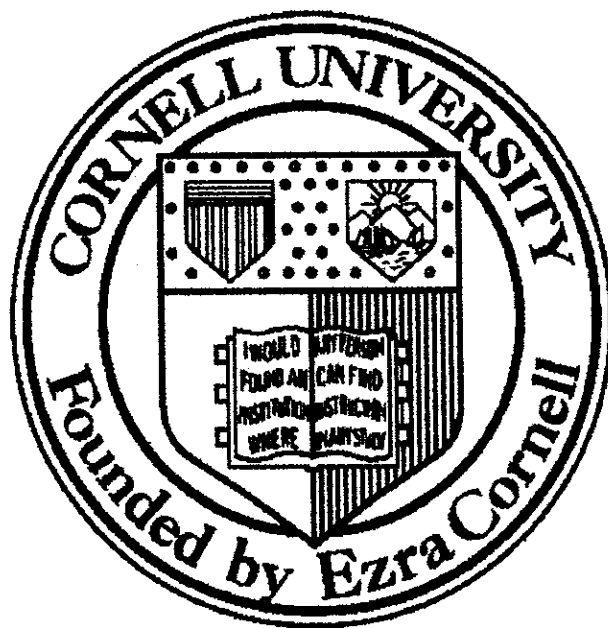


AN ASSESSMENT OF SHELLFISH RESOURCES IN  
THE TRIBUTARIES AND EMBAYMENTS OF THE  
PECONIC ESTUARY



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Marine Program  
Special Report 98-101  
April 30, 1998

## **Acknowledgments**

This publication relates to a program fully or partially funded by Suffolk County Department of Health Services - Robert J. Gaffney, County Executive, using United States Environmental Protection Agency grant funds.

The authors would like to acknowledge the assistance of the following individuals:

Debra Barnes  
Marci Bortman  
Durwood Browne  
Chris Caufield  
Dr. Robert Cerrato  
Dr. Cynthia Decker  
Maureen Davidson  
Todd Dion  
Sandra Dumais  
E. G. Hasbrouck  
Chris LaPorta  
Vito Minei  
Michael Patricio  
Larry Penny  
Robert Slavonik  
Kamela Schell  
Eve Schluter  
Edward Stilwagen  
Kim Tetrault  
Lisa Tettelbach

The entire staff at the Suffolk County Marine Environmental Learning Center

And especially Vicki and Gene Gagliano. Without their generosity, this project would have been immeasurably more difficult.

Although the information in this document has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement CE992002-04-0 to Suffolk County, it may not necessarily reflect the views of the Agency and no official endorsement should be inferred.

## **Executive Summary**

Historically, the Peconic Estuary's shellfish resources have supported significant fisheries for a number of species including hard clams, oysters and bay scallops. However, distribution and abundance data for the tributaries and embayments within the Peconic Estuary is conspicuously absent. The main goal of this survey was to obtain baseline distribution, abundance and size frequency data for commercially important shellfish species and their predators, to be used in the development of resource management strategies for the estuary. This survey was conducted during the summer of 1997 within the tributaries and embayments of the five East End towns that encompass the Peconic Estuary. Methodology duplicated that of the previous Deep Water Survey conducted in 1995 so as to build a comprehensive picture of the entire estuary. Hard clams were found at 75.4% of all stations surveyed and peaked in abundance at 25.33 individuals per 9.29 square meters. The overall abundance for all stations with hard clams present was significantly lower at 4.67 individuals per 9.29 square meters. While hard clam abundance was relatively low, it was higher than that found in the Deep Water Survey. The abundances of bay scallops, oysters, whelks and other commercial species were extremely low. Predator abundances were also low, but reported consumption rates suggest that even low levels of predators can have significant impact on recruitment, and survival. Regions of low hard clam abundance exist in areas that the New York State Department of Environmental Conservation has classified as open to shellfishing all year. These regions might provide adequate conditions for private and public aquaculture opportunities. A high overall species diversity was found. Thirty four macrofaunal species, a number of which were uncommon or rare, were identified and suggest that the Peconic Estuary supports a unique marine community.

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## Introduction

Historically, the Peconic Estuary's shellfish resources have supported significant fisheries for a number of species including; hard clams, oysters and bay scallops. Landing data suggest that a large percentage of those resources reside in the shallow waters, i.e. the tributaries and embayments, of the Peconic Estuary. Except for the landing data however, distribution and abundance data for those tributaries and embayments is conspicuously absent. The recent Deep Water Survey (Lewis et al., 1997) which provided abundance and distribution data for the same resources was limited by depth and access to the more open waters of the Peconic Estuary. Baseline distribution, abundance and size frequency data is essential for the development of effective resource management strategies.

In the late spring and early summer of 1997, a survey was conducted in the tributaries and embayments of the Peconic Estuary, which lies between the North and South Forks of Long Island's East End, as part of the natural resource assessment for the Peconic Estuary Program. The first goal of this survey was to provide baseline data on distribution, abundance and size frequency of the commercially important shellfish, their competitors (i.e., other filter feeding species), and predators within the tributaries and embayments of the Peconic Estuary. This survey comes at a critical time. Events of the last decade have included several brown tide events, increased shellfish bed closures and continued demand for access to shellfish resources. The New York State Department of Environmental Conservation (NYSDEC) has made the townships that border the Peconic Estuary aware that they will need shellfish population data in order to justify intensive water sampling in proposed conditional and seasonal areas. The second goal of this survey was to provide to the five East End townships the equipment and methodology with which to expand upon the baseline data, so that the towns can focus on areas that they believe are specifically important. This second goal is important since our study, while intensive in the total number of stations sampled, covered only a small percent of each town's shellfishing area.

This survey was also meant to compliment the previous deep water survey to give a more complete picture of the entire Peconic Estuary. The data of the two combined surveys will be useful for managing the harvests of productive areas, prioritizing potential transplant and

conditional areas, evaluating resource enhancement (e.g. seed planting) programs and identifying potential private and public aquaculture sites.

## Methods

In this survey, sampling was conducted at 199 stations between June 26<sup>th</sup>, 1997 and August 5<sup>th</sup>, 1997 within the confines of the five East End towns: East Hampton, Riverhead, Shelter Island, Southampton and Southold. Gear restrictions limited the survey to waters between 0.31 meters (1 foot) and 1.85 meters (6 feet). Stations were placed on maps according to where the town trustees and environmental personnel felt they would be most useful. Stations were placed in such a way as to cover most of each township's tributaries and embayments without spreading the sampling too thinly. Additionally, access to some tributaries was limited by either road or railroad bridges and poor boat ramps. Stations were then moved on site to accommodate the gear restrictions. Finally, if no adjacent area to where the stations were initially placed could be found, those stations were eliminated. Stations, where operation of the boat and gear required moving between moored boats and or bulkheads, were also eliminated if they were deemed too hazardous. A total of 7 of the original 203 stations were eliminated in this way. Once a satisfactory site was located, latitude and longitude were then recorded from onboard Differential Global Positioning System and sampling was commenced.

