENAE
1996	М	<1	CENAE
1996	Ν	<1	CENAE

Onset Shoal

Date	Sample	% Fines	
1972	GE-7	<1	CENAE
1972	GE-17	<1	CENAE
1972	GE-18	<1	CENAE
1988	22	<1	CENAE
1996	R	<1	CENAE
1996	S	1	CENAE
1996	Т	1	CENAE
1996	U	<1	CENAE
1996	V	<1	CENAE
1996	II	<1	CENAE

### Town Point Beach

Date	Sample	% Fines	
2001	1	0	Woods Hole Group
2001	2	0	Woods Hole Group
2001	3	0	Woods Hole Group
2001	4	0	Woods Hole Group
2001	5	0	Woods Hole Group
2001	6	0	Woods Hole Group
2001	7	0	Woods Hole Group
2001	8	0	Woods Hole Group
2001	9	0	Woods Hole Group
2001	10	0	Woods Hole Group





SUBJECT: Suitability Determination for Cape Cod Canal FNP, Sandwich and Bourne, Massachusetts.



SUBJECT: Suitability Determination for Cape Cod Canal FNP, Sandwich and Bourne, Massachusetts.



SUBJECT: Suitability Determination for Cape Cod Canal FNP, Sandwich and Bourne, Massachusetts.



**APPENDIX D - BENTHIC DATA** 

# CAPE COD CANAL

## Table D-1

Benthic Organisms Collected from the Cape Cod Canal near Cleveland Ledge on March 27, 1991.

	Locations					
Species	1ABC	2AB	3ABC	4A	6AB	22ABC
Phlyum Cnideria						
Metrium senile	1					
Astrangia danae	P*	Р				
Plylum Mollusca						
Cerastoderma pinnulatum				1		
Nassarius trivittatus		1				
Tellina agilis		1				
Phylum Annelida						
Amphitrite ornate						24
Aricidea jefferysii	4		1			2
Lepidonotus squamatus	1	1				4
Lumbrineris impatiens		3				
Marphysa sanguinea	1					
Pokdarke obscura	1					6
Sabella microphthalma	2	3				2
Spiophanes bombyx	2					
Oligochaeta						1
Phylum Arthropoda						
Ampelisca abdita		6			1	1
Corophium acutum			10			
Pagurus longicarpus			1			
Panopeus herbstii		1				
Phylum Echinodermata						
Sterias Vulgaris	1					

\* P= Present

## CAPE COD CANAL DISPOSAL SITE BENTHIC DATA AND VIDEO SUMMARY



## Table D2a.Benthic organisms per meter square with 0.04 meter square Van Veen grab on Sept 19, 2006 at the<br/>Cape Cod Canal Disposal Site.

			Stations		
	1	2	3	4	5
		(per	meter squa	ired)	
ANNELIDA					
POLYCHAETA					
Terebellides stroemi	100	450	200	275	700
Phyllodoce mucosa	75	50	25	*	*
Phloe minuta	25	75	25	300	75
Cossura sp A	25	*	50	50	*
Exogene verugera	75	*	25	50	25
Acmira catherinae	325	1150	275	550	225
Scalibregma inflatum	200		125	*	*
Thrayx acutis	450	475	150	225	900
Prionospio steenstrupi	700	350	3275	325	175
Sthenothoe minuta	25	*	25	*	*
Asychis elongata	25	25	*	125	150
Spio filicornis	150	825	1050	1250	2300
Driloneris longa	100	875	450	*	1250
Harmathoe imbricata	225	*	*	*	*
Paraonis fulgens	725	650	450	775	575
Clymenella sp.	625				
Nephtys incisa	175	325	250	100	225
Mediomastus ambiseta	1375	780	925	2525	275
Polycirrus eximius	25	*	*	*	*
Eusyllis lamelligera	25	*	*	*	*
Phyllodoce arenae	25	*	*	*	*
Trochochaeta multisetosa	75	125	*	1025	200
Pherusa affinis	25	*	*	25	50
Eteone longa	175	*	*	50	25
Pectinaria gouldii	25	*	*	*	*
Glycera capitata	*	25	*	*	*
Aphelochaeta sp.	*	450	425	250	150
Heteromastus filiformis	*	375	*	*	*
Tharyx anulata	*	75		50	425
Euclymene sp. A	*	225	150	75	250
Euchone incolor	*	*	25	*	75
polydora cornuta	*	*	*	125	*
Cirratulidae	*	*	*	875	25
Monticellina dorsobranchial	*	*	*	375	*
Owenia fusiformis	*	*	*	125	*
Exogene hebes	*	*	*	75	*
Ninoe nigripes	*	*	*	650	*
Lepidodontus sublevis	*	*	*	*	75
Phyllodoce arenae	*	*	*	*	100
Nereis zonalis	*	*	*	*	50
Harmothoe imbricata	*	*	*	*	25
Schistomeringos caeca	*	*	*	*	50
-					
OLIGOCHAETA					
Oligochaete sp A	700	*	650	225	*

Stations

## Table D2a.Benthic organisms per meter square with 0.04 meter square Van Veen grab on Sept 19, 2006 at the<br/>Cape Cod Canal Disposal Site.

			Stations		
	1	2	3	4	5
		(per	meter squa	ared)	
MOLLUSCA					
BIVALVIA					
Macoma balthica	150	25	150	*	*
Astarte unclata	125	175		*	25
Nucula annulata	1050	1275	200	250	50
Cerastoderma sp.	25	*	*	*	*
Tellina agilis	*	175	50	*	50
Cyclocardia borealis	*	25	*	*	*
Gemma gemma	*	225	75	*	*
Thyasira flexuosa	*	50	*	225	25
Pariploma papyratium	*	*	*	25	125
Mysella sp A	*	*	*	25	*
NEMERTEA					
Nemertean Sp A	*	50	*	*	*
Cerebratulus sp.	*	*	*	25	*
NEMATODA					
Nematode sp A	*	*	*	125	75
				120	10
ECHINODERMATA					
Henricia sanquinolenta	50	*	*	*	25
Echinoarachnius parma	*	*	*	25	*
	50	25	75	*	*
Casca bigelowi	50	25	75	*	*
Corophium sp.	025	275	*	*	*
Ampelisca maciocepitala	925	375	*	175	105
Frietheniue gradilionaia	950	75	*	475	420
Encinonius grasiliensis	<u> </u>	/5 *	*	*	*
Loptochoirus pipquis	100	*	*	50	*
Corophium aschoriscum	4175	*	*	*	*
Corophium acutum	*	100	*	*	*
Corophium bonelli	*	*	*	25	*
Harnina sn A	*	*	*	100	*
Unciola irrorrata	*	*	*	200	75
Melita nitida	*	*	*	*	25
Melita alandulata	*	*	*	50	*
menta giandulata					
ISOPODA					
Cyathura polita	25	*	25	*	25
CUMACEA					
Eudorella emarginata	575	175	250	50	350
TOTAL NUMBER OF					
INDIVIDUALS	14700	10055	9450	12125	9825

Table D2a.Benthic organisms per meter square with 0.04 meter square Van Veen grab on Sept 19, 2006 at the<br/>Cape Cod Canal Disposal Site.

	Stations				
	1	2	3	4	5
		(per	meter squa	ared)	
	-				
Diversity Indices					
Shannon-Wiener	2.745801	2.93412	2.430069	2.956765	2.842406
Margalef's	4.239281	3.456428	3.036588	4.259211	4.293147
Evenness	0.744346	0.854435	0.737315	0.807074	0.781399
Simpson's Dominance	0.114842	0.06809	0.15768	0.08264	0.097631
Simpson's Diversity					
(1 / Dominance)	8.707601	14.68635	6.341944	12.10067	10.24266
Simpson's Diversity					
(1 - Dominance)	0.885158	0.93191	0.84232	0.91736	0.902369
Species Richness	40	31	27	39	38

Table 2b. Benthic organisms per meter square with 0.04 meter square Van Veen grab on Sept 19, 2006 at the<br/>Cape Cod Canal Disposal Reference Site.

	Stations			
	1	2	3	
	(per	meter squa	ared)	
ANNELIDA				
POLYCHAETA	105		*	
Terebellides stroemi	125	175	*	
Phloe minuta	*	*	25	
Cossura sp A	50	150		
Acmira catherinae	75	1550	275	
Thrayx acutis	100	*	*	
Prionospio steenstrupi	*	1400	100	
Asychis elongata	*	*	75	
Spio filicornis	200	1225	450	
Driloneris longa	*	1550	1025	
Paraonis fulgens	*	*	950	
Nephtys incisa	50	75	*	
Mediomastus ambiseta	*	3775	1425	
Trochochaeta multisetosa	125	150	*	
Pherusa affinis	*	75	*	
Diplocirrus sp A	25	*	*	
Eteone longa	*	75	*	
Aphelochaeta sp.	*	200	*	
Tharyx anulata	*	50	250	
Euclymene sp. A	150	*	*	
Euchone incolor	*	75	*	
Cirratulidae	575	*	*	
Ninoe nigripes	*	*	50	
Lepidodontus sublevis	*	50	*	
Nereis pelagica	25	*	*	
Praxillella sp A	*	200	*	
Anobothrus gracilis	*	25	*	
MOLLUSCA				
BIVALVIA				
Tellina agilis	*	*	25	
Pariploma papyratium		150	*	
Yoldia limatula	25	*	*	
Kelliella sp.	*	100	*	
NEMERTEA				
Nemertean Sp A	50	50	50	
Nemertean sp B	75	50	*	
Cerebratulus sp.	25	*	*	
ECHINODERMATA				
Echinoarachnius parma	25	*	*	
CNIDARIA				
Ceriantheopsis americana	*	75	125	
Unidentified anemone	*	25	*	

Table 2b. Benthic organisms per meter square with 0.04 meter square Van Veen grab on Sept 19, 2006 at the<br/>Cape Cod Canal Disposal Reference Site.

	Stations				
	1	2	3		
	(per	(per meter squared)			
ARTHROPODA					
AMPHIPODA					
Casca bigelowi	125	*	*		
Ampelisca abdita	*	125	*		
Ericthonius grasiliensis	75	*	*		
Corophium bonelli	*	*	75		
CUMACEA					
Eudorella emarginata	*	25	*		
Oxyurostylis smithi	*	75	*		

TOTAL NUMBER OF			
INDIVIDUALS	1900	11475	4900

	Stations			
Diversity Indices	1	2	3	
Shannon-Wiener	2.446054	2.199749	1.985642	
Margalef's	2.720902	2.827303	1.707222	
Evenness	0.846277	0.675164	0.752406	
Simpson's Dominance	0.132271	0.172892	0.181903	
Simpson's Diversity				
(1 / Dominance)	7.560209	5.783967	5.497424	
Simpson's Diversity				
(1 - Dominance)	0.867729	0.827108	0.818097	
Species Richness	18	26	14	

### Cape Cod Canal Disposal Site Video of Benthos

Thursday Sept. 14, 2006

Grab (grain size and benthic) samples were taken from 5 sites within Cape Cod Canal Disposal Site and 3 sites from the reference area.

Video was taken along 200 meter transects with grab samples taken from center point of transect.

