

Qualitative Assessment of the Subtidal Benthic Fauna and Macroalgae near Seal Cove, Maine

By

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Methodology

The benthic and epibenthic macrofauna (> 2 mm) and flora of a small area of Seal Cove, Tremont, Maine (approximate Latitude: 44° 17.034' N; Longitude: 68° 25.070' W) were surveyed qualitatively and semi-quantitatively during the afternoon low tide of 2 June 2005. The area is henceforth referred to as the "Egbert Proposed Pier," and the land adjacent to the proposed pier site can be found using the Town of Tremont Tax Map #8, Lot #9. A certified SCUBA diver was instructed to dive within the footprint of the Egbert Proposed Pier (Fig. 1a, b) that is described in a Maine Department of Environmental Protection "Permit by Rule Notification Form" filed on 23 December 2004 and revised on 18 January 2005. The diver made visual observations of the benthos (mud, ledge, cobble, etc.), fauna, and flora from the shore to approximately 350 feet from the shore within the footprint. Also, the diver was instructed to collect flora and fauna that were representative of that subtidal location. In addition, three benthic cores were taken in areas within the footprint containing sandy mud using a circular coring device (15.2 cm diameter x 8 cm deep).

Most of the collected macroalgae and invertebrates were identified to species and a representative sample of the larger-bodied organisms was measured (shell length for bivalves and gastropods; shell width for crustaceans; test diameter for sea urchins; body width of asteroids) to the nearest 0.1 mm using a Vernier caliper. Core samples were immediately brought to the surface and washed through a sieve with a 2 mm aperture.

Results

Site description

The subtidal bottom type within the footprint varied with distance from the shore. Within 100 feet from the shore at low tide, the bottom was comprised of small rock and cobble and some ledge that extends from the intertidal. From 100 feet to 350 feet, the bottom was sandy mud dominated by eelgrass, *Zostera marina*, with occasional boulders and small rock outcrops inhabited by large (> 1 m) macroalgae, the sugar kelp, *Laminaria saccharina*. At low tide, water depth from the shore to 350 feet did not exceed 12 feet. Although no close inspection of the intertidal area adjacent to the subtidal footprint (Figure 2) occurred, visually, this area was typical of other semi-exposed intertidal areas in that the main organism attached to ledges and rocks was the knotted wrackweed, *Ascophyllum nodosum*. Generally, this macroalgae and the other fucoid, *Fucus vesiculosus*, serves as a refuge for small fish (e.g., stickleback [*Gasterosteus* spp.], mummichogs [*Fundulus* spp.], juvenile pollock [*Pollachius virens*]), sand shrimp (*Crangon septemspinosa*), and other small crustaceans. Commonly, *Ascophyllum* and *Fucus* provide cover for intertidal populations of the green crab, *Carcinus maenas*.

Although lobster buoys were observed outside (southeast) of Seal Cove in water depths greater than 50 feet, no buoys or traps were observed within the footprint on the survey date. Several lobsters, *Homarus americanus*, were seen crawling from under small boulders when they were disturbed in the area. These events were unexpected because lobsters usually do not move into shallow water until seawater temperatures exceed 13-15°C. This observation, and the favorable bottom type for later season molting (shedding) (macroalgae and eelgrass), suggests that this area

would be ideal for a late summer/early fall lobster fishery. Additional surveys later in the summer and early fall would provide an unambiguous assessment of this assertion.

Qualitative Assessment of Benthic Fauna and Flora

In muddy areas with eelgrass, the bottom was dominated by the common periwinkle, *Littorina littorea*. A subsample of individuals ranged from 19.2 mm to 26.2 mm (mean SL $\pm$ 95% CI = 21.3 ± 1.4 mm, $n = 14$). Hundreds of small, seven-spined sand shrimp, *Crangon septemspinosa*, were observed within the eelgrass meadow. In areas near boulders where macroalgae such as kelp and other species of brown algae such as *Desmarestia aculeata* and red algae, *Ceramium nodulosum*, were common, the diver found many juvenile sea urchins, *Strongylocentrotus droebachiensis* (mean test diameter = 28.1 ± 5.2 mm, $n = 6$) and two species of cancrid crabs (rock crab, *Cancer irroratus*, mean shell width = 97.1 ± 14.8 mm, $n = 8$; jonah crab, *Cancer borealis*, $n = 2$ individuals measured: 133.4 mm and 145.0 mm). Both jonah crabs and seven of the eight rock crabs were male.