Duplicate 22.9 meter (75 foot) tows were taken at each station using a hydraulic clam dredge towed from Cornell Cooperative Extension's boat *Parker*. A 22.9 m (75 foot) weighted line was released from the boat during the tow to determine the length of tow. The hydraulic clam dredge has an opening of 0.31 m (one foot), a bar spacing of 19 mm (3/4 inch) and the cutting edge, which determines the depth of dredge penetration, was set at 76 mm (three inches).

The bar spacing on the dredge (19 mm) is designed for harvesting large benthic organisms. Small organisms or highly mobile organisms, such as bay scallops, may have washed out, fallen through, or otherwise escaped the dredge. For this reason, values reported for scallops and smaller species probably underestimate absolute abundances. Mud crabs and mud snails were reported as present or absent only, as they had a high tendency to wash through the dredge.



All organisms collected during each tow were brought on board to be identified. Commercial shellfish species and their larger predators were also counted and measured. They were then returned as near as possible to the collection site. Animals collected in closed areas were returned within the bounds of those areas. For abundant species such as slipper shell (*Crepidula fornicata*), abundance was qualified as none, light, medium or heavy coverage. Commercial shellfish species were classified according to market standards. Bay scallops (*Argopecten irradians*) were classified as legal or sublegal size (<57 mm length from mid-hinge to mid-bill). Oysters (*Crassostrea virginica*) were also classified as legal or sublegal size (< 127 mm added length and width); no oyster spat were collected. Hard clams (*Mercenaria mercenaria*) were sorted into the following categories: sublegal (<25 mm thick), littleneck (25 to <37 mm thick), cherrystone (37 to <41 mm thick), chowder ( $\geq$ 41 mm thick). Length or maximum diameter were the axes of measure for all other organisms.

Sediments were qualitatively characterized by material retained in the dredge with the organisms. The presence of plants, worm tubes, shell or stone was also noted. Stations with no indication of sediment type were classified as "no record". This sediment characterization must be interpreted cautiously since the material recovered was subjected to substantial washing during towing and recovery of the dredge. However, visualization at the stations where no sediment remained in the dredge suggests that those stations were composed of clean sand. Even in stations where the sediment was thin mud, the other sediment type likely to wash out of the dredge, small amounts of mud adhered to the dredge in the protected corners and niches.

After all stations were sampled, abundance and size data were compiled in a computer spreadsheet. Stations were grouped by region (Figure 1). Station locations for each region are plotted in Figures 2-19. Abundance data for each species for each station is listed in Tables 2-19 as average catch per 9.29 sq. meters (100 square feet). Three stations that did not fall within any of the above regions are listed in table 20. Descriptions of each species' geographic, temperature, salinity, and sediment ranges along with their feeding habits can be found in Lewis et al. (1997). One species in that survey was described with its outdated name, *Nassarius trivittatus* is now *Ilyanassa trivittatus*. *Ilyanassa trivittatus*, the New England dog whelk, which is not a predator on shellfish, is grouped with the other gastropods in Tables 2-19. Another important predatory species not found in the Deep Water Survey, but found in this survey is the thick lip oyster drill,

*Eupleura caudata*, which has the same ranges as The Atlantic oyster drill, *Urosalpinx cinerea*, but is not as abundant. The Atlantic oyster drill is described in Lewis et al. (1997). *Mya arenaria*, the soft shell clam, was reported at several stations. The soft shell clam ranges from the subarctic to South Carolina and is found intertidal to 9 meters. It is a suspension feeding bivalve, and has a maximum reported length of 150 mm. (Gosner, 1978).

A complete species list and all abbreviations can be found in Appendix A. Length data for all species that were measured can be found in Appendix B. Length data from all organisms collected at the three stations that did not fall within any region are grouped as region 20 in Appendix B. Stations where the *notata* variant of *Mercenaria mercenaria* were found are listed in Appendix C. The *notata* variant is used as a marker to differentiate between natural and hatchery reared clams.

Statistical analyses were planned on stations in regions that had significant numbers of stations both within and outside of shellfish closure areas to test for differences in abundance between those areas. Shellfish closure areas are noted on figures 2-19. There are 4 closure classifications; closed year round, conditional, seasonal and open year round. Conditional closure areas, in general, are open for a specific duration each year, unless temporarily closed due to episodic events like high rainfall. Seasonal closure areas are open for specific durations each year listed in table 1. Water quality testing performed by NYSDEC determines which areas fall within these categories. Small number of stations, and significant covariants, including sediment type, sediment surface characteristics and flow regime suggest, however, that statistical analysis is inappropriate on this data. Hard clam abundances for the above station comparisons are listed in Appendix D.

Additionally, a simple economic evaluation was performed on several regions in an attempt to determine the value of the hard clam resource lost because of poor water quality in those regions. Specific areas were selected because they had a greater density of stations than other areas in the survey, and were of specific interest to the towns. One region in each town was selected except for the town of Riverhead, because there was not a specific region in that town with a significant number of stations. This evaluation was accomplished by averaging the abundance data for all stations within that region, and using the total acreage to calculate the total

number of clams present. Current market values were then used to estimate the value of the hard clams present.

## Results

**Region 1.** Riverhead, Southampton: Peconic River, Colonels Island and Saw Mill Creek (Figure 2). Muddy sediment was found in both stations in Saw Mill Creek while mostly sandy sediments were recorded for the rest of the region (Table 2). Station 3 was dominated by stones and significant sea lettuce was found at stations 1, 2, 3 and 6.

Hard clam abundance ranged from 0.00 individuals per 9.29 sq. meters at stations 5 and 6 to 20.00 individuals per 9.29 sq. meters at station 4. Seed ranged from 0.00 individuals per 9.29 sq. meters for several stations to 3.33 at station 2. Littleneck abundance ranged from 0.00 individuals per 9.29 sq. meters to 4.00 individuals per 9.29 sq. meters at station 4. Cherrystones and chowders peaked at station 4 with 5.33 and 8.67 individuals per 9.29 sq. meters.

Few *Crepidula fornicata* were found at station 4 and were absent from the rest of the stations. The only other filter feeders (i.e. competitors) found were 0.67 soft shell clams at station 1.

