

**DINGLEY ISLAND SHELLFISH  
STUDY**

**Prepared for:  
MAINE CORPORATE WETLAND  
RESTORATION PARTNERSHIP**

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# DINGLEY ISLAND SHELLFISH STUDY

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### **ATTACHMENTS** *[not included here]*

ATTACHMENT 1 – FIGURES

ATTACHMENT 2 – SITE PHOTOGRAPHS

ATTACHMENT 3 – DATA TABLES

ATTACHMENT 4 – BACKGROUND MATERIALS

## Section 1

# Introduction

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Dingley Island is a small island located in Cundy's Harbor, Harpswell, Maine. Historically, the island was connected to the mainland by a small bridge that allowed water to flow through. The current causeway, built in the 1940's, is solid and does not allow any tidal flow between the north and south sides. The Dingley Island Tidal Flow Restoration Project consists of replacing a section of the existing causeway with a bridge and reestablishing natural tidal flow between the clam flats on either side of the causeway. The Town of Harpswell expressed concern about the potential impacts of the project to the existing clam-flats. The Dingley Island clam-flats, harvested for soft-shell clams (*Mya arenaria*), are considered to be of significant value; average harvested value of the annual clam harvest in these flats is \$225,000. Due to the concern over the clam resources, the Maine Corporate Wetland Restoration Program (CWRP) was asked to fund some preliminary engineering and biological feasibility studies. A description of these studies is attached. Duke Engineering & Services, Inc. (DE&S) donates services to the ME-CWRP and was requested to conduct some of these studies. The biological study consisted of providing baseline data on shellfish population on either side of the causeway as far as current population boundaries (about 300 feet) and provide an assessment on the potential impacts of the project on the clam flats. The clam survey will also allow for comparison to post-construction conditions in the future. This report concerns the biological study.

## Section 2

# Methods

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An initial site review and meeting with the project coordinator, Elsa Martz, was made on August 24, 2001. Ms. Martz provided some background and historical information on the project. A clam population survey was conducted in the area of the Dingley Island causeway using guidelines provided in “The Maine Clam Handbook” (Maine DMR 1998). Transects across the tidal flat were located every 100 feet starting from just north and south of the causeway (Figure 2) (Attachment 1). Because of the flats are relatively narrow, sample plots (1 foot by 2 foot) were taken every 50 feet along the transects (instead of the recommended 100 foot interval). Each plot was excavated to a depth of about 12 inches and all clams found were counted and measured. Spat were sampled in every other plot by removing the top two to three inches of sediment on 1/4th of the plot and screening it gently through a 1/4-inch mesh screen.

Preliminary information described the main area harvested for soft-shell clams was approximately 300 feet to the south of the causeway. In order to assess any potential post-construction impacts to the existing clam flat, the area 600 feet south of the causeway was surveyed. The survey area north of the causeway was limited to 300 feet as requested for feasibility studies.

## Section 3

# Results

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### 3.1 South side of Causeway

The survey of the tidal flat south of the causeway was conducted on the afternoon of October 14 and 15, 2001. According to the tide chart for South Harpswell, there was a -0.3 foot low tide at 3:34 on the 14<sup>th</sup> and -0.9 foot low tide at 4:31 on the 15<sup>th</sup> (URL [www.maineharbors.com/octhar01.htm](http://www.maineharbors.com/octhar01.htm)). The width of the tidal flat survey area ranged from 150 to 211 feet. Substrate consisted primarily of fines (silt, mud and clay). Sediment near the existing salt marsh and causeway had a moderately high organic content while sediment furthest from causeway (500 to 600 feet) had a significant amount of shell material mixed with coarse sand and clay underneath several inches of unconsolidated fines (Figure 3) (Attachment 1). A total of 33 plots were sampled with only 30 soft-shell clams found. Sizes ranged from 26 mm to 87 mm (Table 1). Most clams found were along the shoreline edges of the flat and over half the clams were in the last two transects, 500 and 600 feet south of the causeway. No spat were observed in any plots. A couple of live quahogs (*Mercenaria mercenaria*) and many *Macoma sp.* were also found as well as abundant shell material.