Video 1 = grab sample 1 Video 2 = grab sample 2 Video 3 has no grab sample – disposal mound center for 1980 and 1986 disposal events Video 4 = grab sample 3 Video 5 = grab sample 4 Video 6 = grab sample 5 Video 7 = reference sample 2 (CREF2)

Reference samples CREF1, CREF2, and CREF3

**Table E-1**. Cape Cod Canal Disposal Site Sediment Samples- (1984 post-disposal survey<br/>occurred one month after disposal) and<br/>benthic descriptions.

1984	2006	<b>Description Sediment</b>		<b>Description of Benthos</b>	
Sample	Sample	1984	2006	1984 (divers)	2006
					(underwater
					video)
1	3 grab/	Brownish gray	Wet, dark	Sea star, sea	Sea Star and crabs
	4 video	mud (5 cm)	olive brown	scallops, Jonah	(Cancer sp.)
		overlying	silty sand	crabs, sabellid	
		coarse sand		polychaete moon	
				snail, mysid	
				shrimp, and a four	
		<b>D</b>	***	spotted flounder	a a 1
2	4 grab/	Brownish-gray	Wet, very	Aggregations of	Sea Stars, crab
	5 video	mud	dark gray	<i>Myxicola</i> , sea	(Cancer sp.),
			sinty sand	anemones, sea	flounder
				lobstor and a	Hounder
				skate	
3	2	Brownish_gray	Wet dark	Rock natch had	Sea Stars
5	grab/video	mud rock	olive gray	iuvenile lobster	Sed Stars
	grue, rices	cobble.	sandy silt	sea raven, eelpout.	
		boulders, and	~~~···	and silver hake.	
		gravel		Mysids and	
		0		shrimp, sea	
				scallops, Jonah	
				crab, sabellid	
				polychaetes, and	
				drift algae	
		<b>D</b>			
4	-	Brownish-gray	-	Polychaete tubes,	-
		mud and		anemones,	
		several rocks		sabellid	
				crabe sea store 2	
				winter flounders	
				mysids, hermit	
				crab. drift algae	

1984	2006	Description Sediment		Description of Benthos	
Sample	Sample	1984	2006	1984 (divers)	2006
-	_				(underwater
					video)
6	-	Brownish-gray	-	Fig sponges, sea	-
		mud		stars, anemones,	
		Bottom trawled		mysids, one pipe	
		at end of		fish	
		transect			
1990	1	-	Wet, dark	-	
Disposal	grab/video		olive gray		
Buoy			sand with		
			clay and		
			gravel		
Historic	3 video	-		-	Sea Star, hermit
Disposal					crabs, crab
Mound					(Cancer sp.), sea
					anemone,
					scallops, oyster
					shells and
					flounder
-	5 grab /	-	Wet, very	-	Sea Stars, crabs
	6 video		dark gray		(Cancer sp.),
			sandy silt		skate, scallops
-	CREF 1	-	Wet, black	-	-
			sandy silt		
9	CREF2	Brownish-gray	Wet, very	Anemones,	Sea Star, hermit
		mud, compact	dark gray	starfish, sabellid	crabs, crab
		with ripples	silty sand	polychaetes,	(Cancer sp.)
		_		Jonah crabs, and	_
				a silver hake	
-	CREF 3	-	Wet, dark	-	-
			olive brown		
			sandy silt		

## Table E-1. Continued.

## APPENDIX E – WOODS HOLE GROUP TOWN NECK BEACH SHELLFISH AND EELGRASS REPORT



October 23, 2014

Mr. George H. Dunham Town Administrator Town of Sandwich 130 Main Street Sandwich, MA 02563

### Re: Shellfish and Eelgrass Survey Report Town Neck Beach & Vicinity Field Data Collection

Dear Mr. Dunham:

www.woodsholegroup.com

508.540.1001

FAX:

508.540.8080

TELEPHONE:

E. Falmouth, MA 02536 USA

81 Technology Park Drive

**Noods Hole Group** 

As requested, Woods Hole Group (WHG) conducted a shellfish and eelgrass (*Zostera marina*) survey of the Town Neck Beach area on September 30, October 7, and October 10, 2014. The purpose of the survey was to gather data pertaining to the existing density of shellfish and eelgrass characteristics within the area proposed for dune and beach restoration.

### **General Site Description and Background**

The survey area is shown in Figure 1. The site consists of a coastal beach, dune, and barrier beach system, with some rocky intertidal areas, and a mixture of rocky and sandy subtidal environments (Figures 2-3). Intermittent peat and clay formations (relict salt marsh deposits) exist within the lower intertidal and subtidal areas, mainly in the eastern section of the study area. Town Neck Beach is a sediment starved system due primarily to an interruption in longshore sediment transport from the northwest caused by the Cape Cod Canal jetties. Consequently, the beach has a long history of erosion.



Figure 1. Site Locus at Sandwich Town Neck Beach (yellow denotes survey area).



Figure 2. Mixture of cobble, gravel, and sandy intertidal beach.

www.woodsholegroup.com

FAX: 508.540.1001

TELEPHONE: 508.540.8080

Woods Hole Group 81 Technology Park Drive E. Falmouth, MA 02536 USA



Figure 3. Mixture of gravel and sandy substrate on the high tide beach.

### Methods

www.woodsholegroup.com

508.540.1001

FAX:

TELEPHONE: 508.540.8080

E. Falmouth, MA 02536 USA

81 Technology Park Drive

**Woods Hole Group** 

The purpose of the survey was to identify the existing density of shellfish and eelgrass within and just beyond the area where the dune and beach restoration is proposed. The original plan to sample the area along predetermined transects was not possible due to the rocky nature of the intertidal and subtidal areas. An extensive deposit of impenetrable cobble and gravel throughout the entire area made shellfish sampling virtually impossible. Therefore, WHG scientists completed a thorough visual survey accompanied by random digging (by hand and rake) throughout and beyond the survey area. Where possible, sample volumes were one cubic foot and collected with a 12-inch modified bull rake. The bull rake was covered on the inner surface with 0.25-inch mesh as recommended by the Massachusetts Division of Marine Fisheries. For each sample plot, the bull rake was used to obtain an approximately 1-ft sample to a depth of 1 foot. Successful sample extractions occurred only within sandy subtidal zones.

Historical eelgrass maps developed by the Massachusetts Department of Environmental Protection do not show any previous eelgrass habitat within the study area. Despite this, Woods Hole Group scientists conducted a thorough visual inspection of the subtidal areas to determine whether any eelgrass habitat exists.

### **Results of Shellfish Survey**

The site was first surveyed on September 30, 2014 around the time of low tide. Weather conditions were mostly cloudy, with moderate north winds and a relatively high sea state. WHG scientists managed to visually survey most of the study area during this first visit. The majority of the intertidal area was hard-packed rock (gravel, cobble, and larger) and was impenetrable to standard shellfish sampling tools (i.e., rake) (Figures 4 and 5). No signs of shellfish habitat were observed except for a recent set of blue mussels on some of the boulders within the existing rock jetties along the eastern area of the beach (described below). No relic shells were observed in the beach wrack (along high tide elevation), and only a few shell fragments were found within the intertidal zone.

A second survey was conducted on October 7, 2014 during the early evening low tide. The wind was southerly and seas were calm. Water clarity was good, though daylight was poor (near sunset). WHG scientists met with the Sandwich Shellfish Constable prior to the survey. He stated the Town Neck Beach area is not considered a significant shellfish harvest area because there are no shellfish there. Historically there was a surf clam fishery in the deeper waters north of the beach (about 20 foot depths) but this ended in the early 1980s and he has not seen any significant harvesting since. WHG scientists managed to survey throughout the subtidal sandy zones within and beyond the study area boundary (Figure 6). No live shellfish were found, nor were there any signs of shellfish in the area (no shell fragments).

A final field visit occurred on October 10, 2014 during the early morning low tide. A series of additional holes were dug within the lower intertidal and subtidal areas along the eastern portion of the site. No shellfish were found.

A map showing the location of the proposed beach and dune restoration, areas of visual examination, and shellfish rake locations is provided in Figure 6.


Figure 4. Hard-packed rocky beach and intertidal area.



Figure 5. Hard-packed rock substrate.



Figure 6. Study area map showing sample stations and area of visual examination.

www.woodsholegroup.com

FAX: 508.540.1001

TELEPHONE: 508.540.8080

E. Falmouth, MA 02536 USA

ology Park Drive

#### **Results of Eelgrass Survey**

Eelgrass (Z. marina) was observed in one location within the study area (Figures 6 and 7) but outside of the project footprint. This unique location consists of a tidal pool near the western end of the study area. This pool is approximately 4 to 5 feet deep at low tide and contains an area of eelgrass extending approximately 100 feet along its western edge (water depths from 2 to 4 feet). The pool is protected from wave energy by a pronounced rocky bar that extends several hundred feet seaward into Cape Cod Bay. Attached macroalgae (*Fucus* spp.) was also observed within this pool.



Figure 7. Portion of eelgrass bed observed outside the project footprint.

#### Summary

www.woodsholegroup.com

508.540.1001

FAX:

TELEPHONE: 508.540.8080

E. Falmouth, MA 02536 USA

81 Technology Park Drive

**Noods Hole Group** 

Woods Hole Group conducted a shellfish and eelgrass resource survey on September 30, October 7, and October 10, 2014. The purpose of the survey was to observe and record the density of shellfish and *Z. marina* habitat characteristics within the general vicinity of the proposed dune and beach restoration project at Town Neck Beach in Sandwich, MA.

The following summarizes WHG findings:

- 1. No live shellfish were found in or near the study area.
- 2. A few small sets of blue mussel were observed on a small number of boulders along some of the rock jetties.
- 3. Intertidal and subtidal environments were primarily hard-packed cobble with some shallow sand environments in subtidal areas.
- 4. The Sandwich Shellfish Constable provided anecdotal information suggesting little or no shellfish resource in the area except for historical sea clam harvesting by offshore dredgers which ended in the early 1990s.
- 5. One area of eelgrass was observed within a tide pool in the western end of the study area, but outside of the project footprint.

The potential impacts to shellfish associated with the proposed dune and beach restoration project will be of low significance due to the lack of existing resource. It is possible that the addition of sand in the area would result in an increase in shellfish habitat. However, this is difficult to predict due to the beach's exposure to high wave energy.

Should you have any questions or require additional information, please do not hesitate to contact me at (508) 495-6222.

Sincerely,

John W. Brawley, Ph.D. Senior Marine Systems Ecologist

JWB/beh

www.woodsholegroup.com

508.540.1001

FAX:

TELEPHONE: 508.540.8080

E. Falmouth, MA 02536 USA

Woods Hole Group 81 Technology Park Drive

cc: Kirk Bosma, P.E., Woods Hole Group, Inc.

Cape Cod Canal EFH 2015

# **APPENDIX F -EFH ASSESSMENT**

#### ESSENTIAL FISH HABITAT ASSESSMENT

# FOR THE MAINTENANCE DREDGING OF THE CAPE COD CANAL FEDERAL NAVIGATION PROJECT IN CAPE COD BAY AND BUZZARDS BAY WITH PLACEMENT ON TOWN NECK BEACH OR CAPE COD CANAL DISPOSAL SITE, MASSACHUSETTS

# **1.0 INTRODUCTION**

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act require that an Essential Fish Habitat (EFH) consultation be conducted for activities that may adversely affect important habitats of federally managed marine and anadromous fish species. EFH includes "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Cape Cod Canal, Town Neck Beach, and Cape Cod Bay fall into this category and thus have the potential to provide habitat for fish species in the area. An assessment of the EFH for the maintenance dredging of the Cape Cod Canal Federal Navigation Project is contained within this Appendix.