The only predators found were 0.67 horseshoe crabs at station 3, mud crabs at station 4 and 1.33 knobbed whelks at station 4.

**Region 2.** Riverhead, Southold: East Creek to Deep Hole Creek (Figure 3). Stations 2-6 were dominated by muddy sediment, while mostly sandy sediments were recorded for stations 6-10 (Table 3). Station 9 has significant amounts of gravel and peat. Sea lettuce was found at stations 6 and 10.

Hard clam abundance ranged from 0.00 individuals per 9.29 sq. meters at stations 7 and 8 to 11.33 individuals per 9.29 sq. meters at station 6. Seed abundance was greater than zero at stations 2, 5, 9 and 10 and was maximal at 7.33 individuals per 9.29 sq. meters at station 10. Littlenecks were found at only stations 4 and 6 with 0.67 and 3.33 individuals per 9.29 sq. meters. Cherrystones were found at stations 3, 4, 6 and 10, with the maximum abundance of 2.00

individuals per 9.29 sq. meters at stations 3 and 6. Chowders were found at stations 1 to 6 and peaked in abundance at station 6 with 6.00 individuals per 9.29 sq. meters.

*Crepidula f.* were found at stations 1, 4, 5 and 7 to 10. Razor clams were present at station 8, with an abundance of 1.33 individuals per 9.29 sq. meters.

Lady crabs were found at stations 1, 5, 7, 8 and 10 and peaked in abundance with 9.33 individuals per 9.29 sq. meters at station 10. Knobbed whelks, with an abundance of 0.67 individuals per 9.29 sq. meters at station 5 were the only other predators captured.

**Region 3.** Riverhead: Indian Island to Miamogue Point (Figure 4A). Muddy sediments were found at stations 1 and 3, while all other stations were mostly sand (Table 4a). Sea lettuce was found in significant quantity at stations 1, 3, 4, 5 and 8.

Stations 4, 5, 8 and 10 had no hard clams, while station 6 was maximal with 16.00 individuals per 9.29 sq. meters. Only stations 1 and 3 had any seed size clams with 2.00 and 0.67 individuals per 9.29 sq. meters respectively. There were no littlenecks found at any station. Only stations 3 and 6 had cherrystones, both with 0.67 individuals per 9.29 sq. meters. Chowders accounted for 86% of all clams found in this region, mostly found at stations 6 and 7, with 14.67 and 8.00 individuals per 9.29 sq. meters respectively.

*Crepidula f.* were found at stations 2, 6 and 11 and 0.67 razor clam individuals per 9.29 sq. meters were found at station 11. No other competitors were found.

Lady crabs were found at stations 2, 6, 10 and 11 and ranged from 0.67 to 2.00 individuals per 9.29 sq. meters. An abundance of 0.67 long wristed hermit crabs per 9.29 sq. meters were found at station 6 along with 0.67 Atlantic oyster drill individuals per 9.29 sq. meters. Knobbed whelks were found at stations 2 and 7, both with 0.67 individuals per 9.29 sq. meters. Horseshoe crabs were found at station 5 with 0.67 individuals per 9.29 sq. meters.

**Region 4.** Southampton: Iron Point to Squire Pond (Figure 4B). Stations 5 to 10, 16, 20 and 21 were dominated by muddy sediment, while mostly sandy sediments were recorded for stations 1 to 4, 11 to 15, 17 to 19 and 21 (Table 4b). Significant amounts of gravel were found at stations 2, 15 and 19. Peat was found at station 5, and significant amounts of shell were found at

station 4. Sea lettuce was found at stations 1 and 6, while graceful red weed was found at stations 1, 4, 5, 6 and 8.

Hard clam abundance ranged from 0.67 individuals per 9.29 sq. meters at stations 11, 19 and 22 to 12.00 individuals per 9.29 sq. meters at station 2. Seed abundance was greater than zero at stations 1-3, 5-8, 10, 15 and 17 and was maximal at 4.00 individuals per 9.29 sq. meters at station 6. Littlenecks were found at stations 5-7, 10, 14, 15, 17 and 21 but did not exceed 2.67 individuals per 9.29 sq. meters at any station. Cherrystones were found at stations 3, 6, 8, 15, 16, 18, 20 and 21 with the maximum abundance of 4.00 individuals per 9.29 sq. meters at station 15. Chowders accounted for 57% of all clams captured. Chowders were found at all stations except 6, 7 10, 17 and 21 and peaked in abundance at 8.67 individuals per 9.29 sq. meters for station 2.

*Crepidula f.* were found at 12 of the 22 stations in this region. They ranged from very light at stations 1, 18 and 21 to moderate at stations 2, 17 and 19. Low abundances of razor clams, 0.67 individuals per 9.29 sq. meters, were captured at stations 15 and 16. Blood arks, with an abundance of 0.67 individuals per 9.29 sq. meters, were found at station 15.

Lady crabs were found at stations 11, 14, 15, 18, 19 and 22 and ranged from 0.67 to 1.33 individuals per 9.29 sq. meters over those stations. Mud crabs were found at stations 4 and 9, and 0.67 horseshoe crabs per 9.29 sq. meters were found at station 1. Knobbed whelk were captured at stations 1, 2 and 14, peaking in abundance at 2.67 individuals per 9.29 sq. meters for station 2. Stations 2 and 18 had 0.67 Channeled whelks per 9.29 sq. meters present.

**Region 5.** Southold: Hashamomuck Pond, Mill Creek and Sage Pond (Figure 5). Muddy sediments were found at stations 1 to 5, 9 and 10 (Table 5). Sandy sediments were found at stations 6 to 8. Significant gravel was recorded for stations 6 and 8, while station 8 also had significant shell.

Hard clam abundance ranged from 0.67 to 21.33 individuals per 9.29 sq. meters. Stations 3 and 4 had no seed present, and seed abundance ranged from 0.67 to 10.00 individuals per 9.29 sq. meters over the remaining stations. Littleneck abundance ranged from 0.00 individuals per 9.29 sq. meters at stations 1, 7 and 10 to 15.33 individuals per 9.29 sq. meters at station 5. Cherrystones ranged from 0.00 to 8.00 individuals per 9.29 sq. meters, peaking at station 3, while chowders peaked at 7.33 individuals per 9.29 sq. meters for station 6.

*Crepidula f.* were present at stations 5, 7 and 8 and ranged from light to moderate coverage. Stations 3 and 5 had 0.67 scallops per 9.29 sq. meters each, while station 6 and 8 had 0.67 razor clams per 9.29 sq. meters present.