### 3.2 North side of Causeway

The survey on tidal flat north of the causeway was conducted on the afternoon of October 16, 2001. Low tide was at 5:24 and had a height of -1.3 (URL [www.maineharbors.com/octhar01.htm](http://www.maineharbors.com/octhar01.htm)). The tidal flat area near the causeway is narrower than the south side, ranging from 123 feet to 164 feet at the tip of the ledge outcrop (Figure 4) (Attachment 1). No attempt was made to survey the area behind the ledge outcrop. Sediments were primarily unconsolidated silt, mud and clay and moderately enriched with organic material, especially near the causeway. A total of 15 plots in four transects were sampled. Eleven clams were found, and ranged in size from 47 mm to 67 mm (Table 2) (Attachment 3). Most of these were located in the transect 300 feet from the causeway and appeared to be on the outside edge of the existing clam bed. No spat were observed.

## Section 4

# Discussion

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### 4.1 Evaluation of Existing Conditions

Based on the survey conducted in October, the areas of the tidal flats near the causeway do not support a significant soft-shell clam population. Few clams were found in the predominantly soft sediments and there was no evidence of future recruitment. As you move further from the causeway, the sediments become coarser and these areas are commercially harvested for soft-shell clams. The amount of unconsolidated fines increased near the causeway and the apparent organic load also increased. Some of the sediments very near the causeway were nearly black and had the distinct odor of decomposition, which are indicative of low dissolved oxygen. These conditions are not generally productive for soft-shell clams. A comment had been made that the area near the causeway supported a dense clam population but that the clams had already been harvested prior to the survey. If that were true, we would expect to find some clams too small to legally harvest as well as a few legal sized clams that had been missed. The regional shellfish biologist was contacted to discuss the results of the survey. He was in agreement with our assessment and added that his previous efforts to locate clams near the causeway had not been successful (Personal communication with Don Card, Shellfish Biologist for the Department of Marine Resources).

### 4.2 Assessment of Potential Impact of New Bridge

Re-establishing flow between the south and north tidal flats are not expected to impact the existing clam populations and may well improve conditions near the causeway where they do not currently occur. The rate of sedimentation for fines (silt and clay) near the causeway has increased since the construction of the causeway (DOC memorandum dated November 9, 2000) (Attachment 4) and is expected to continue under existing conditions. Productive populations of soft-shell clams generally prefer a mix with coarser substrates such as sand. Also, the warmer water temperatures of relatively stagnant water over sediment with high oxygen demand probably result in lower dissolved oxygen levels in the water. Reestablishing flow over these substrates may help improve oxygen levels that may be more suitable for clams. This contention was also supported by another biologist who was previously consulted on this project (MER Assessment Corporation memo undated) (Attachment 4).

Based on the hydrologic evaluation of construction of a bridge that would allow for flow through the tidal flats, the existing sediments would remain basically as they exist now (Dingley Island Sedimentation Assessment by DE&S, October 2001). Thus the existing clam population located at least a few hundred feet from the existing causeway is not expected to be impacted by the bridge construction. Only a small area immediately adjacent to the open area under the bridge is expected to have enough flow velocity to remove some of the finer substrate. The small rivulet channel draining the tidal flat would also be expected to increase slightly and have the smaller fines removed. The larger tidal flat area that exists today should remain essentially the same. These basic assessments are in agreement with the assessment made by the Maine Geological Survey (DOC memo dated November 9, 2000) (Attachment 4).

## Section 5

# References

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Maine Department of Marine Resources. 1998. The Maine Clam Handbook- A Community Guide for Improving Shellfish Management. Produced by the Maine/New Hampshire Sea Grant Program, Maine Coastal Program, Maine State Planning Office and Maine Department of Marine Resources. 75pp.

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