# 2.0 PROPOSED ACTION: DREDGING AND PLACEMENT/DISPOSAL

The proposed work involves maintenance dredging of up to 150,000 cubic yards (cy) of clean sand and gravel from portions of the 32 feet deep channel and the 25 feet deep east mooring basin with advanced maintenance of sand wave shoals to the depth of surrounding habitat.

There are nine shoal areas that typically form within the Cape Cod Canal and six of these areas currently have shoals that need to be dredged (see Figure F-1). These areas include the South Breakwater shoal, East Mooring Basin-basin shoal, East Mooring Basin-channel shoal, East Sagamore shoal (east of the bridge), Sagamore shoal (west of the bridge), and the Onset shoal. The channel is authorized to a depth of -32 feet deep and the East Mooring basin is authorized to a depth of -25 feet, all with a two foot allowable overdepth. In order to extend the time between dredge events, advance maintenance will be conducted to reduce the sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 feet deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. See Figures F-3a through F-3c for survey of shoal areas. A hydraulic hopper dredge will be used to perform the proposed work over a 3 to 4 month period during late fall of 2015 to early spring 2016. A study is currently ongoing under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the Cape Cod Canal project as beach-fill on a 2,500 foot long eroded section of Town Neck Beach in Sandwich. If the Section 204 study is completed in time to coincide with this maintenance dredging event, then the material dredged from the Canal could be placed on Town Neck Beach. The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study to have material placed on Town Neck Beach.



Figure F-1. Map of the Cape Cod Canal with shoal areas that require maintenance dredging.



Figure F-2. Map of the east end of the Cape Cod Canal with proposed placement areas.



Figure F-3a. Shoals in the eastern end of the Cape Cod Canal (south breakwater, east mooring basin, and east mooring basin channel shoals).



Figure F-3b. Shoals near the Sagamore Bridge (east and west Sagamore shoals).



Figure F-3c. Shoal area in the western end of the Cape Cod Canal (Onset shoal).

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the Cape Cod Canal Disposal Site (CCCDS) would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging.

# 3.0 ANALYSIS OF IMPACTS

Potential impacts to EFH from dredging and placement/disposal of dredged material in general include changes in the chemical and physical properties of the water column, changes in sediment types, and changes in water depth. Changes in the abundance and/or distribution of prey species may also result from dredging and disposal activities. These impacts may range from short-term as a result of increased levels of total suspended solids (TSS) in the water column during dredging, to longer term impacts as a result of changes in bathymetry from either dredging or disposal of dredged material.

# **3.1 Physical Environment:**

*Water Quality* — The impacts from dredging the Cape Cod Canal Federal Navigation Project (FNP) on water quality are expected to be short-term and localized. The sediment to be dredged is coarse grained sand which will rapidly settle from the water column. Given the nature of the material there is little if any organic matter present to affect water quality or dissolved oxygen levels in the near field areas.

Short-term water quality impacts will be mostly due to increased total suspended sediment (TSS) loads in the water column. Potential releases of TSS will be minimized by using appropriate dredging equipment and techniques and that the coarse material rapidly settles out of the water column.

*Bathymetry/Water Depth* — Other impacts from the proposed project include changes in the bathymetry of the areas to be dredged and at the placement/disposal sites due to placement of sediment. Areas within the Cape Cod Canal that are to be dredged will result in increased depths. Depths will also change within the intertidal areas and surf zone on affected areas of Town Neck Beach where the dredge material is proposed to be placed as part of the Section 204 project.

The beach fill along 2,500 feet of Town Neck Bach will cover 15.49 acres of upland, intertidal, and a relatively small area of subtidal habitat (2 acres). Approximately 70 % of that will be in the renourished dunes and beach berm (10.77 acres). Within this area approximately 5.36 acres of intertidal habitat will be converted to beach berm. This will result in the loss of 3.54 acres of intertidal habitat. As the beach equilibrates over time it is expected that portions of the newly created berm areas will return to intertidal habitat. The placement of sand will impact approximately 2.21 acres of subtidal habitat of which1.82 will be converted to intertidal habitat. As a result of the sand palcment the mean high water line will be relocated approximately 50 to 150 feet seaward of its current position. The mean lower low water line will only move seaward in two areas (west of the two most eastern groins). As a result of the project the beach profile will be modified to a condition similar to that found in 1952.

*Rock Habitat* – Adjacent to the placement site on Town Neck Beach there is intertidal rock habitat. A relatively small area of boulders (0.55 acre) is found on the gravel beach on the most western end of the placement site. The Massachusetts DEP mapped 5.28 acres of intertidal rock but a recent survey by USACE (2014) showed that only 3.47 acres was currently intertidal rocky habitat. Previous DEP mapping showed 0.292 acres of intertidal rock habitat had existed along the eastern side of the project but erosion now has exposed an additional 2.947 acres of intertidal rock. Placement of 150,000 cy of material on Town Neck Beach will directly impact most of the newly exposed rock habitat (2.947 acres) on the eastern end. The 0.292 acres of the previously mapped intertidal rock area will not be directly impacted. In total, approximately 40 % of the boulder area on the western end will be directly impacted (0.219 acres). In the central area about 53% of the intertidal rock (1.845 acres) will be directly impacted. The beach profile will be rebuilt to be similar to the one that existed in 1952.

# **3.2 Biological Environment**

*Prey Species* — The abundance and/or distribution of prey species, for which EFH has been designated, may be impacted from the dredging and placement/disposal activities conducted for the Cape Cod Canal. Many of these fish feed on organisms that live in or on the sediment. At locations that are to be dredged, these prey species will be disrupted and or destroyed during the dredging process. During placement/disposal operations, prey species are likely to be buried. However, the substrate types in both dredging and placement/disposal locations following project completion is expected to be similar to pre-project conditions thus promoting rapid recolonization by organisms from adjacent areas, except for areas of intertidal rock. Therefore, most impacts to fish species using these areas for forage, would be expected to be temporary. Any intertidal rock areas that are completely covered by sand will lose their functionality as rock habitat until the beach returns to its pre-project condition as the sand erodes within an approximately 2 to 5 year timeframe.

Prey species that live in the water column are also likely to be impacted during dredging and disposal activities. The increased suspended sediments resulting from dredging and disposal activities have the potential to impact planktonic species in the vicinity of any elevated suspended sediment plumes in the water column. However, given the short-lived and transient nature of these water column disturbances, it is expected that any impacts would be of a temporary nature and return to ambient conditions upon cessation of operational activities. Thus any impacts would be temporary and not be expected to have any significant long-term effects on prey species within the project area.

The anadromous fish alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) serve as prey for some of the EFH species found in the Cape Cod Canal area, specifically Atlantic cod, haddock, bluefish (Bigelow and Schroeder, 1953), and possibly squid. During the spring, both alewife and blueback herring migrate upriver through the Monument River to spawn. Alewife spawn when the water temperature is between 16° C and 19° C, the blueback herring spawn later in the spring when the water is about 5° warmer (http://www.nefsc.noaa.gov/sos/spsyn/af/herring). Immediately after spawning, the surviving adults emigrate downstream. The juveniles emigrate from the upstream areas (freshwater) when the water temperatures decrease in the fall. LaSalle *et al.* (1991) reviewed the literature on

studies of suspended sediments and fish. They concluded that all life stages of anadromous fish species appear fairly tolerant of elevated suspended sediment concentrations. LaSalle *et al.* (1991) concluded that a conservative safe level at which no impact would be anticipated would be 500 mg/l. For previous dredging activities, no dredging within 500 yards of the mouth of the Herring River (previously referred to as the Monument River) was allowed from March 15 through July 30. No shoals are currently within 500 yards of the Herring River. Consequently, emigrating anadromous fish would have the ability to avoid project operations by not having to swim directly through the dredge site and not restricting migratory behavior. Therefore, impacts to EFH species that prey on the alewife and blueback herring would not be significantly impacted in the Cape Cod Canal during maintenance dredging.

Shellfish also serve as prey items for EFH species. Potential shellfish habitat for blue mussel, quahog, and bay scallop surrounds or may be within the navigation channel within Buzzards Bay. Shellfish have the ability to tolerate increased suspended sediments in the water column as a defense mechanism to naturally occurring storm events. In order to avoid ingestion of suspended sediments bivalves can tightly seal their valves for several days. In a study conducted by Pratt (1978) on sediment transport, erosion and deposition, it is shown that there were no mortalities to either adult quahogs or their larvae at levels of 83,200 mg/l or 10,200 mg/l respectively during 96-hour bioassay testing with fine grain fractions of natural sediments. These levels are significantly higher than the levels encountered in the monitoring of suspended sediments by different dredge types (Hayes, 1986). Any shellfish that have established themselves within the FNP have the potential to be impacted, but no significant impacts are expected to occur within the shellfish populations of Cape Cod Bay or Buzzards Bay in general as a result of project operations. Atlantic sea scallops occur in Cape Cod Bay and any present within the disposal area have the potential to be impacted by the disposal of dredged sediments (more details are presented within the managed species section)

State mapped shellfish suitability habitat within the general project area includes blue mussels and surf clams (Figure F-4). Historically there was a surf clam fishery in the deeper waters north of the beach (along the t 20 foot depth contour), but this ended in the early 1980s and there has not been any significant harvesting since (pers comm., Sandwich Shellfish Constable). The town of Sandwich conducted a shellfish survey of the intertidal and near subtidal areas of Town Neck Beach during September/October 2014. The hard-packed rock of the intertidal area was impenetrable to standard shellfish sampling tools. In regions that could be sampled, this survey did not identify any shellfish within the project areas, except for a recent set of blue mussels on some of the boulders associated with the rock jetties along the eastern area of the beach (letter to Town from WHG, 2014 in Appendix E).

*Eelgrass* — Eelgrass beds are highly productive communities, and are ecologically important because they act as a nursery, habitat, and feeding ground for many fish, waterfowl, and invertebrates. Its growth and survival is dependent on clear water to provide light for photosynthesis. There are annual and perennial forms of eelgrass *Zostera marina*. In the northern portion of the geographical range, *Zostera* abundance peaks later in the summer and declines sharply in winter. Both sexual and asexual reproduction occurs, but vegetative reproduction has been recorded as important in maintaining meadows (Thayer *et al.*, 1984). Seeds are released between May and August and germination continues through the winter and spring (Thayer *et al.*, 1984).

According to the eelgrass map from Massachusetts Department of Environmental Protection (DEP) there is no eelgrass present in the Cape Cod Canal, but eelgrass does surround some of the channel in of the Hog Island section in Buzzards Bay. The eelgrass is at least 100 feet away from the channel according to the MA GIS eelgrass maps. The canal consists of sandy sediments that should rapidly settle out of the water column in a relatively short distance from the dredge, mostly within the confines of the channel. Any localized, short-term turbidity created by the dredging will have minimal impact on any nearby eelgrass. Consequently, when considering all of the above, the eelgrass within the project area would only be minimally impacted by the dredging activities and will not suffer any long-term significant impacts.