Lady crabs were found at stations 6 and 8 with 1.33 and 0.44 individuals per 9.29 sq. meters respectively. Spider crabs were found at stations 5 and 6, long wristed hermit crabs were found at station 6, and channeled whelks were found at station 9, but none of their abundances were greater than 0.67 individuals per 9.29 sq. meters. Mud crabs were present at station 8.

**Region 6.** Southold: East Creek Complex and Little Creek (Figure 6). The stations outside of the creeks, 1 and 8, had sandy sediments, while all stations within the creeks, 2 to 7, were dominated by mud (Table 6). Sea lettuce was found in significant amounts at stations 3, 4 and 7 and ditch grass was also found at stations 4 and 7.

No hard clams were found at stations 3, 4 and 7, while abundances at 1, 5 and 8 were low, at 0.67 individuals per 9.29 sq. meters. Station 2 had the greatest abundance with 5.33 individuals per 9.29 sq. meters for all size classes combined. Only station 2 had littlenecks, with an abundance of 0.67 individuals per 9.29 sq. meters.

Station 8 had light-moderate *Crepidula f.* and 0.67 razor clams individuals per 9.29 sq. meters.

Knobbed whelks and lady crabs were the only predators captured. Lady crabs were found at stations 1 and 8, while knobbed whelks were found at stations 1, 2 and 8.

**Region 7.** Southold: Richmond Creek to Town Creek (Figure 7). Stations outside of the creeks had sandy sediment, except for station 11, west of Paradise Point (Table 7). All stations inside the creeks had mostly muddy sediment except for station 6, inside Corey Cove. Significant amounts of shell were found at stations 4, 13, 14 and 15. Additionally, significant amounts of gravel were present at stations 4, 5, 10 and 11. This region had 7 stations with significant amounts of one or more of the following algal species: sea lettuce, green fleece, kelp, graceful red weed and Agardh's red weed.

Total hard clam abundance ranged from 0.00 to 25.33 individuals per 9.29 sq. meters, peaking at station 13, in Goose Creek. Six of the 20 stations had greater than 5.00 individuals per

9.29 sq. meters. Few seed sized individuals were found, and only stations 13 and 18 had greater than 0.67 seed per 9.29 sq. meters. Littlenecks were found at only 5 stations, but ranged from 3.33 to 11.33 individuals per 9.29 sq. meters for those 5 stations.

*Crepidula f.* was present at 9 of the 20 stations and was the dominant organism at station 10. Razor clams were found at stations 4 and 11, with abundances of 1.33 and 0.67 individuals per 9.29 sq. meters respectively.

Six species of predators were found in this region, but they were dominated by lady crabs, which were found at 8 stations and peaked at 4.67 individuals per 9.29 sq. meters for station 4. Spider crabs and mud crabs were captured from 4 and 3 stations respectively.

Hairy cucumbers were found at only 2 of the 20 stations but their abundance at station 18, 11.33 individuals per 9.29 sq. meters, was very high.

**Region 8.** Southampton: Wooley Pond, North Sea Harbor and Fish Cove (Figure 8). The 2 stations outside of the embayments had sandy sediment with gravel present (Table 8). Stations within the embayments were muddy.

Hard clam abundance was low except for stations 6 and 7, with 16.00 and 7.33 individuals per 9.29 sq. meters, respectively. Littleneck abundance at both stations was 6.67 individuals per 9.29 sq. meters. Few seed were found, with all stations less than 1.33 individuals per 9.29 sq. meters, and stations 1, 3 and 5 had no hard clams present at all. Station 6 also had relatively moderate cherrystone and chowder abundances, 4.00 and 4.67 individuals per 9.29 sq. meters. Except for station 6, cherrystone and chowder abundances were low, ranging from 0.00 to 2.00 individuals per 9.29 sq. meters.

*Crepidula f.* were found at three stations; 1, 3 and 8. The only other competitor captured was 0.67 blood arks individuals per 9.29 sq. meters.

Mud crabs and lady crabs were the only predatory species found. Mud crabs were found at station 5, while stations 1 and 3 had 4.00 and 3.33 lady crabs per 9.29 sq. meters.

**Region 9.** Southampton: Sebonac Creek Complex and Cold Spring Pond (Figure 9). Stations 1, 9, 10 and 11 had sandy sediments (Table 9). Station 3 had No Record for sediment, and was not visually checked. Stations 2, 4 to 8, 12 and 13 were muddy. Stations 5, 6 and 7 had

significant shell, while gravel was present at stations 1, 9 and 10. Stations 2, 3 and 4 were dominated by eelgrass.

Hard clam abundance was generally low with 6 of the 13 stations having no clams present and 4 stations having 2.00 individuals per 9.29 sq. meters or less. Station 11, however, had an abundance of 20.67 individuals per 9.29 sq. meters, with 61.3% being in the seed size class. Only 4 stations had seed, and the abundance at 3 of those stations was 0.67 individuals per 9.29 sq. meters. Only 2 stations had littlenecks, 8 and 11, and only stations 11, 12 and 13 had cherrystones.

Seven of the 13 stations had *Crepidula f.* present and stations 1, 9, 10 and 11 had moderate abundances. Razor clams were found at station 11 with 0.67 individuals per 9.29 sq. meters. Station 11, along with station 13, also had blood arks present. Their abundances were 4.67 and 0.67 individuals per 9.29 sq. meters, respectively.

In this region, 7 predatory species were captured. The most abundant were lady crabs, being found at 4 stations and peaking at 6.67 individuals per 9.29 sq. meters for station 10. Spider crabs were found at stations 4 and 11 and peaked at 2.67 individuals per 9.29 sq. meters for station 11. Mud crabs were found at stations 6, 9 and 11. Knobbed and channeled whelks were captured from station 9 and had abundances of 0.67 and 2.67 individuals per 9.29 sq. meters. Atlantic oyster drills were found at station 11 with an abundance of 0.67 individuals per 9.29 sq. meters. Station 9 had 0.67 horseshoe crab individuals per 9.29 sq. meters.

**Region 10.** Southold: Sterling basin (Figure 10). All stations within Sterling Basin were mostly mud (Table 10). The 1 station outside of Gull Pond was sandy. Station 1 and 2 had gravel present.

Hard clam abundance within the basin ranged from 2.67 individuals per 9.29 sq. meters at station 3 to 12.67 individuals per 9.29 sq. meters for station 1. The abundances were not dominated by any single size class, but were distributed among all 4 classes.

Light amounts of *Crepidula f.* were found at stations 1, 2 and 5. An abundance of 0.67 individuals per 9.29 sq. meters for razor clams was recorded at stations 1. Blood arks were present at station 2 with an abundance of 0.67 individuals per 9.29 sq. meters.



