

**GREAT CHEBEAGUE ISLAND
MAINE
NAVIGATION IMPROVEMENT PROJECT**

**APPENDIX K
BENTHIC COMMUNITY ANALYSIS**



June, 2018

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TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	MATERIALS AND METHODS.....	1
2.1	Sediment Sampling for Benthic Community Analysis	1
3.0	RESULTS AND DISCUSSION	2
3.1	Benthic Community Analysis	2

TABLES

Table 1: Summary of Benthic Community Analysis for Great Chebeague Island Improvement Project Areas	3
Table 2: Visual Sediment Type Descriptions	4

FIGURES

Figure 1: Benthic Sample Locations within the Great Chebeague Island Improvement Project	5
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1.0 INTRODUCTION

The Town of Chebeague Island is comprised of several islands located in the upper portion of Casco Bay, in Cumberland County, Maine. Great Chebeague, the largest and most populated island, is the center for town commerce and features a landing and stone pier along the northwest shore which serves as the town's principal link to the mainland. Town officials report that shallow water depth hinders operation of the many activities that rely on the landing, including commercial fishing, barging, and ferry operations. As the Island's principal landing, public safety, the island economy, and island services all depend on adequate access to the mainland from this point.

The Town of Chebeague Island has requested that the New England District (NAE) of the U.S. Army Corps of Engineers (USACE) investigate the potential of establishing a federal channel to allow full time vessel traffic to the Great Chebeague Island landing. The results of this investigation determined that a 0.5 acre turning basin and a 100 to 150 feet wide channel extending approximately 1,600 feet from the stone pier northwest to deep water would be required to meet the project objectives. The dredged depths for the turning basin and channel would be 8 and 10 feet, respectively, at mean lower low water (MLLW) plus 1 foot of allowable overdepth. This would produce approximately 33,000 cubic yards of mixed gravel, sand, and silt. It is expected that this material would be mechanically dredged and placed at the Portland Disposal Site (PDS).

In July of 2017, field studies were conducted to provide baseline information on biological resources, specifically the benthic communities, of the proposed improvement portions of the study area.

2.0 MATERIALS AND METHODS

2.1 Sediment Sampling for Benthic Community Analysis

Survey efforts were conducted on 18 July of 2017 by staff from the NAE Environmental Resources Section. Work was carried out on a 17 foot Boston Whaler outfitted for shallow water survey operations. Positioning was achieved using a Hemisphere R330 Global Positioning System (GPS) receiving real time differential corrections. The system was interfaced with a computer running Hypack® for navigation.

Six sample locations were established within the project area to collect samples for benthic community analysis. All stations were located within proposed improvement areas (Figure 1). At all stations, a 0.04 m² sized VanVeen grab sampler was used to collect benthic samples for community analysis. Visual descriptions of the sediments were noted for each sample location. No samples were obtained from Station #5 as the entire bottom at Station #5 was covered in a dense layer of leaf litter and macroalgal wrack.

Each sample was sieved with seawater thorough a 0.5 mm sieve and preserved in 10% formaldehyde with 0.1% rose Bengal stain. Samples were kept in formaldehyde solution

until processed at the NAE environmental laboratory located at Fort Devens, MA. At the time of processing the samples were washed on a 0.5 mm sieve to remove the preservative and remaining fine sediment. The material was then sorted under a low-power dissecting microscope where organisms were removed from the sediments and transferred to jars containing 70% ethanol. Organisms were identified to the lowest taxon possible and enumerated.

3.0 RESULTS AND DISCUSSION

This section summarizes results obtained from benthic community analysis of sediments from the within the Great Chebeague Island improvement project.

3.1 Benthic Community Analysis

Five grab samples for benthic community analysis were processed at the NAE Environmental Laboratory. Counts of organisms in each sample location are summarized in Table 1.

The benthic communities of the improvement areas in the Great Chebeague Island Harbor contained a mix of both stable community benthic species (*Clymenella torquata* and *Tellina agilis*) and opportunistic benthic species (*Streblospio benedicti*). The species noted in Table 2 represent that of a typical fine sand/silt environment dominated by deposit feeders. The benthic communities in these sandy-silty sediments ranged in diversity (i.e., the number of species per sample) from 7 to 10 species per location (Table 2). Individuals tended to be distributed evenly among species.

Table 1. Benthic invertebrates collected from the Great Chebeague Island Navigation Improvement Areas in July, 2017. Numbers are per 0.04 m²

STATION NUMBER	1	2	3	4	5	6
ANNELIDA						
POLYCHAETA						
<i>Clymenella torquata</i>	-	4	3	-	N	1
<i>Glycera dibranchiata</i>	1	6	3	6	O	3
<i>Lumbrineris</i> spp.	-	4	-	-		-
<i>Mediomastus ambiseta</i> .	-	4	2	1	S	3
<i>Neanthes virens</i>	2	-	-	2	A	1
<i>Nephtys picta</i>	2	4	2	-	M	-
<i>Paraonis</i> spp.	-	7	5	44	P	31
<i>Spio setosa</i>	14	1	-	-	L	-
<i>Streblospio benedicti</i>	2	15	8	3	E	8
ARTHROPODA – CRUSTACEA						
AMPHIPODA						
Unidentified Ampeliscidae	1	-	1	1		1
<i>Leptocheirus pinguis</i> .	-	-	-	1		-
CUMACEA						
<i>Diastylus</i> spp.	-	-	-	2		-
MOLLUSCA						
BIVALVIA						
<i>Pitar morhuanna</i>	-	-	-	-	-	1
<i>Tellina agilis</i>	-	20	-	4		3
<i>Solemya velum</i>	2	-	-	-		-
NEMERTEA						
<i>Cerebratulus</i> spp	-	1	-	-		-
INDIVIDUALS / SAMPLE	24	66	24	64		52
SPECIES / SAMPLE	7	10	7	9		9

**Table 2: Visual Sediment Type Descriptions
from Great Chebeague Island Benthic Samples.**

Sample ID	Sediment Description
Station 1	Gray fine sand and silt
Station 2	Gray fine sand and silt
Station 3	Black silt and eelgrass wrack – no live eelgrass shoots noted
Station 4	Gray medium & fine sand and silt – some gravel
Station 5	No sample collected – dense layer of leaf litter and macroalgal wrack
Station 6	Medium – coarse sand and gravel – some shell hash