Eelgrass has been mapped in the water adjacent to Town Neck Beach near the Canal south jetty since 1995. The town of Sandwich conducted an eelgrass survey of the subtidal habitat (WHG, October 2014). A tidal pool area near the western edge of the project area formed from the hooked shoal. Within this tidal pool that is protected from wave energy an eelgrass bed extends approximately 100 feet along the western edge in water depths from 2 to 4 feet. Attached macroalgae (*Fucus*) is also found within the pool. On the eastern end of the project in subtidal waters seaward of the groin USACE identified some small eelgrass patches while mapping rock habitat. The eelgrass was growing in the sand patches between the rocks. Most patches were sparse having only several blades covering over several inches of bottom. The two larger patches are one to two feet in diameter and the center of these patches are identified in Figure F-5. All eelgrass is seaward of any sand placement and would not be directly impacted.



**Figure F-4.** Cape Cod Bay end of the Canal with state mapped potential shellfish habitat identified.



**Figure F-5**. Map of placement area on Town Neck Beach and with rock and eelgrass habitats. Eelgrass plotted on eastern end were plotted to be seen on the map, but are center points of 2 sparse beds so mapped areas appear larger than actual eelgrass areas (see descriptions in text).

# 4.0 LIFE HISTORY OF EFH SPECIES

# 4.1 Selection of EFH Species

The National Marine Fisheries Service Guide to Essential Fish Habitat web site was used to determine which species have designated EFH in the Cape Cod Canal, adjacent to Town Neck Beach, and at the Cape Cod Canal Disposal Site. The location of this site is http://www.nero.nmfs.gov/ro/doc/webintro.html. The species and the life stages of those species, that have EFH in the study area was determined by using the quick reference 10 x 10 minute squares of latitude and longitude. The coordinates of the 10 x 10 minute squares that are representative of the geographic area where dredging and placement/disposal of dredged material may occur are 41° 50.0' N, 70° 20.0' W, 41° 40.0' N, 70° 30.0' W. Dredging will also occur within the following 10 X 10 minute square, 41° 50.0' N, 70° 30.0' W, 41° 40.0' N, 70° 40.0' W. The managed species are listed in Table 1.

# Table 1. Square Description (i.e. habitat, landmarks, coastline markers):

Atlantic Ocean waters within the square within Cape Cod Bay affecting the following: north of Sandwich, MA, and Barnstable, MA. Also, these waters affect from the Cape Cod Canal on the west, east to the western part of Sandy Neck, along with the Great Marshes and the western part of Barnstable Harbor. Also affected are: Town Beach, Old Harbor Creek, and Springhill Beach northeast of Sandwich, MA, Scorton Neck and Beach, Scorton Ledge, a dump site on the northwest corner, and Plowed Neck (marked with C in table). Coordinates of square, 41° 50.0' N, 70° 20.0' W, 41° 40.0' N, 70° 30.0' W.

The canal is also found in the 10 X 10 square that includes Atlantic Ocean waters within the square within Cape Cod Bay affecting the following: the Cape Cod Canal and surrounding from Lookout Point in Plymouth, MA, southeast to the north half of Scraggy Neck, and to Great Neck and Onset, MA., except for the far end of Stony Point Dike. This square also includes waters within Buzzards Bay affecting around Bourne, MA, and the northeast part of Wareham, MA. Also affected are: Scusset Beach and Sagamore Beach (marked with X). Coordinates of square, 41° 50.0' N, 70° 30.0' W, 41° 40.0' N, 70° 40.0' W.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod (Gadus morhua)	C X	C X	СХ	C X
haddock (Melanogrammus aeglefinus)	C X	C X		
pollock (Pollachius virens)		C X	СХ	C X
whiting (Merluccius bilinearis)	C X	СХ	СХ	C X
red hake (Urophycis chuss)	C X	C X	СХ	C X

white hake (Urophycis tenuis)	C X	C X	СХ	C X
Species	Eggs	Larvae	Juveniles	Adults
winter flounder (Pseudopleuronectes americanus)	C X	C X	СХ	C X
yellowtail flounder (Pleuronectes ferruginea)	C X	C X	СХ	C X
windowpane flounder (Scopthalmus aquosus)	C X	C X	СХ	C X
American plaice (Hippoglossoides platessoides)	C X	C X	СХ	СХ
ocean pout (Macrozoarces americanus)	C X	C X	СХ	C X
Atlantic halibut (Hippoglossus hippoglossus)	C X	C X	СХ	СХ
Atlantic sea scallop (Placopecten magellanicus)	C X	C X	СХ	СХ
Atlantic sea herring (Clupea harengus)	С	C X	СХ	СХ
monkfish (Lophius americanus)	C X	C X		
bluefish (Pomatomus saltatrix)			СХ	СХ
long finned squid (Loligo pealei)	n/a	n/a	СХ	СХ
short finned squid (Illex illecebrosus)	n/a	n/a	СХ	СХ
Atlantic butterfish (Peprilus triacanthus)	C X	C X	СХ	СХ
Atlantic mackerel (Scomber scombrus)	C X	C X	СХ	СХ
summer flounder (Paralicthys dentatus)				C X
scup (Stenotomus chrysops)	n/a X	n/a X	СХ	СХ
black sea bass (Centropristus striata)	n/a		СХ	СХ
spiny dogfish (Squalus acanthias)	n/a	n/a	С	C X
bluefin tuna (Thunnus thynnus)			СХ	СХ
little skate (Leucoraja erinacea)			СХ	СХ
winter skate (Leucoraja ocellata)			СХ	СХ

The following describes the managed species and their appropriate life stage history for the species listed above.

### **Atlantic Cod**

EFH is designated within both dredging and placement/disposal areas for all life stages of Atlantic cod (*Gadus morhua*). The EFH description describes eggs and larvae to be found in pelagic waters, but the eggs are near the surface waters and the larvae are found at greater depth, 98 to 230 feet (30-70 m). Eggs are most often observed with peaks in winter and spring and the larvae are most common in spring. Both the canal and proposed placement/disposal sites are generally shallower than that preferred by larvae. The juveniles and adults are found on bottom habitats with a substrate of rocks, pebbles, or gravel; with the adults having a greater depth range (juveniles 82-246 ft (25-75m), adults 33-492 ft (10-150 m). Massachusetts Department of Marine Fisheries sampled the spatial distribution of age 0 and 1 cod form 1978 though 1999. They collected the cod north and south of the project area but their sampling methods restricted access to the shallow depths, the <30 feet samples had a minimum depth of 16 feet and a mean depth of 27 feet (Howe *et al.*, 2002). There is no data on the minimum depth for juvenile cod in Cape Cod Bay.

In nearshore environments age 0 Atlantic cod feed on zooplankton by day and disperse to the bottom for more protective covering at the night and become less active (Grant and Brown, 1998a) showing diurnal activity. Grant and Brown (1998b) found age 0 cod to be localized and not moving more than a few hundred meters within shallow nearshore environments for several weeks after settling from a pelagic habitat and may remain localized during their first winter. Methven and Schneider (1998) found 4-7 meters to be the depth center of distribution for age 0 cod. Age 1 cod become more nocturnal with feeding on the benthos at night (Grant and Brown, 1998a). Seining studies in Newfoundland have shown significantly more and larger cod at night than during the day due to the catch of age 1 cod which were primarily caught at night and only when water temperatures were  $< 0^{\circ}$ C and (Methven and Bajdik, 1994). In Conception Bay Newfoundland, seasonal variations in activity pattern and habitat selection were observed for 3-year old Atlantic cod. In the summer the fish were nocturnal with wide ranging deep cold resting sites and shallow warm feeding areas but in the autumn had a home range in shallow water over sand and were inactive at nocturnally, resting in shallow rocky areas (Clark and Green, 1990).

Habitat use of structurally complex bottoms containing seagrass, macroalgae, rocks and cobbles tend to be positively correlated with survival for young juvenile Atlantic cod. Postlavae settlement does not differ with habitat type but survival and growth are associated with these structurally complex habitats (Tupper and Boutilier, 1995). Numerous studies focused on habitat types and preference with and without predators present.

In lab studies juvenile cod would use either cobble substrate or kelp in the presence of a predator and when provided a choice would choose cobble (Gotceitas *et al.*, 1995), but with no predator present sand or gravel-pebble were preferred (Gotceitas and Brown, 1993). In lab studies with eelgrass for protection from predators eelgrass density was  $\geq$ 720 stems/m<sup>2</sup> (Gotceitas et al., 1997). In Newfoundland field work demonstrate that age 0 cod was primarily found in eelgrass and age 1+ cod appeared to be concentrated in areas of coarse bottom with macroalgae (Gotceitas *et al.*, 1997). The use of structurally complex habitats is associated with predation risks. In the lab age 0 juvenile cod aggregated more closely and maintain further distance from older conspecifics in settings without cover, but only to age 3 individuals when cover was available (Thedorou *et al.*, 2013). Daytime shoaling behavior of age 0 cod was also

noted by Grant and Brown (1998b) and assumed to enhance foraging success and increase detection of age 1 cod. At night age 0 cod disperse and cease foraging due to increased shoreward movement of 1 to 3 year old conspecifics. Juvenile cod are capable for assessing the risk a predator represents and adjust their response accordingly (Gotceitas *et al.*, 1995; Ryan *et al.*, 2012).

Newly settled juvenile age 0 Atlantic cod from Georges Bank inhabit large pebble-gravel deposits that match the coloration of their body most likely making them less vulnerable to predation. Unlike the coastal age 0 cod, these are active night-time feeders and remain within a few centimeters of bottom and maintain position by swimming to the currents. Eventually they are transported by the tidal currents when they rise off the bottom at night (Lough *et al.*, 1989).

Older juveniles are known to prey on the younger conspecifics. They move into shallower waters at night to feed. Many migrate to deeper warmer waters late fall through the winter to return in the fall. Some individuals have been recorded as remaining in the shallow habitats for age 2-3 year cod and use structurally complex substrata and areas of bathymetric relief (Cote *et al.*, 2004).

Adults are motile and have the ability to avoid most disturbances. Any eggs and larvae in path of disposal at CCBDS would have the potential to be impacted, but the area of impact would be limited compared to potential habitat where these life stages could be found. In 1984, only one individual was caught (1 % of the catch) in the gill net sampling of the CCCDS. At the Town Neck Beach placement area, there is 0.374 acres of intertidal cobble habitat that would be impacted by placement of sand. It is not known if any juvenile cod use this intertidal area. As the juveniles of the species settle into protective rock habitats for the night when intertidal areas are not always available, there must be suitable shallow subtidal habitat available for use. All collections of juvenile cod in the area are from waters much deeper than those adjacent to the project area due to the sampling techniques used. Based on the above, the loss of the rocky intertidal habitat should not have a significant impact to the overall juvenile cod population in this region of Massachusetts. Therefore, no more than minimal impacts on Atlantic cod EFH would be expected as a result of this project.

# Haddock

EFH is designated within the project areas for eggs and larvae of haddock (*Melanogrammus aeglefinus*). The egg and larval stages of haddock occur in the water column at depths of 98 to 295 feet (30-90 m). Peak abundance for eggs tends to be in April and April and May for larvae. The project is expected to have minimal effects on EFH for haddock because the eggs and larvae tend to be found in waters deeper than those in the Canal or either of the disposal sites.