Station 2 had knobbed whelks, spider crabs and horseshoe crabs in abundances of 0.67 individuals per 9.29 sq. meters. Mud crabs were also present at station 2. Station 5 had channeled whelks and lady crabs present with 0.67 individuals per 9.29 sq. meters for both.

**Region 11.** Shelter Island: Coecles Harbor, including Congdons Creek (Figure 11). For Coecles Harbor, sediment did not follow any trend and ranged from mostly sand to mud (Table 11). Congdons Creek stations, however, were both mud with eelgrass present.

Hard Clam abundances were generally low and ranged from 0.00 individuals per 9.29 sq. meters for stations 4 and 5 to 6.67 individuals per 9.29 sq. meters for station 7. The abundance at station 7 was dominated by cherrystone and chowder size classed individuals accounting for 57% and 29%, respectively. Only station 8 had littlenecks and their abundance at station 8 was 0.67 individuals per 9.29 sq. meters. Seed abundance was low, 1.33 individuals per 9.29 sq. meters or less, for all stations.

*Crepidula f.* was found at 5 of the 8 stations and ranged from very light to moderate coverage at those 5 stations. Razor clams were captured at stations 1 and 7 and their abundance was maximal at station 1 with 3.33 individuals per 9.29 sq. meters.

Channeled whelks and moon snails were present at 0.67 individuals per 9.29 sq. meters for stations 2 and 3 respectively. Spider crabs were found at 2 stations, 1 and 6, and their abundance for those stations was 1.33 and 0.67 individuals per 9.29 sq. meters.

Station 4 and 5, within Congdons Creek, were devoid of macrofauna except for mud snails and 1 soft shell clam at station 4.

**Region 12.** Shelter Island: Dering Harbor and Gardiners Creek (Figure 12). The 2 stations on either side of the mouth to Gardiners Creek were mostly sand (Table 12). Stations deeper into Gardiners Creek were all mud. Stations 1 and 4 had ditch grass present in significant amounts, while station 3 had Agardh's red weed present.

Inside Gardiners Creek, hard clam abundances were low except for station 1. Abundance at station 1 was 6.67 individuals per 9.29 sq. meters. Clams at station 1 were exclusively cherrystone and chowder, and no seed or littleneck were present at any station inside the creek.

Outside Gardiners Creek, seed, littleneck and chowder were present in approximately equal, but low numbers.

*Crepidula f.* were found only at station 5, outside of Gardiners Creek, and were moderately abundant there. Razor clams were found at stations 1 and 5 with the low abundance of 0.67 individuals per 9.29 sq. meters for both stations.

Mud crabs were the only predators inside Gardiners Creek and were present at stations 3 and 4. Lady crabs were found at station 5 with an abundance of 0.67 individuals per 9.29 sq. meters.

Both stations 2 and 4 had hairy cucumbers present with 2.00 individuals per 9.29 sq. meters for both stations.

**Region 13.** Shelter Island: West Neck Bay, West Neck Creek and Menantic Creek (Figure 13). The 6 stations followed no obvious trend in sediment (Table 13). Stations ranged from mostly sand for stations 1 and 2 to mud for stations 3 and 4. Station 3 was dominated by worm tubes, which filled the dredge half full on both tows.

Hard clam abundances were low except in West Neck Bay, stations 1 and 2, where abundances were 7.33 and 5.19 individuals per 9.29 sq. meters, respectively. Stations 3 and 5 had no clams present, and station 4 only had chowder size individuals, with an abundance of 0.67 individuals per 9.29 sq. meters. The only station that had seed was station 2 with an abundance of 0.74 individuals per 9.29 sq. meters.

There were no *Crepidula f.* at any of the 6 stations, nor were there any other competitors.

The only predators found were 0.67 knobbed whelks individuals per 9.29 sq. meters at station 1, 0.67 and 1.33 horseshoe crabs individuals per 9.29 sq. meters at stations 1 and 4, and mud crabs at stations 1 and 3.

**Region 14.** Southampton: Noyac Creek and Mill Creek (Figure 14). The stations inside Mill Creek, 4, 5 and 6, were either mostly mud or mud, while the 2 outside station, 3 and 7, were sand, with gravel present (Table 14). Eelgrass was found at station 2.

Hard clam abundance ranged from 0.00 individuals per 9.29 sq. meters for station 7 to 8.00 individuals per 9.29 sq. meters for station 1. Clams at station 1 were exclusively chowder.

Seed and littleneck were found at 3 stations each at low abundances, 2.67 individuals per 9.29 sq. meters or less.

*Crepidula f.* were found at all stations except 5, and ranged from light to moderate coverage. The only other competitors were razor clams found at stations 1, 2 and 6, in low abundance.

Lady crabs were the only predatory species captured in this region, at stations 1 and 3, with abundances of 2.67 and 0.67 individuals per 9.29 sq. meters.

**Region 15.** Southampton: Sag Harbor Cove, Upper Sag Harbor Cove, Paynes Creek and Ligonee Creek (Figure 15). Stations in the northern end of Sag Harbor Cove, 8, 9 and 11, and in Upper Sag Harbor Cove, 1 and 2, were mostly mud (Table 15). Stations in the more southern end of Sag Harbor Cove, 4, 5, 7 and 10, and stations in the creeks, 3 and 6 were a mix of mostly sand to sandy mud. Shell was present at stations 7 and 9.

Abundance for hard clams ranged from 0.00 at stations 4, 7, 10 and 11 to 20.67 for station 6. Seed, littleneck and cherrystone were present at only 3 of the 11 stations. Chowders were more prevalent, being present at 7 of the 11 stations.

Few *Crepidula f.* were found, and their abundances were low, ranging from very light to light coverage at only 4 of the 11 stations. Razor clams were found at stations 3 and 5, and were in moderate abundance at station 5, with 5.33 individuals per 9.29 sq. meters. Another competitor that was in high abundance at stations 1, 2, 3 and 6, was the soft shell clam. Their abundance ranged from 5.33 individuals per 9.29 sq. meters for stations 1 and 3 to 82.67 individuals per 9.29 sq. meters for station 2. It is possible that these abundance values are an underestimation since smaller clams easily escaped through the bars of the dredge.

The only predators reported were spider crabs at stations 3 and 11 with abundances of 2.00 and 0.67 individuals per 9.29 sq. meters, and mud crabs at station 1.

**Region 16.** East Hampton: Northwest Harbor and Northwest Creek (Figure 16). The 4 most southerly stations, 2 to 5, were mostly mud, while the 3 northerly stations, 1, 6 and 7 were a mix of sand and muddy sand (Table 16). Eelgrass was recorded at station 7, near the Alewife Pond Inlet.