Closer to shore where more rocks and ledge occurred, the diver observed blue mussels, *Mytilus edulis* (mean SL = 80.9 ± 4.4 mm, $n = 7$). These were old individuals (> 8 yrs) and had coralline algae (*Lithothamnion* spp.) growing on the valves. In addition, many small amphipods, *Gammarus* spp. were observed in this area, as were dead and disarticulated valves of the ocean quahog (*Arctica islandica*), soft-shell clam (*Mya arenaria*), and razor clam (*Ensis directus*).

Many hermit crabs, *Pagurus acadianus*, utilizing the shells of periwinkles (20.6 mm to 26.4 mm), were seen in both locations. Several dead valves of the blue mussel and a the shell of a dead gastropod, the common whelk, *Buccinum undatum*, were inspected and juvenile boring clams, *Hiatella arctica*, slipper limpets, *Crepidula fornicata*, and the common tortoiseshell limpet, *Tectura testudinalis*, were observed attached to these shells. In addition, a large sea anemone, *Metridium senile* (basal diameter = 85.6 mm) was sampled from a rock outcrop.

Benthic cores

Three core samples were taken in soft bottom areas within the proposed footprint. The first sample came from shallow water (4-5 feet) approximately 150 feet from the shore. It contained several polychaete worms such as the bamboo worm, *Clymenella torquata*, and *Praxillella praetermissa*. The diver commented that he saw numerous "sediment cones" with a small, single hole in the center of the cone. This was likely the fecal cast of the lugworm, *Arenicola marina*, and, although he tried to sample one of these cones, no large worms were observed in the benthic core. In addition, the core contained several small gastropods, the chink shell, *Lacuna vincta*, that commonly are associated with kelps (*Laminaria* spp.) upon which they graze.

The second and third cores were taken in deeper water (10-12 feet) and contained both live (at the surface) and dead (below the surface) periwinkles, bamboo worms, and the ice cream cone worm, *Pectinaria granulata*.

Table 1. Species list of living benthic fauna and flora observed and/or collected during dive within footprint of the Egbert Proposed Pier, Seal Cove, Maine on 2 June 2005. Location (NS = near shore (within 100 feet); AS = away from shore 100-350 feet from shore; I = Intertidal). XC = collected during core sample; X = collected by diver while swimming within proposed footprint.

Species	Location	Collected	Observed but not Collected
<u>Macroalgae</u>			
Division Phaeophyta			
<i>Ascophyllum nodosum</i>	I		▲
<i>Fucus vesiculosus</i>	I		▲
<i>Desmarestia aculeata</i>	NS/AS	XC	
<i>Laminaria saccharina</i>	NS/AS	X	
Division Rhodophyta			
<i>Ceramium nodulosum</i>	NS	X	
<u>Phylum Annelida</u>			
<i>Clymenella torquata</i>	NS/AS	XC	
<i>Pectinaria granulata</i>	AS	XC	
<i>Praxillella praetermissa</i>	NS	XC	
<u>Phylum Arthropoda</u>			
<i>Cancer borealis</i>	NS/AS	X	
<i>Cancer irroratus</i>	NS/AS	X	
<i>Carcinus maenas</i>	NS/AS		▲
<i>Crangon septemspinosa</i>	AS	X	
<i>Gammarus oceanicus</i>			▲
<i>Homarus americanus</i>			▲
<i>Pagurus acadianus</i>	NS/AS		
<u>Phylum Cnidaria</u>			
<i>Metridium senile</i>	AS	X	
<u>Phylum Echinodermata</u>			
<i>Asterias forbesii</i>	NS	X	
<i>Strongylocentrotus droebachiensis</i>	NS/AS	X	

Table 1. (cont.)