# Pollock

EFH is designated in the project areas for the larvae, juveniles, and adults of pollock (*Pollachius virens*). Larvae are pelagic, most are found at depths of 164 to 295 feet (50-90 m). The juveniles have been reported over a wide variety of substrates, including sand, mud, or rocky bottom, and vegetation. Most commonly juveniles are found at depths of 82 to 246 feet (25-75 m) although they can be found from the surface to 410 feet deep (125 m). Adults show little

preference for bottom type and they inhabit a wide range of depths from 115 to 1197 feet (35-365 m). This project is expected to have minimal effects on EFH of pollock since the larvae, juveniles, and adults are all commonly found at depths deeper than that found in the Cape Cod Canal and the CCBCDS. Any juvenile pollock in the eelgrass surrounding sections of the navigation channel would be outside the area of dredging impact and would be able to avoid any disturbance caused by dredging if needed. Only one pollock fish was caught in the gill net sampling of the CCBCDS (1% of catch) in 1984. All life stages are found at depths greater than the waters adjacent to the Town Neck Beach. Therefore, no more than minimal impacts on pollock EFH would be anticipated as a result of this project.

### Whiting

EFH is designated within all project areas for all life stages of whiting (*Merluccius bilinearis*). The eggs are pelagic and drift with the prevailing currents. Most eggs are found between 164 and 492 feet (50-150 m) depth with abundance peaks from June through September in temperatures below 20° C. The larvae are also pelagic and most are found at depths of 164 to 426.5 feet (50-130 m) with abundance peaks from July through September. Juvenile whiting are found on bottom habitats of all substrate types with water temperatures below 21° C and depths between 66 and 886 feet (20-270 m). Adult whiting are found on bottom habitats of all substrate types with water temperatures below 22° C and depths between 98 to 1,066 feet (30-325 m). This species is broadly distributed in the northwest Atlantic from the Gulf of Maine to Cape Hatteras. All the life stages are more common at greater depths than found at the dredge site and areas adjacent to beach placement. Any disruption of EFH to the juveniles would be associated with the disposal activities at CCCDS with no long-term impacts expected. Juveniles and adults should be able to avoid any impacts due to their mobility. Therefore, no more than minimal impacts on whiting EFH would be anticipated as a result of this project.

# **Red Hake**

EFH is designated within all project areas for larvae, juveniles and adult life stages of red hake (Urophucis albidus), eggs are only associated with the Cape Cod Bay side of the canal. The eggs are found in surface waters with temperatures below 10° C, during the months from May - November, with peaks in June and July. Larvae are most often observed from May through December, with peaks in September – October, in surface waters with temperatures below 19° C, water depths less than 656 feet (200 m), and salinity greater than 0.5 ‰. The juveniles are found on bottom habitats with a substrate of shell fragments, including areas with an abundance of live scallops, when water temperatures are below 16° C, depths less than 328 ft (100 m), and a salinity range from 31 to 33 ‰. Adults are found in bottom habitats with depressions having a substrate of sand and mud (but generally not in open sandy bottoms), with water temperatures below 12° C, depths from 33 to 426.5 feet (10-130 m), and salinities of 33 to 34 ‰. Although EFH for red hake is within the project area, this species is broadly distributed in north and mid-Atlantic waters from the Gulf of Maine to Cape Hatteras. Any disruption of EFH will be temporary and not significant due to their wide geographical range and broad habitat requirements. At the Cape Cod Canal Disposal Site 69% of the fish captured during the gill net sampling in 1984 were red hake. Juveniles and adults should be able to avoid any potential impacts due to their mobility. Therefore, no more than minimal impacts on red hake EFH would be anticipated as a result of this project.

### White Hake

EFH is designated within all project areas for all life stages of white hake (*Urophycis tenuis*). Eggs are found in surface waters while the larvae are pelagic, both are found from August through September. Juveniles have a pelagic and demersal stage. In the demersal stage, the juveniles are found on bottom habitats with seagrass beds or a substrate of mud or fine-grained sand, with water temperatures below 19° C, and depths from 16 to 738 feet (5-225 m). The adults are found associated with bottom habitats with a substrate of mud or fine-grained sand, water temperatures below 14° C, and depths from 16 to 1,066 feet (5 - 325 m). Although EFH for white hake is within the project area, this species is broadly distributed in the northwest Atlantic from the Gulf of St. Lawrence to Cape Hatteras. Juveniles and adults should be able to avoid any potential impacts because of their mobility. Eggs and larvae would not be present during the proposed dredge period late fall through March. Therefore, no more than minimal impacts on white hake EFH would be anticipated as a result of this project.

# Winter flounder

EFH is designated within both the dredging and disposal areas for all life stages of the winter flounder (*Pseudopleuronectes americanus*). The eggs of winter flounder, which are demersal, are typically found at depths of less than 16 feet (5 m) in bottom waters in a broad range of salinities (10 - 30 ‰). Spawning, and therefore the presence of eggs, occurs from February to May. EFH for larvae, juveniles, and adults includes bottom habitats of mud and fine-grained sandy substrate in waters ranging from 0.3 to 328 feet (0.1-100 m) in depth. Spawning adults are typically associated with similar substrates in less than 20 feet (6 m) of water. Although winter flounder EFH is located within the project area, larger juveniles and adults are very mobile and would be able to flee from the dredging or disposal areas once activities commence. Minimal amounts of eggs and larvae may be affected by sediment removal or disposal, but most are found in areas shallower than that of the canal or the CCCDS and are not expected in the areas just adjacent to the beach placement site. Consequently, any potential impacts that occur will be localized and short term. Therefore, no more than minimal impacts on all life stages of the winter flounder EFH would be anticipated as a result of this project.

# Yellowtail flounder

EFH is designated within all project areas for all life stages of yellowtail flounder (*Pleuronectes ferruginea*). The eggs are pelagic; they are found in depths of 98 to 295 feet (30-90 m) and most often observed during the months from mid-March to July. Larvae are found at depths of 33 to 295 feet (10-90 m), water temperatures below 17° C, and a salinity range from 32.4 - 33.5 ‰. Both juveniles and adults are found on bottom habitats with a substrate of sand or sand and mud, water temperatures below 15° C, salinity 32.4 - 33.5 ‰, and depths from 65 to 164 feet (20-50 m). Juvenile and adults are motile and typically prefer deeper than the canal and waters adjacent to beach placement site. Eggs and larvae are distributed throughout Cape Cod Bay and those at dredge and disposal sites will only have the potential to be impacted by localized, short-term turbidity associated with project activities. Therefore, no more than minimal impacts would be expected to occur to the yellowtail flounder EFH.

# Windowpane flounder

EFH is designated within all project areas for all life stages of windowpane flounder (*Scopthalmus aquosus*). Eggs are buoyant and typically found in the water column at water

depths of 3 to 230 feet (1-70 m). Larvae are found in pelagic waters. Juveniles and adults prefer bottom habitats of mud or fine-grained sand and can be found in salinities ranging from 5.5 ‰ to 36 ‰. Seasonal occurrences in the project area are generally from February to November, with peaks in occurring May and October. Although EFH for the windowpane is within the project area, this species is broadly distributed in north and mid-Atlantic waters from the Gulf of Maine to Cape Hatteras. Consequently, any disruption of windowpane flounder EFH will be temporary and not significant due to their wide geographic range and broad habitat. Windowpane flounder adults and juveniles should be able to avoid any potential impacts because of their mobility. Eggs and larvae will potentially be impacted by localized, short-term turbidity associated with the dredging and disposal activities. Therefore, no more than minimal impacts on all life stages of windowpane flounder EFH would be anticipated as a result of this project.

### **American Plaice**

EFH is designated within all project areas for all life stages of American plaice (*Hippoglossoides platessoides*). All life stages of American plaice are generally found in waters with depths of over 98 feet (30 m). The eggs and larvae are pelagic while the juveniles and adults prefer bottom habitats with fine-grained sediments or a substrate of sand or gravel. The juveniles and adults tend to be found at depths from 148 to 492 feet (45 to 150 m). This project is expected to have minimal effects on EFH for American plaice as the Cape Cod Canal and the both disposal sites are generally shallower than their preferred habitat for all life stages. Therefore, no significant long-term impacts to EFH would be expected as a result of this project.

# **Ocean Pout**

EFH is designated within both all project areas for all life stages of ocean pout (*Macrozoarces americanus*). This is a nearshore species that inhabits hard bottom substrates with salinities greater than 30 ‰. Ocean pout egg development takes two to three months during late fall and winter. The larvae are most often observed from late fall through spring. Juveniles tend to be found on smooth bottoms near rocks or algae with water temperatures below 14° C, depths less than262 feet (80 m) and salinities greater than 25 ‰. Adults are generally found in water temperatures below 15 C, depths less than 360 feet (110 m) and a salinity range from 32-34 ‰. The soft bottom substrate found at the dredging areas and CCCDS should limit any potential impact to the life stages and there should be minimal impacts to the rocky habitat in the subtidal waters adjacent to the beach placement area. Adults and juveniles should be able to avoid any potential impacts because of their mobility. Therefore, no more than minimal impacts to ocean pout EFH would be expected as a result of this project.

# **Atlantic Halibut**

EFH is designated within all project areas for all life stages of Atlantic halibut (*Hippoglossus hippoglossus*), but the dredge sites and waters adjacent to the beach placement is too shallow to have any effect on the EFH of this species. Atlantic halibut eggs are bathypelagic, floating not at the surface, but suspended in the water column at depths ranging from 177 to 656 feet (54-200 m). The eggs are observed between late fall and early spring, with peaks in November and December. The larvae are pelagic floating within 50 m of the surface. Juveniles and adults are found on bottom habitats with a substrate of sand, gravel, or clay. The juveniles are found in depths from 66 to 197 feet (20-60 m), where as the adults are found at depths of 328 to 2,297 feet (100-700 m). Adults and juveniles should be able to avoid any potential impacts because of their mobility. Eggs, larvae, and adults tend to be found in waters deeper than the

dredge and disposal sites. Juveniles would only have the potential to be impacted by localized, short-term turbidity associated with the disposal activities at CCCDS. Juveniles are motile and should be able to leave any areas of disturbance. Any potential disruption of EFH would be associated with the project activities and therefore will not be long-term. Therefore, no more than minimal impacts on all life stages of Atlantic halibut EFH would be anticipated as a result of this project.

## **Atlantic Sea Scallops**

EFH is designated within all project areas for all life stages of Atlantic sea scallops. Spawning occurs from May through October, with peaks in September and October. Eggs remain of the sea floor until they develop into free-swimming larvae. The first two larval stages are planktonic (for over one month after hatching). They tend to be found in salinities between 16.9 ‰ to 30 ‰. The distribution of the early larval stages is dependent upon the currents in the area. The larvae will metamorphose into spat and settle on bottom habitats with a substrate of gravelly sand, shell fragments, and pebbles, or on various red algae, hydroids, amphipod tubes and bryozoans. They do not survive well on shifting sand bottoms. Juvenile scallops (5-12 mm shell height) leave the original substrate on which they have settled and attach themselves to shells and bottom debris. As young scallops grow, they lose their byssal attachment. Scallops are relatively active until they are about 80 mm in shell height. They can swim to escape predation and disturbances (Hart and Chute, 2004). In general, juveniles and adults are found on bottom habitats with a substrate of cobble, shells and silt in water depths from 59 to 361 feet (18-110 m). No scallops are expected to be present within the canal FNP or waters adjacent to the beach placement, but they are present at the CCCDS (not necessary in an aggregate). Most animals at the disposal site would be able to leave the area of disturbance unless they are directly under the scow during disposal activities. Therefore, no more than minimal impacts on all stages of Atlantic sea scallop EFH would be anticipated as a result of this project.