Hard clam abundance was very low, except for stations 4 and 6, where it was more moderate. At stations 4 and 6, chowder was the dominant size class, accounting for 83 and 71%, respectively. Seed, littleneck and cherrystone abundance ranged from 0.00 to 1.33 individuals per 9.29 sq. meters.

Few competitors were present. *Crepidula f.* was found at 3 of the 7 stations and ranged from very light to light-moderate coverage. Station 1 also had 2.00 razor clams per 9.29 sq. meters. Predatory abundance was also very light. Lady crabs were found at station 1 with an abundance of 2.67 individuals per 9.29 sq. meters, and mud crabs were found at station 7. No predators were found at the 5 stations inside Northwest Creek, 2 to 6.

Stations 3, 4 and 5 had hairy cucumbers present and their abundance peaked at 3.33 individuals per 9.29 sq. meters at station 3.

**Region 17.** East Hampton: Hog Creek, Acabonack Harbor and East Harbor (Figure 17). Stations outside the embayments, 3 and 4, in Gardiners Bay, had sandy sediment (Table 17). Sediment type inside, stations 1, 2 and 5 to 9, were mostly mud. The Hog Creek stations also had Eelgrass present, while gravel was found at station 3.

Stations 1 to 4 had no hard clams present. Abundances were low for the remaining stations, 5 to 9, and ranged from 0.67 to 3.33 individuals per 9.29 sq. meters, peaking at station 9. Station 9 was dominated by chowder size class individuals, accounting for 80% of total clams captured. There were no seed found at any station.

Station 4 had moderate coverage of *Crepidula f.*, and 3 other stations, 3, 5 and 7 also had *Crepidula f.* present in lesser abundance. No other competitors were found within this region. Lady crabs and knobbed whelks were found at station 4 with an abundance of 1.33 and 0.67 individuals per 9.29 sq. meters. Mud crabs were found at station 1.

Hairy cucumbers were found at stations 1 and 7 with 2.00 individuals per 9.29 sq. meters at both stations.

**Region 18.** East Hampton: Three Mile Harbor (Figure 18). Stations 2 and 5, the most northerly and southerly station respectively, were the only stations where the sediment type was mud (Table 18). All other stations were mostly sand. Gravel and larger rocks were found at

stations 7, 8, 9 and 15. Six stations, 1, 4, 5, 7, 11 and 15 had significant amounts of flora; either eelgrass, green fleece or hollow green weed.

Hard clam abundance was low to moderate and ranged from 0.00 individuals per 9.29 sq. meters at stations 4, 5, 9 and 13 to 7.33 individuals per 9.29 sq. meters at station 3. Seed abundance was low, ranging from 0.00 to 2.67 individuals per 9.29 sq. meters, with 12 station having no seed present. No littleneck were found at any station, and only station, 6 had cherrystone, with 0.67 individuals per 9.29 sq. meters. Chowder sized individuals accounted for 73% of all clams collected in this region.

Abundance of *Crepidula f.* was high for most stations, especially stations 1, 6 and 15. Only at station 5 were *Crepidula f.* absent. Station 16 had 4.00 oysters per 9.29 sq. meters, and was the only station in the entire survey to have oysters present. Razor clams were found at stations 12, 14 and 16 with low abundances, 1.33 individuals per 9.29 sq. meters or less. Blood arks were also found at low abundance at stations 4 and 11.

Lady crabs were found at stations 12 to 16 and peaked in abundance at station 14 with 4.00 individuals per 9.29 sq. meters. Spider crabs, long wristed hermit crabs and knobbed whelks were found at 3, 2 and 1 stations respectively, with very low abundances of 0.67 individuals per 9.29 sq. meters. Green crabs were found at stations 11 and 15 with 0.67 and 1.33 individuals per 9.29 sq. meters. Mud crabs were present at 8 stations.

**Region 19.** Southold: Orient Harbor, Narrow River, Long Beach Bay and Little Bay (Figure 19). Stations in Orient Harbor, 1 to 4, were dominated by mostly sandy sediment and eelgrass (Table 19). Stations in Narrow River, 5 and 6 were mud, with sea lettuce present at station 5. Sediment type in Long Beach Bay and Little Bay ranged from mostly sand to mostly mud.

Hard clams were present at 13 of the 14 stations, and abundance ranged from very low to moderate. Four stations had 0.67 individuals per 9.29 sq. meters, while abundance peaked at station 13 with 7.33 individuals per 9.29 sq. meters. Distribution, in general, was not dominated by any size class.

Ten of the 14 stations had *Crepidula f.* present, and abundance ranged from light to moderate coverage. Stations 1 and 8 had 0.67 and 1.33 scallops per 9.29 sq. meters respectively,

and they were the only other competitors present. The abundance of scallops at station 8, while low, was the greatest of all the stations in the survey.

Mud crabs were the dominant predator found, being present at 6 of the 14 stations. Spider crabs and knobbed whelks were present at 1 station each, with abundances of 0.67 individuals per 9.29 sq. meters each.

**Economic Evaluation.** Values for littlenecks, cherrystones and chowders; \$0.18, \$0.14 and \$0.12 per individual, respectively, were obtained from Ken Homan of Braun Oyster, in Cutchogue, N.Y. Acreage for the eastern closure in Three Mile Harbor in East Hampton, Gardiners Creek in Shelter Island, Reeves Bay in Southampton and Sterling Basin in Southold were estimated to be 101, 27, 245 and 55 acres, respectively by NYSDEC (Table 21). The hard clam resource in the seasonally closed area on the east side of Three Mile Harbor was estimated to be worth \$4,022 composed exclusively of chowder sized individuals. Reeves Bay was also dominated by chowders, with a value of \$32,254. There were also \$12,807 worth of littlenecks and \$3,320 worth of cherrystones in Reeves Bay. Gardiners Creek had \$2,195 worth of cherrystones and \$1,882 worth of chowders. Sterling Basin had the largest average littleneck and total clam abundances of the 4 areas evaluated. The littleneck resource was worth \$6,366, while the value of the cherrystones and chowders present were both greater than \$5,000. All regions, except for Gardiners Creek, had significant seed abundances, however, the value of seed clams was not estimated.

## **Discussion**

According to the New York State Department of Environmental Conservation, the Peconic Estuary encompasses 121,390 acres of underwater lands available for the harvest of molluscan shellfish. Geographically as well as hydrographically there are, however, two very different types of shellfish lands in the estuary, the deep waters of open regions of the Peconic Estuary which constitute approximately 113,480 acres and the shallow waters of the open regions, tributaries and enclosed embayments which constitute nearly 8,000 acres. Even though

these shallow water regions make up only 6.6 percent of the Peconic Estuary, they contribute the major percentage to the Estuary's commercial shellfish harvest.