Phylum Mollusca*Crepidula fornicata*

AS

X

Hiatella arctica

AS

X

Lacuna vincta

NS/AS

X & XC

Littorina littorea

NS/AS

X & XC

Mytilus edulis

NS/AS

X

Tectura testudinalis

NS/AS

X

Phylum Tracheophyta

Zostera marina

AS

X

Figure Legends

- Figure 1. a) A topographic map showing the approximate footprint of the Egbert Proposed Pier site highlighted with black line (map obtained from www.maptech.com). Scale is 1:24,000. b) A topographic map showing a larger area with the proposed pier site highlighted as in a) (map obtained from www.maptech.com).
- Figure 2. Intertidal area adjacent to the Egbert Proposed Pier site. Most of the brown macroalgae attached to rocks and ledges is the knotted wrackweed, *Ascophyllum nodosum*.
- Figure 3. Digital photographs taken near the Egbert Proposed Pier site on 2 June 2005. 1) Eelgrass, *Zostera marina*; 2) Sea stars, *Asterias forbesii*; 3) Rock crab, *Cancer irroratus* (left), Jonah crab, *Cancer borealis* (right); 4) Sugar kelp, *Laminaria saccharina*; 5) benthic core in sieve with 2 mm aperture; 6) dive site near the Egbert Proposed Pier site; 7) Rock crab, *Cancer irroratus*, and green sea urchins, *Strongylocentrotus droebachiensis*.

Figure 1. a

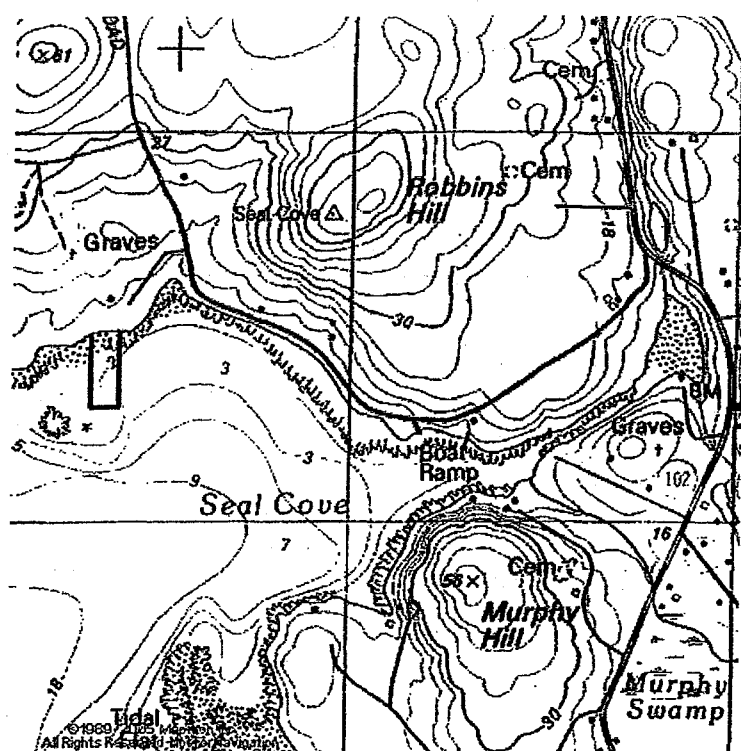


Figure 1 b.