# **Atlantic Sea Herring**

EFH is designated within the eastern end of the canal and Cape Cod Bay all life stages of Atlantic sea herring (*Clupea harengus*), and western end of the canal for the larvae juveniles and adults. The eggs are found on bottom habitats with a substrate of gravel, sand, cobble and shell fragments, or on aquatic macrophytes, at depths from 66 to 263 feet (20 - 80 meters). They are most often observed during the months from July through November. The larvae are pelagic in water below 16° C, salinities around 32‰, and depths from 164 to 295 feet (50-90 m). Peak abundances of larvae are observed from September through November though may be found in the water column through April. Juvenile and adults are found in bottom habitats with depths of 49 to 443 feet (15-135 m) and water temperatures below 10° C. The eggs, larvae, juveniles, and adults tend to prefer depths that are deeper than those found in the Cape Cod Canal and waters adjacent to the beach placement area. The adults and juveniles are motile and can avoid any disturbances caused by disposal of material at the disposal site. Therefore, no more than minimal impacts would be expected to occur to Atlantic sea herring EFH as a result of this project.

#### Monkfish

EFH is designated within all project areas for eggs and larvae of monkfish (*Lophius americanus*). The eggs are found in surface waters within a mucus veil and are most often

observed during the months from March to September in water depths from 49 to 3,281 feet (15-1000 m). The larvae are pelagic, most found at depths of 98 to 295 feet (30-90 m). The eggs and larvae are found from the Gulf of Maine to Cape Hatteras, so they will only have the potential to be impacted by localized, short-term turbidity associated with disposal activities at CCCDS. Also the eggs and larvae are found in the water column over a seven-month period, while the project activities would have little overlap with the time of year the eggs and larvae are present. Therefore, no more than minimal impacts would be expected to occur to the monkfish EFH.

### Bluefish

EFH is designated within all project areas for bluefish (*Pomatomus saltatrix*) juveniles and adults. Although juveniles and adults are found in the surface waters in North Atlantic estuaries from June through October, EFH for this species is mostly pelagic waters over the Continental Shelf. Bluefish adults are highly migratory. Both adults and juveniles should be able to avoid any areas of disturbances caused by dredging and placement activities. Also the dredging activities are proposed to occur when this species is not within the nearshore waters. Therefore, no more than minimal impacts on bluefish EFH would be anticipated as a result of the proposed project.

### Squid

EFH is designated within all project areas for juveniles and adults of long finned (*Logio pealei*) and short finned (*Illex illecebrosus*) squid. EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina where the highest catches are found. The squid are highly mobile therefore, no more than minimal impact on squid EFH is anticipated.

# Butterfish

EFH is designated within all project areas for all life stages of the Atlantic butterfish (*Peprilus triacanthus*). Butterfish eggs and larvae are pelagic and occur at salinities that range from estuarine (brackish) to oceanic. They have been collected to depths of about 6000 feet (1829 m). Juvenile and adult butterfish are pelagic, form loose schools, often near the surface. Although EFH for the butterfish is within the project area, this species is broadly distributed in north and mid-Atlantic waters from the Gulf of Maine to Cape Hatteras. The adults and juveniles should be able to avoid any potential impacts because of their mobility. Eggs and larvae will only have the potential to be impacted by localized, short-term turbidity associated with the project activities. In 1984 gillnet sampling of the Cape Cod Canal Disposal Site resulted in the capture of four butterfish (5 % of the catch). Therefore, any disruption of EFH as a result of project activity would be temporary and no more than minimal impacts on all life stages of Atlantic butterfish EFH would be anticipated as a result of this project.

# **Atlantic Mackerel**

EFH is designated within all project areas for all life stages of Atlantic mackerel (*Scomber scombrus*). Since all life stages of Atlantic mackerel are generally found offshore, no impacts to Atlantic mackerel EFH are expected within the dredging area or waters adjacent to beach plaement. Atlantic mackerel may also be found in inshore estuarine areas. The eggs are pelagic and occur in water having salinities greater then 34 ‰, floating in surface waters above the thermocline or in the upper 33 to 49 feet (10-15 m). Larvae are primarily distributed at

depths between 33 feet and 425 feet (10-129.5 m). The juveniles and adults change depth seasonally. Atlantic mackerel is a pelagic schooling species distributed in the northwest Atlantic from the Gulf of St. Lawrence to Cape Lookout, North Carolina. Consequently, any disruption of EFH as a result of the project would be associated with disposal activities at CCCDS and therefore short-term. The adults and juveniles should be able to avoid any potential impacts because of their mobility. No more than minimal impacts on all life stages of Atlantic mackerel EFH would be anticipated as a result of this project.

#### Summer flounder

EFH is designated within all project areas for adult summer flounder (*Paralicthys dentatus*). Adult summer flounder migrate into shallow coastal and estuarine waters during warmer months and move offshore during colder months. Nursery areas such as seagrass beds are considered habitat areas of particular concern (HAPC) for summer flounder. Although summer flounder may occur in the project area, primarily, in the eelgrass beds along the sides adjacent to the channel areas, adults should be able to avoid any potential project impacts because of their mobility. Proposed dredging and placement activities are to take place during late fall and winter so there should be no summer flounder in the project areas at that time. Therefore, no more than minimal impacts on summer flounder EFH would be anticipated as a result of this project.

#### Scup

EFH is designated within the Cape Cod Bay area of the project for all life stages of Scup (*Stenotomus chrysops*). The Buzzards Bay side of the project has EFH designated for juvenile and adult scup. Eggs are found in estuaries from May through August. Larvae are found in the nearshore waters from May through September. Scup juveniles and adults have the potential to occur in estuarine systems during the spring and summer months. All life stages of scup prefer salinities greater than 15 ‰. Juveniles and adults use structured areas for foraging and refuge that are not found within the dredge footprint. Juveniles may also be found in eelgrass beds of which some are adjacent to the channel areas to be dredged, but should not be impacted by dredge operations. Scup are highly mobile species and would be expected to have the ability to avoid dredging and disposal activities. Therefore, no more than minimal impacts to Scup EFH would be anticipated as a result of this project.

#### **Black Sea Bass**

EFH is designated for black sea bass (*Centropristus striata*) juveniles and adults within all the project areas. EFH for the juveniles and adults of this species is predominantly within estuarine systems with oceanic salinities. Juveniles and adults are found in estuaries during spring and summer months (May through October) in water temperatures above 6° C and salinities greater than 18 ‰. Black sea bass prefer rough, shelly substrates and can be found in natural and man-made structured habitats. Although sea bass may occur in the project areas, project activities would occur during the months the fish are not typically present. Any adults and juveniles should be able to avoid any potential impacts because of their mobility. Therefore, no more than minimal impacts to black sea bass EFH are anticipated as a result of this project.

# **Spiny Dogfish**

EFH is designated in the project area for juvenile (Cope Cod Bay only) and adult (Cape Cod Bay and Canal) spiny dogfish (*Squalus acanthias*). However, juvenile dogfish are generally found at depths of 33 to1280 feet (10-390 m), much deeper than the waters adjacent to the beach placement but within the depths of the Cape Cod Canal and CCCDS. The spiny dogfish is motile and can swim way from any disturbances. Therefore, no more than minimal impacts to dogfish EFH would be anticipated as a result of this project.

## **Bluefin Tuna**

EFH is designated within all project areas for bluefin tuna (*Thunnus thynnus*) juveniles and adults. Bluefin tuna is a highly migratory species found in pelagic waters of at least 82 feet (25 m) depth. The few that enter coastal waters are highly mobile and can evade any potential short-term water column disturbances as a result of dredging and disposal activities. Therefore, no impacts to highly migratory species would be anticipated as a result of this project.

### **Coastal Migratory Species**

EFH is designated in all project areas for all life stages of the following coastal migratory species: king mackeral (*Scomberomorus cavalla*), Spanish mackeral (*Scomberomorus maculatus*), and cobia (*Rachycentron canadum*). 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, all coastal inlets, and all state-designated nursery habitats of particular importance to coastal migratory pelagics. These species prefer warm water about 20° C. It would be summer before these species would be found in the area, the juveniles and adults can swim away from any disturbances. Therefore, no more than minimal impacts to coastal migratory species EFH are anticipated as a result of this project.

#### Little Skate

EFH is designated within all project areas for juvenile and adult little skates (*Leucoraja erinacea*). The little skate has a coastal distribution; and is found in habitats with sandy, gravelly, or mud substrates of the shallow water in the western Atlantic from Nova Scotia, Canada to North Carolina, USA. This species can tolerate a wide range of temperatures and salinity ranges from 27 to 33.8 ppt. They are found from the surface waters to depths of 295 feet (90 m). The little skate does not appear to have large-scale migrations but they do move to shallower water during the summer and move to deeper water in fall or early winter. The skates are motile should be able to swim from any areas of disturbance. Therefore, no more than minimal impacts to little skate EFH are anticipated as a result of this project.

# Winter Skate

EFH is designated within all project areas for juvenile and adult winter skates (*Leucoraja ocellata*). The winter skate also has a coastal distribution; and is found in habitats with sand and gravel for juveniles and sandy, gravelly, or mud substrates for adults. This species is found in the shallow water in the western Atlantic from Newfoundland Banks and southern Gulf of St. Lawrence in Canada to North Carolina, USA from the surface to depths of 295 feet (90 m). The skates are motile should be able to swim from any areas of disturbance. Therefore, no more than minimal impacts to little skate EFH are anticipated as a result of this project.

# **5.0 SUMMARY OF EFFECTS**

The dredging activities conducted for the Cape Cod Canal maintenance dredging project could potentially have some limited temporary impacts on EFH species found within the vicinity of the canal and Cape Cod Bay. In general, eggs and larvae are more susceptible to impacts than juveniles and adults (Sherk et al., 1975) which can avoid dredging and disposal related disturbance by moving away from the area. Demersal species such as flounders and sea scallops are more susceptible to impacts than pelagic species since most dredging related disturbance occurs near the bottom, but they also tend to be the more tolerant to suspended solids (Sherk et al., 1975). The EFH species with the most potential to be affected by the Cape Cod Canal dredging project are those with demersal eggs (winter flounder, Atlantic sea herring, and Atlantic sea scallops) and those with planktonic eggs and larvae suspended in the water column (red hake, windowpane flounder, and monkfish). These eggs and larvae may be physically damaged or killed from exposure to elevated concentrations of suspended solids. The dredged material is composed of sandy sediments that would rapidly settle out of the water. The dredging and disposal activities are localized and temporary in nature. Mobile organisms such as finfish and lobsters are expected to avoid dredging activities. Juveniles and adults of cod, haddock, pollock, whiting, red hake, white hake, yellowtail flounder, summer flounder, winter flounder (older juveniles), windowpane flounder, ocean pout, halibut, sea scallops, sea herring, black sea bass, scup, bluefish, long finned squid, butterfish, Atlantic mackerel, and scup have the ability to swim from areas of disturbance created by dredging and disposal activities.