Sediment data, in general, followed obvious water flow patterns, with stations buried deep in the back of the tributaries and those stations in wide embayments, being mostly mud. Stations near the mouths of the tributaries were, in general, dominated by sand. While shellfish community structure is likely to have some degree of correlation to this distribution, the low abundance of shellfish species, and the small number of stations per embayment, makes it difficult to identify statistical trends in the distribution of abundance including the relationship between abundance and environmental parameters such as sediment type

Hard clams were found at a greater percent of stations, 75.4% (150 of 199 stations) in this survey, compared to the Deep Water Survey, 49.2% (61 of 124 stations.) Hard clam densities were higher at those stations, 4.67 individuals per 9.29 sq. meters in the current survey, compared to 3.25 individuals per 9.29 sq. meters in the DWS. However, even though distribution and abundances were greater in this survey, overall abundance must still be considered comparatively low. Seed, littleneck and cherrystone sized clams were found at 69 or fewer stations, and their average abundances at those stations were 2.05, 2.43 and 1.76 individuals per 9.29 sq. meters. Chowders, however, were found at 119 of the 199 stations surveyed and accounted for 41% of all clams present in this survey, compared to 86% in the DWS. This domination by chowders suggests that recruitment has been low, and/or smaller size classes are being preferentially harvested. So, while the Chowder size class dominated both surveys, there is still a greater percentage of marketable clams found in this survey compared to the DWS. Also, this data suggests that the shallow water areas support a more productive clam population, in terms of tissue production and population turnover.

Hard clam distribution was highly heterogeneous, with several stations having more moderate abundances. 17 station had abundances greater than 9.99 individuals per 9.29 sq. meters, and 10 of the 19 regions surveyed had at least 1 station over 9.99 individuals per 9.29 sq. meters. During sampling, recreational clammers were observed successfully finding hard clams by treading (using their feet to locate clams) in areas adjacent to where we were working. In some of those areas, clam abundance that we recorded was lower than the apparent densities being recovered by the clammers. Again, this suggests a heterogeneous or patchy hard clam distribution.

Most of the places where the clammers were observed were in very shallow waters near shore, places our boat could not reach. This suggests that the borders of the creeks and bays may contain a significant resource that we missed in this survey.

The results of the economic evaluation should be interpreted cautiously. Less than .05% of the bottom of any of the 4 areas was inventoried. Because of the above mentioned patchy distribution of hard clams, the estimated average abundances could underestimate the total population. This survey is a starting point in determining the resources within the 5 towns, this evaluation should also be considered a starting point, which can be modified with more complete sampling. More importantly than the dollar value of each area, the evaluation shows that all areas except for Gardiners Creek, have seed clams. This suggests that there is still some level of recent recruitment to these areas, and that the value of the resource should therefore be increasing with time, since these areas are closed to shellfishing for all or part of the year. For areas like Sterling Basin, which are closed year round and have modest hard clam resources, the possibility of transplantation of the resource could be considered if attempts at water quality improvement fail to change their shellfishing closure status.

Even though landings for the 1997 bay scallop season were significantly greater than the previous year, and the Brown Tide was severely limited in its spatial and temporal distribution, abundance and distribution was extremely low in this survey as scallops were found at only 5 stations, 2 in regions 5 and 3 in region 19. Bay scallops were not found in many of the areas that contain suitable habitat and have been historical producers. A possible explanation is that towed hydraulic dredges do not efficiently sample for bay scallops. However, visual inspection by skin diver in Bullhead Bay, Southampton, a region historically productive and having significant amounts of eelgrass present, registered no bay scallops.

Oyster distribution was limited to one station on Three Mile Harbor, East Hampton. The station was located near a facility that is part of East Hampton's aquaculture program. It is likely that the oysters found were seed planted from that facility (personal communication, Craig Hassler, East Hampton's aquaculture program). The deep waters of the Peconic Estuary were historically a major producer of oysters, although the production was based on the growout of seed oysters that had been transplanted into the Peconic Estuary as natural recruitment was low.



The survival of oysters near the facility suggests that some of the tributaries and embayments of the Peconic Estuary may provide a good habitat for oyster growout.

Few stations had soft shell clams present. This is surprising since their distribution is sufficiently subtidal to fall within the range of this survey. Significant quantities of clams were found at only 4 stations, all within region 15, the Sag Harbor Complex. Stations 2 and 6 in Upper Sag Harbor Cove and Paynes Creek, had high abundances, 82.67 and 41.33 individuals per 9.29 sq. meters, respectively. These abundances make soft shell clams the single most abundant species at any one station, but are comparatively low compared to Mt. Sinai Harbor, an active fishery on the north shore of Long Island, where abundances can be greater than 500 individuals per 9.29 sq. meters. Abundance values for this survey are likely to be underestimated, since smaller individuals easily passed between the bars of the dredge.

Surf clams and razor clams are harvested commercially in many areas but no landings are reported for the Peconic Estuary. This survey found very low abundances for both species. One surf clam was found at station 14 in Region 18, Three Mile Harbor. Razor clams were found at 24 stations and had a average abundance at those station of 1.79 individuals per 9.29 sq. meters.

While large whelks, knobbed and channeled, are part of a commercial fishery, their low abundances within the tributaries and embayments of the Peconic Estuary, 0.81 individuals per 9.29 sq. meters at 18 stations and 1.00 individuals per 9.29 sq. meters at 6 stations respectively, suggest that they are more important as predators on hard clams, than as a commercial resource. Lady crabs were the most abundant predator, being present at 47 stations with an average abundance of 2.31 individuals per 9.29 sq. meters, at those stations. Mud crabs, were found at 34 stations, while spider crabs were found at 17 stations. Common sea stars, normally a significant predator on shellfish, were not found at any stations. Only 1 individual was found during the Deep Water Survey. This continued absence of sea stars is possibly due to their highly cyclical population cycle, or high mortality rates due to commercial and recreational clammers. Overall predator abundances seem low, but mud crabs have been reported to be able to eat several hundred hard clams per crab per day (Gibbons, 1984). That data is for juvenile hard clams, between 1 and 7mm. Hard clams set with an average size of 250  $\mu$ m, and predation rates on newly set clams are likely to be even higher. Low abundances of all predatory species is therefore

misleading. With the above predation rate, mud crabs alone could have a serious impact on recruitment to the fishery.