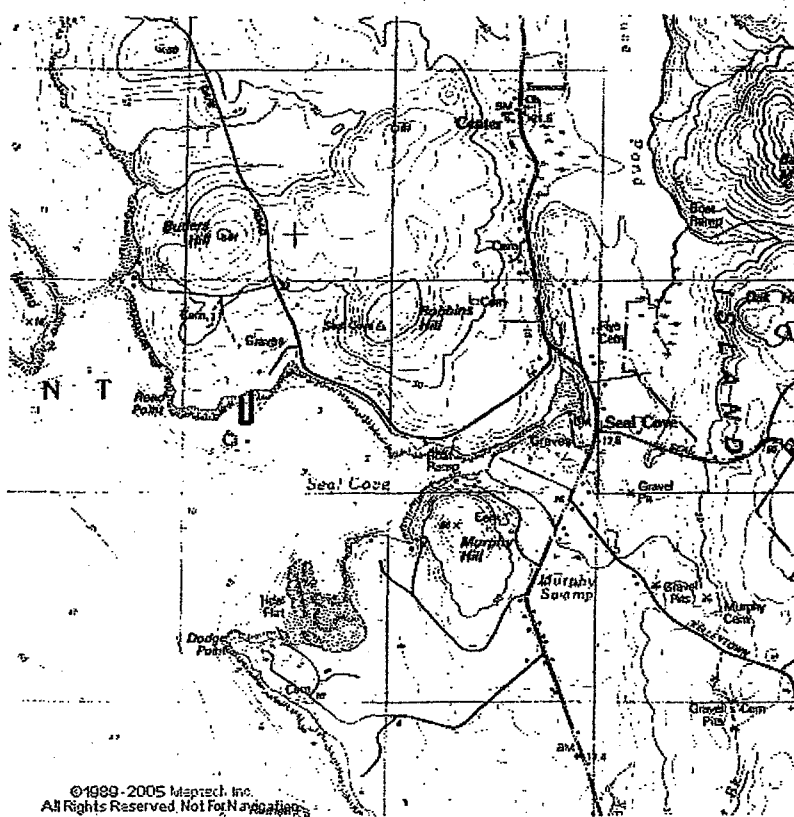


Figure 2.