Some of the rocky intertidal habitat adjacent to the beach will be directly impacted by placement activities, but the project will be returning sand to a sediment starved beach that was covered with sand previously. As the beach equalizes and erosion of the sediments occurs over time, there will be some indirect impacts to surrounding rocky areas as well. Some of this intertidal rocky area has been recently exposed due to the severe erosion of Town Neck Beach. Macroalgae is found on many of the larger rocks and in the subtidal areas. As the sand moves over time, the algae should be able to re-establish on the top of larger intertidal rocks while there may be some impacts to that found on smaller rocks in the intertidal and subtidal areas as the sand moves through the area. Evidence of this rocky headland has been found in older aerial photos so it is unlikely that the sand moving off the beach will bury the subtidal rock, it will most likely move through the area due to the high wave energy.. As this beach has been eroding the movement of sand through the area is not a new event. Any fish that may use the rocky intertidal area during high tide may have a reduced area of complex structure available for use until the newly placed sand has eroded.

Eelgrass has been found growing in the protected tidepool area of the spit and some sparse plants have found protection behind the rocks on the eastern side of the project. There will be no direct impacts to the eelgrass but the movement of the sediments over time may be beneficial in some areas but detrimental to the growth of eelgrass in others. The eelgrass growing on the eastern side of the project is limited by lack of sandy sediments to grow within. Placement of sand on the beach may provide additional substrate for some plants, but by building up the sediments between the rocks some plants may lose their protection from the high energy waves.

# 6.0 CONCLUSIONS

Although dredging and placement/disposal activities may impact species present in the project areas, the impacts at the dredge site and CCCDS would be temporary. The species inhabiting or utilizing these areas will return following project completion. Hydrological conditions such as tides and currents in the dredge area will not change as a result of the project. Any changes to water quality (TSS) will be temporary and water quality will return to pre-project conditions when the project is complete. Prey species destroyed or otherwise impacted during the dredging process are expected to return and recolonize following project completion. No long-term significant impacts from dredging or disposal at CCCDS are expected.

While no long-term significant impacts are expected from placement of material on Town Neck Beach there will be some loss and/or impacts to rocky habitat in the intertidal area. Without a continual source of sand the material placed on the beach will erode re-exposing the rock habitat in approximately a 2-5 year period. Any intertidal rock habitat covered by the sediments will lose functional value as hard substrate for algae attachment and crevices for defensive cover by marine organisms. The resources of concern use this habitat for protection. The adjacent shallow subtidal habitat provides the same functional value with as much complexity due to the associated macroalgae providing additional coverage for protection. Therefore no long-term significant impacts to local marine organisms and habitat are anticipated from the placement of sandy material on Town Neck Beach.

Additionally, not all areas designated, as EFH for the various species will be impacted. Most species with designated EFH in the Cape Cod Canal project area also have available EFH throughout Cape Cod Bay and Buzzard Bay. The effects of dredging and placement/disposal will be confined to limited areas of Canal Federal navigation project and the placement/disposal site(s). Any potential impacts would be short-term and temporary due to the sandy nature of the material being dredged. Therefore, the species at these locations will be able to sustain the population of their respective species in this geographic region.

# 7.0 REFERENCES

- Clark, D.S. and J. M. Green. 1990. Activity and movement patterns of juvenile Atlantic cod, *Gadus morhua*, in Conception Bay, Newfoundland, as determined by sonic telemetry. *Canadian Journal of Zoology* 68:1434-1442.
- Cote, D., S. Moulton, P.C.B. Frampton, D.A. Scruton, and R.S. McKinley. 2004. Habitat use and early winter movements by juvenile Atlantic cod in a coastal area of Newfoundland. *Journal of Fish Biology* 64:665-679.
- Gotceitas, V., and J.A. Brown. 1993. Substrate selection by juvenile Atlantic cod (*Gadus morhua*): effects of predation risk. *Oecologia* 93:31-37.
- Gotceitas, V., S. Fraser, and J.A. Brown. 1995. Habitat use by juvenile Atlantic cod (*Gadus morhua*) in the presence of an actively foraging and non-foraging predator. *Marine Biology* 123:421-430.

- Gotceitas, V., S. Fraser, and J.A. Brown. 1997. Use of eelgrass beds (*Zostera marina*) by juvenile Atlantic cod (*Gadus morhus*). *Canadian Journal of Fisheries and Aquatic Sciences* 54:1306-1319.
- Grant, S.M. and J.A. Brown. 1998a. Diel foraging cycles and interactions among juvenile Atlantic cod (*Gadus morhua*) at a nearshore site in Newfoundland. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1307-1316.
- Grant, S.M. and J.A. Brown. 1998b. Nearshore settlement and localized populations of age 0 Atlantic cod (*Gadus morhua*) in shallow coastal waters of Newfoundland. Canadian *Journal of Fisheries and Aquatic Sciences* 55:1317-1327.
- Hart, D.R. and A.S. Chute. 2004. Sea Scallop, *Placopecten magellanicus*, Life History and Habitat Characteristics, Essential Fish Habitat Source Document. Second Edition. NOAA Technical Memorandum NMFS-NE-189. US. Department of Commerce, NOAA, NMFS, Northeast Fisheries Science Center, Wood Hole, MA.
- Howe, A.B., S.J. Correia, T.P. Currier, J. King, and R. Johnston. 2002. Spatial distribution of Ages 0 and 1 Atlantic cod (*Gadus morhus*) off the eastern Massachusetts coast, 1978-1999, relative to 'Habitat Area of Special Concern'. Technical Report TR-12, Massachusetts Division of Marine Fisheries, Pocasset, MA.
- LaSalle, M. W., D. G. Clarke, J. Homziak, J.D. Lunz, and T.J. Fredette. 1991. A framework for assessing the need for seasonal restrictions on dredging and disposal operations. Technical Report D-91-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A240 567.
- Lough, R.G., P.C. Valentine, D.C. Potter, P.J. Auditore, G.R. Bolz, J.D. Neilson, and R. I. Perry. 1989. Ecology and distribution of juvenile cod and haddock in relation to sediment type and bottom currents on eastern Georges Bank. *Marine Ecology Progress Series* 56:1-12.
- Methven, D.A. and C. Bajdik. 1994. Temporal variation in size and abundance of juvenile Atlantic cod (*Gadus morhua*) at an inshore site off eastern Newfoundland. *Canadian Journal of Fisheries and Aquatic Sciences* 51:78-90.
- Methven, D.A. and D. C. Schneider. Gear-independent patterns of variation in catch of juvenile Atlantic cod (Gadus morhus) in coastal habitats. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1430-1442.
- Pratt, S.D. 1978. Impacts of Power Plant Construction on Sediment Erosion, Transport and Deposition. In: An Environmental Study of a Nuclear Power Plant at Charlestown, Rhode Island. Phase II. Mar. Tech. Report 64, University of Rhode Island.

- Ryan, M.R., S.S. Killen, R.S. Gregory, and P.V.R. Snelgrove. 2012. Predators and distance between habitat patches modify gap crossing behavior of juvenile Atlantic cod (*Gadus morhua*, L. 1758). Journal of Experimental Marine Biology and Ecology 422-423:81-87.
- Sherk, J.A., J.M. O'Connor, and D.A. Neumann. 1975. Effects of suspended and deposited sediments on estuarine environments. *Estuarine Research* 2:541-558.
- Thayer, G.W., W.J. Kenworthy, and M.S. Fonseca. 1984. The Ecology of Eelgrass Meadows of the Atlantic Coast: A Community Profile. U.S. Fish Wildl. Serv. FWS/OBS-84/02. 147 pp. Reprinted September 1985.
- Theodorou, P., S.S. Snorrason, and G.Á. Ólafsdóttir. 2013. Habitat complexity affects how young of the year Atlantic cod *Gadus morhua* perceive predation threat from older conspecifics. *Journal of Fish Biology* 82:2141-2146.
- Tupper, W., and R.G. Boutilier. 1995. Effects of habitat on settlement, growth, and postsettlement survival of Atlantic cod (*Gadus morhus*). Canadian Journal of Fisheries and Aquatic Sciences 52:1834-1841.

#### CENAE-PN

#### 28 April 2015

#### MEMORANDUM FOR THE COMMANDER

SUBJECT: Proposed Maintenance Dredging and Advanced Maintenance of the Cape Cod Canal Federal Navigation Project in Bourne and Sandwich, Massachusetts.

Attached for your signature are the Statement of Findings, Clean Water Act Section 404 (b)(1) Evaluation, and Findings of No Significant Impact (FONSI) for the maintenance dredging at the subject project.

Bill Koranavgl

Bill Kavanaugh Programs and Project Management Division

Attachments

# Statement of Findings

<u>Prepared by</u>: Valerie Cappola, Environmental Resources Section, Bill Kavanaugh, Navigation Section, and Michael Riccio, Planning Section.

#### Date Prepared: April 28, 2015

Waterway: Cape Cod Canal FNP, Cape Cod Bay and Buzzards Bay, Massachusetts

#### Proposed Action:

The authorized FNP provides for a 600 foot long jetty and a 3000 foot long breakwater at the east end of the Canal; a channel, 32 feet deep and varying in width (i.e. from 500 – 700 feet) throughout its 17.5 mile length, and two mooring basins: the West Mooring Basin, 32 feet deep and the East Mooring Basin (EMB), 25 feet deep.

The Cape Cod Canal (CCC) connects Buzzards Bay and Cape Cod Bay. Use of the CCC saves mariners an average of 135 miles of coastal travel while circumnavigating Cape Cod and the Nantucket shoals. Roughly 14,000 commercial and recreational vessels transit the 17.4 mile waterway each year. The project is used extensively by deep-draft vessels including oil tankers, tug and barge combinations, cargo and container vessels, cruise ships and passenger ferries as well as recreational vessels. The FNP is part of the Intra-Coastal Waterway and is an integral segment of the corridor for petroleum products being delivered to the northeast region.

The CCC is a highly dynamic area characterized by a combination of extremely strong tidal currents and unpredictable shifting shoals that form in various locations throughout the project. This combination creates hazardous conditions for the deep draft vessels that use the project and increases the risk of a grounding occurring within the Canal. Shoaling in the main-ship channel consists of large sand wave formations. Recent hydrographic surveys indicate that shoaling has occurred in six areas of the project and the controlling depth in the Canal proper is now at 30' below Mean Lower Low Water (MLLW). The reduction in available depth is significant and has resulted in draft restrictions being placed on vessels transiting the Canal, tidal delays and hazardous conditions for deep-draft commercial vessels transiting the Canal. Shoaling in the EMB limits the available space to moor vessels in emergencies (e.g. icing). Further shoaling in the Canal may result in some deep draft vessels having to completely avoid using the Canal and transit around Cape Cod thereby significantly increasing the risk profile of these vessels, especially during the winter months and may have adverse economic impacts on the cost of products being delivered to and from the northeast region.

The proposed work involves maintenance dredging and advance maintenance dredging to remove approximately 150,000 cubic yards (cy) of clean sand and gravel from six areas in the authorized, 32 foot deep by 500 foot wide, main-ship channel and the 25 foot deep EMB portions of the project. In order to extend the time between maintenance dredging events, advance maintenance will be performed to reduce the

sand wave shoals to that of the surrounding environment. The six shoal areas in the authorized 32 foot deep main-ship channel will be dredged to depths ranging from -36 feet MLLW to -40 MLLW (includes 2 feet of allowable over-depth). The authorized 25 foot deep EMB will be dredged to -34 feet MLLW. The proposed work will be performed by a hydraulic hopper dredge within a three to four month period during the late fall of 2015 to early spring 2016.

A study is currently underway under the authority of Section 204 of the Water Resources Development Act of 1992 (as amended) to evaluate the Federal interest in beneficially re-using the dredged material from the CCC project to rebuild the dunes and beach berm on a 2,500 foot long eroded section of Town Neck Beach in Sandwich. Town Neck Beach has experienced increased erosion (currently estimated to be about 5 feet per year) due in large part to severe coastal storms such as Hurricane Sandy and more recently, Winter Storm Juno.

The town of Sandwich has been identified as the non-Federal sponsor for cost sharing of the study and for the potential beach nourishment. If the 204 study is completed in time to coincide with this maintenance dredging event then the material dredged from the Canal could be placed on Town Neck Beach; the cost of which would be shared between the Federal government and the town of Sandwich at a 65 percent and 35 percent ratio, respectively. The preliminary indications are that the study will result in a positive benefit/cost ratio, The town of Sandwich has also expressed interest in receiving the material dredged from the maintenance dredging of the Canal regardless of the outcome of the Section 204 study and has expressed a willingness to pay any additional costs over and above the Federal base plan (i.e. dredging and placement of the material at the Cape Cod Canal Disposal Site (CCCDS)) to have material placed on Town Neck Beach.

Alternatively, if for any reason the dredged material cannot be placed on Town Neck Beach (e.g. non-Federal funding is unavailable), the CCCDS would be used for the disposal of the dredged material from the Cape Cod Canal maintenance dredging. The CCCDS is a circular area, one nautical mile in diameter, located about 3 nautical miles northeast of the east entrance to the Cape Cod Canal. The CCCDS was last used for disposal of material dredged from the Canal in 1990.

### **Coordination with Federal Agencies:**

**US Environmental Protection Agency (EPA):** The material to be dredged has undergone physical testing performed in coordination with the EPA and other agencies. The EPA concurred with our determination that the material to be dredged is suitable for beach placement as proposed. On February 10, 2015 a letter along with a copy of the draft Environmental Assessment (EA) was sent to the EPA requesting review and comments relative to Section 176 (c) and 309 of the Clean Air Act (CAA). The EPA responded in a letter dated March 12, 2015 which stated that the project, as proposed, meets the requirements of Sections 176(c) and 309 of the CAA. EPA also encouraged us to monitor the eelgrass beds found seaward of the proposed project.
**National Marine Fisheries Service (NMFS)**: A letter dated February 10, 2015 was sent to NMFS, Office of Protected Resources which summarized the project, requested information about any additional threatened or endangered species, and requested concurrence with our determination of "not likely to adversely affect any species under NMFS' jurisdiction". Via email, NMFS requested additional information concerning the endangered Right Whale and its critical habitat. NAE provided the requested information in a second letter dated March 16, 2015. In a letter dated April, 14, 2015, NMFS concurred with our determination that the maintenance dredging of Cape Cod Canal FNP with placement on Town Neck Beach or at the CCCDS is not likely to adversely affect any listed species under NMFS jurisdiction as all the effects from the proposed project will be insignificant or discountable as long as an endangered species observer is present on the hopper dredge if transiting between the CCC and CCCDS.

Essential Fish Habitat (EFH): A letter summarizing the project as well as our EFH assessment was sent to NMFS, Division of Habitat Conservation on February 10, 2015. NMFS responded in a letter dated March 20, 2015 and provided two EFH conservation recommendations. NAE responded in a letter dated April 3, 2015. In this letter NAE did not agree with NMFS' recommendations. NAE disagreed with the first recommendation that the scope of the project should be minimized to eliminate the placement of material on all rocky habitats, because this would impact building the beach in a manner that would protect the residences behind the dunes. The second recommendation focused on re-suspended sediments potentially impacting the existing eelgrass. This eelgrass is beyond the project area and sediment moves and settles into the area naturally due to winter storms so the proposed work is not expected to create unnatural conditions that would be detrimental to the health of eelgrass.

**U.S. Fish and Wildlife Service (USFWS):** A letter dated February 10, 2015 was sent to USFWS summarizing the project, requesting information about any additional threatened or endangered species in the project area and asking for final coordination under the Fish and Wildlife Coordination Act and concurrence with our determination that the project is not likely to adversely affect any ESA species under USFWS jurisdiction. Part of the determination was based on the town of Sandwich monitoring the nesting shorebirds on the beach. Since the town of Sandwich was also requesting concurrence for a larger project that includes our project area, USACE Regulatory Division sent a letter to USFWS dated March 26, 2015 requesting concurrence for the determination of not likely to adversely affect any ESA species for the Town Neck Beach in its entirety. USFWS concurred with USACE's determination that the proposed dredging of the CCC and beach nourishment on Town Neck Beach is not likely to adversely affect dated April 29, 2015. USFWS letter also determined that the proposed project will only have minimal effects on fish and wildlife resources providing a Fish and Wildlife Final Coordination Act Report (FCAR).

## **Coordination with State Agencies:**

**Massachusetts Executive Office of Energy and Environmental Affairs (OEEA):** NAE made a determination that the work, as proposed, is consistent to the maximum extent practicable with the Massachusetts Coastal Zone Management (MACZM) Program. A letter describing the project and requesting MACZM consistency concurrence was sent to the OEEA Office of Coastal Zone Management along with a copy of the draft EA and applicable MACZM program policies on February 10, 2015. On March 30, 2015, MA OEEA requested an extension to complete their review of the project that was approved by NAE. On April 6, 2015 MA OEEA concurred with our MACZM Program Consistency Determination for the proposed work.

**Massachusetts Department of Environmental Protection (MADEP) – Water Quality Wetlands and Waterways:** A cover letter; an application packet and a copy of the draft EA were all sent to the MADEP on February 10, 2015. A 401 WQC was re-issued by MADEP on April 3, 2015. The WQC required a "no dredge" window between May 1 and June 30 at the Onset Shoal area to protect horseshoe crabs, a 75 foot buffer between the seaward edge of the nourishment and the eelgrass, no equipment or pipeline placed within 25 feet of the eelgrass beds, and run-off from the sediment slurry after it is pumped on the beach be directed away from the eelgrass.

**Massachusetts Division of Marine Fisheries (MADMF):** The MADMF generally reviews proposals including those that involve maintenance dredging of a FNP. MADMF received a copy of the draft EA and was copied on our letter to MADEP summarizing the project. They responded after a review of our public notice in a letter dated March 2, 2015. They recommended a 75 foot buffer between the dredge slope and eelgrass beds in the Onset area of the Canal and between the seaward extent of the nourishment area and eelgrass. They also requested a May 1 to June 30 time of year restriction for horseshoe crab spawning and May 1 to November 1 restriction to protect shore-zone and juvenile fishes. All dredging is proposed to take place between November 1 and March 31. Therefore, the MADMF-proposed time of year restrictions were adopted by default. The eelgrass buffer naturally occurs at both the dredging and placement sites.

**Massachusetts Natural Heritage and Endangered Species Program (NHESP):** In response to the public notice, the NHESP agreed that due to the time of year restrictions, continued monitoring of the shorebirds (Town's responsibility), and the design of dunes and beach, that no significant impacts to any endangered species will occur as a result of the proposed project. They also support additional research to find a long-term solution to the sediment transport issues in the area.

**Massachusetts Historical Commission – State Historic Preservation Officer** (SHPO): A letter dated January 12, 2015 was sent to SHPO describing the project and requesting concurrence that the proposed project would have no effect upon any structure or site of historic, archaeological or architectural significance as defined by Section 106 of the National Historic Preservation Act. In response to a letter from the Town of Sandwich, the SHPO sent them a copy of our letter for dredging the Canal and recommended that they write to us with any comments. On April 3, 2015 the SHPO sent a letter to the USACE Regulatory Division concerning the Town of Sandwich Dune and Beach Reconstruction Project and the use of dredged Canal sediments for placement on Town Neck Beach. The SHPO stated that the project is unlikely to affect any significant historic and archaeological resources.

**Massachusetts Board of Underwater Archaeological Resources (BUAR):** In letter dated February 3, 2015 in response to the public notice, the BUAR indicated that they found no record of any underwater archaeological resources in the project areas. The project area is considered to be archaeologically sensitive so if any unknown resources are encountered appropriate steps should be taken to limit adverse impacts and notify the BUAR and SHPO.

## **Coordination with Town Agencies:**

**Sandwich Department of Natural Resources:** Mr. Mark Galkowski, Director of the Sandwich Department of Natural Resources sent a letter dated March 16, 2015 to the Regulatory Division stating the Town has the resources and commitment to monitor the entire Town Neck Beach area for piping plovers.

**Sandwich Historical Commission:** USACE received an email from the Sandwich Historical Commission on January 30, 2015 requesting information on the Section 106 Review. The information was sent, there was a phone call follow up and Mr. Michael Riccio one of the Project Managers met with Ms. Lisa Hassler from the Commission. In a letter dated April 1, 2015, the Town of Sandwich Historical Commission expressed support for the placement of dredge material on Town Neck Beach and expressed concern about the interruption of the sediment transport. They requested to be consulted during the Section 111 study.

## **Coordination with the Public:**

**Public Notice:** An electronic public notice designed to provide information about and seek comments on the proposed work was issued on February 2, 2015. The comment period closed on March 3, 2015 and there were eight responses, including one from the Massachusetts Natural Heritage and Endangered Species Program (NHESP), one from Massachusetts Division of Marine Fisheries, and one from the Massachusetts Board of Underwater Archaeological Resources (BUAR). See the above sections for details. Additionally, there were five email responses from local individuals, most asking about placing some material on Spring Hill Beach. USACE responded to these comments in letters dated April 20, 2015 which advised that due to the limited amount of material available and the natural coastal processes occurring at this location that placing the sand at the westernmost location is expected to benefit the longest stretch of shoreline.

**Private Dredging:** No private dredging will be performed in conjunction with the Federal dredging.

**Environmental Effects and Impacts**: The attached Environmental Assessment (EA) was prepared for the proposed work and considers the potential environmental impacts associated with the project. The EA was coordinated with both the Federal and Commonwealth of Massachusetts resource agencies and is in compliance with all applicable environmental laws and regulations. The project as proposed complies to the maximum extent practicable with all applicable Coastal Zone Management Program policies. The project as designed is not expected to have any significant adverse impacts on the environment.

**Determination:** The attached EA includes consideration of dredging, and dredged material management alternatives (including the no-action alternative), cumulative impacts and a Finding of No Significant Impact. Dredging and dredged material management alternatives (including the no-action alternative) and cumulative impacts can be found in Sections 4.0 and 9.0 of the EA. All conditions necessary to meet the Commonwealth of Massachusetts' Water Quality standards and to be consistent with the Coastal Zone Management Program will be met to the maximum extent practicable.

**Findings and Conclusions:** In view of the foregoing, and in review of the administrative record for this project, I find that maintenance dredging and placement of the dredged material for this project is in the general public interest and that there is no significant unaddressed objection to the project from the standpoint of navigation, natural resources, water quality, or public interest. Therefore, the maintenance dredging of the Cape Cod Canal Federal Navigation Project in Buzzards Bay Cape Cod Bay, Massachusetts along with the placement on Town Neck Beach or placement at the CCCDS of the dredged material from the project as described herein, is hereby authorized.

4MA7 15

Date

Christopher J. Barron Colonel, Corps of Engineers District Engineer