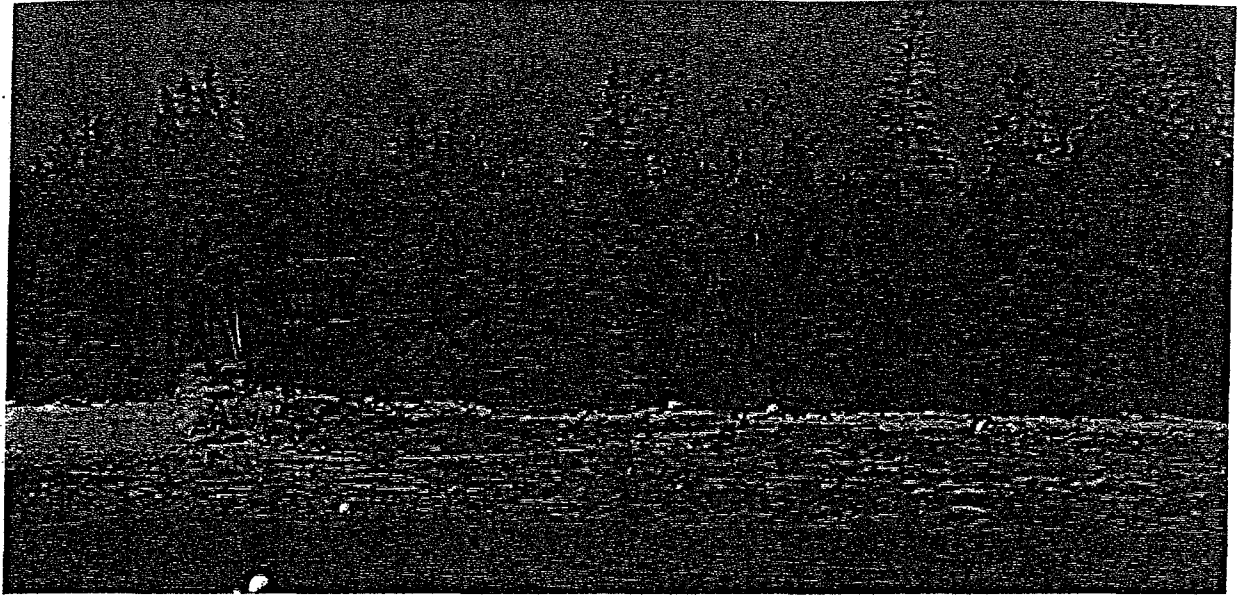
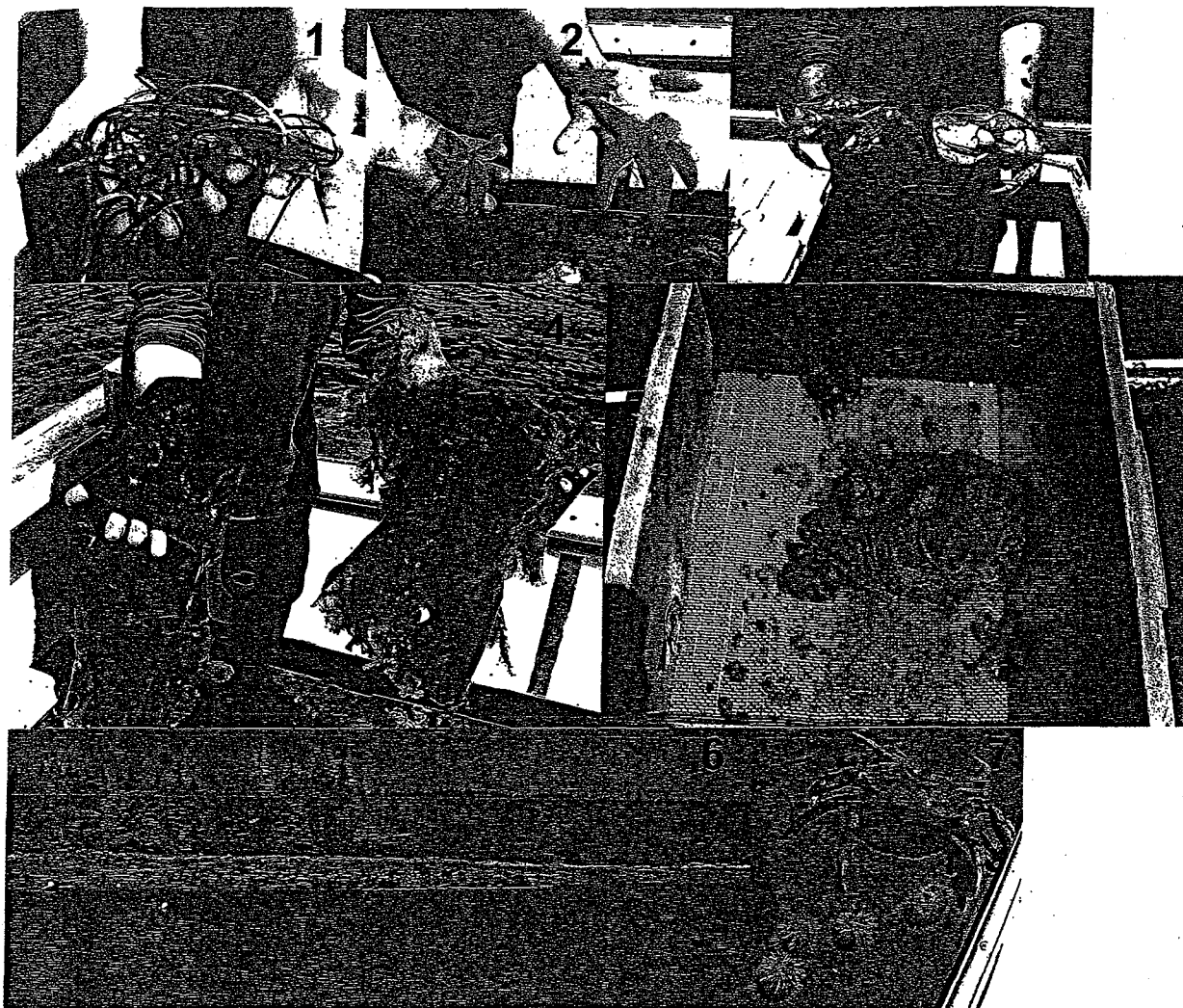
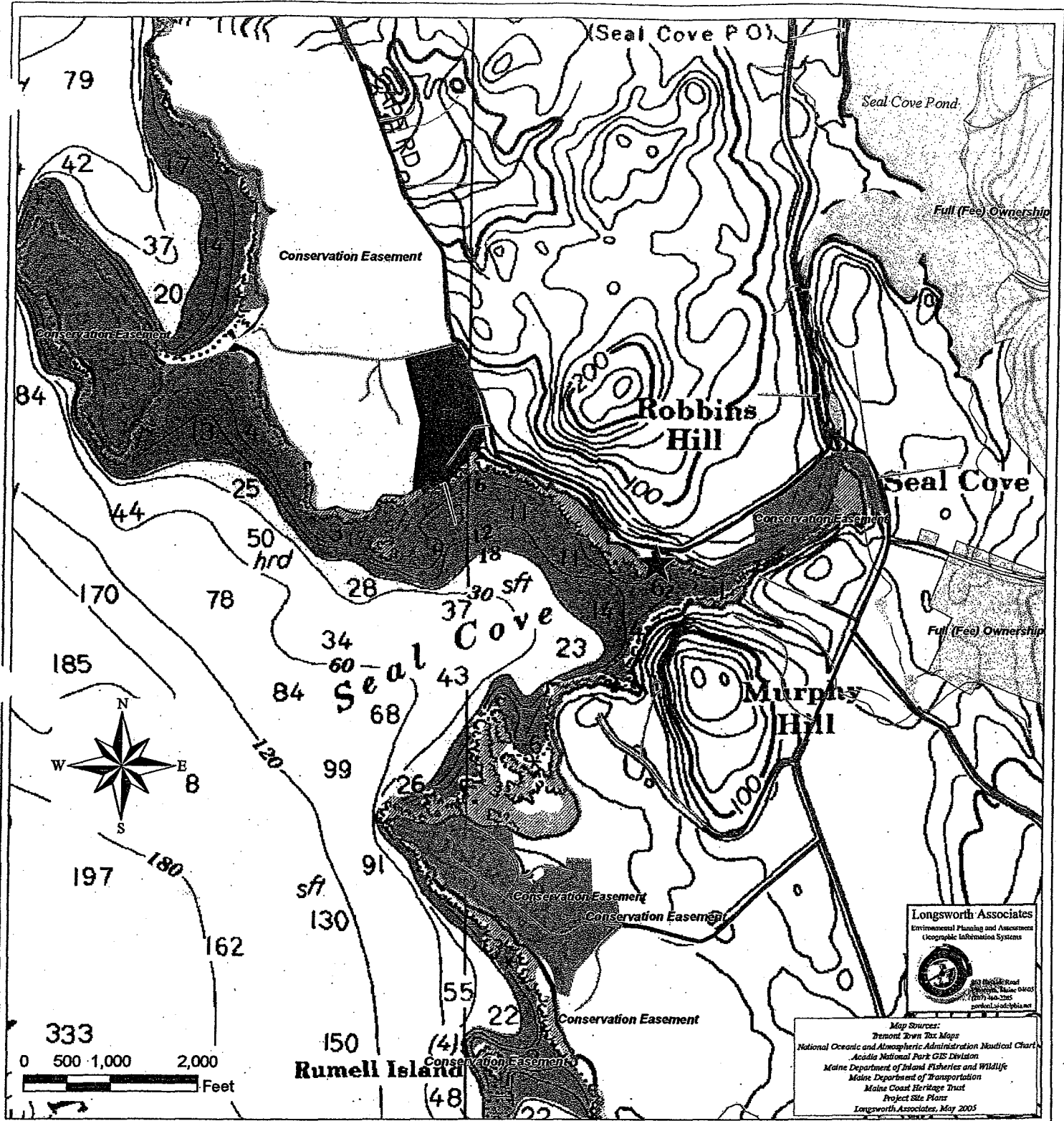


Figure 3.





Project Location-Map8 Lot9	Acadia National Park Full (Fee) Ownership	Coastal Waterfowl and Wading Bird Habitat NOAA Chart# 13316_1
Approximate Location of Proposed Pier	Acadia National Park Conservation Easement	ME Dept. of Inland Fisheries and Wildlife
Town Landing, Approximate	Maine Coast Heritage Trust Easement	High Habitat Value
		Medium Habitat Value
		5-18
		19-48
		Land
		Tidal Areas

Seal Cove and Surroundings

Tremont, Maine