Hairy cucumbers are a species of interest. Their presence in regional waters (Long Island Sound, Atlantic Ocean) is rare, but they are found in significant abundance in the Peconic Estuary and Great South Bay. Feeding habits of the hairy cucumber are not well known, but they appear to be a filter feeder, with the possibility of filtering out particles including hard clam larvae, making them a possible predator as well as a competitor. Hairy cucumbers also help define the Peconic Estuary as a region with a diverse and special community structure. Species diversity was low, on a per station basis, with an average value of 2.83, but overall diversity was high, included 34 animal species. Several species collected are not common to New York waters. Two species of bivalve, *Macoma balthica* and Morton eggcockle, along with 2 species of brittle star, burrowing and short spined, are additional rare and interesting parts of the Peconic Estuary's unique community.

On other species of special interest is *Crepidula fornicata*. The Deep Water Survey reported that *Crepidula f.* was the most abundant species present in the open waters of the Peconic Estuary and suggested that their presence, as filter feeders, could be impacting on phytoplankton concentrations and could be an important competitor of hard clams. *Crepidula f.* were widely distributed in the tributaries and embayments of the Peconic Estuary also, being present at 99 of the 199 total stations. However, their abundance never reached the extreme high values seen in the Deep Water Survey. Abundance values were relatively high for a number of stations, and *Crepidula f.* are likely to be a significant competitor to hard clams in all parts of the Peconic Estuary.

The shallow waters of the tributaries and embayments of the Peconic Estuary are used for nursery culture of commercially valuable bivalve shellfish. Within these bodies of water, clams, oysters and scallops are grown from hatchery reared post set to a size suitable for unprotected plantings in public waters. All of the five East End towns have cultured one or more of these species at some time in this fashion. Good water quality in many of the creeks with low abundances of naturally occurring stock suggests the abilities to continue or expand shellfish mariculture in these areas.

Abundances of the commercially important hard clam were found to be higher in the tributaries and embayments of the Peconic Estuary, compared to its open water areas, although their average abundances were still relatively low. The distribution of hard clams was patchy and denser pockets of clams are likely, considering landing data. The above survey should serve as a good starting point for the five East End towns to define areas that need more focused sampling. In addition, numerous areas exist that could support shellfish mariculture activities, some of which are already planned or being implemented. Additionally, the unique faunal community of the entire estuary should provide opportunities for further study.

## **Literature Sited**

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Table 1. NYSDEC Seasonal Shellfish Closure Dates

Closure Code	Closed between the listed dates.	
1	May 15	September 30
2	May 15	October 31
3	April 1	December 14
4	May 1	November 30
5	April 1	October 31
6	May 1	December 14
7	April 15	December 31
8	May 15	December 30
9	May 15	October 15
10	May 1	October 31
11	May 1	December 31
12	December 1	March 30
13	April 15	November 30

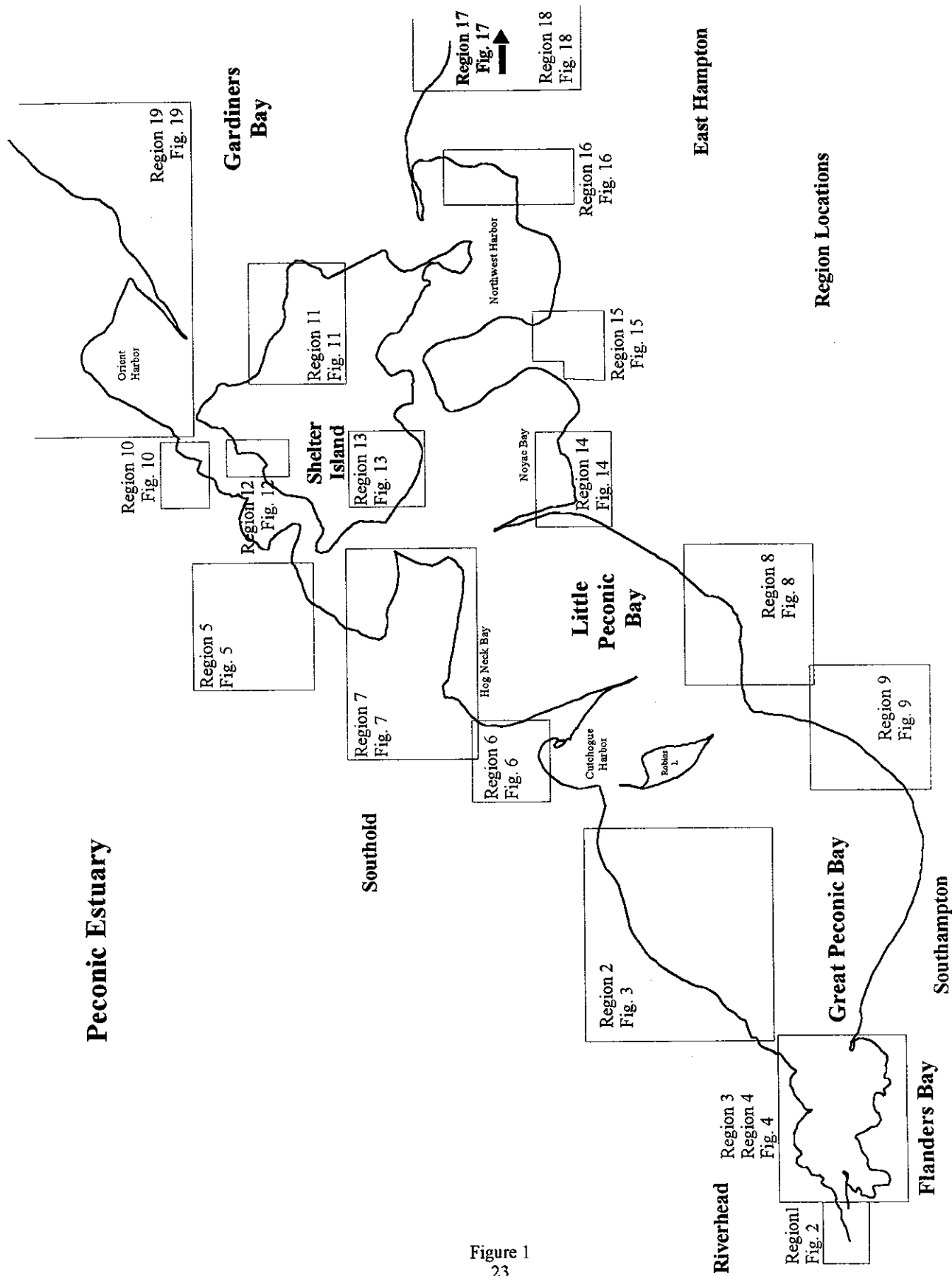


Figure 1  
23

### Region 1

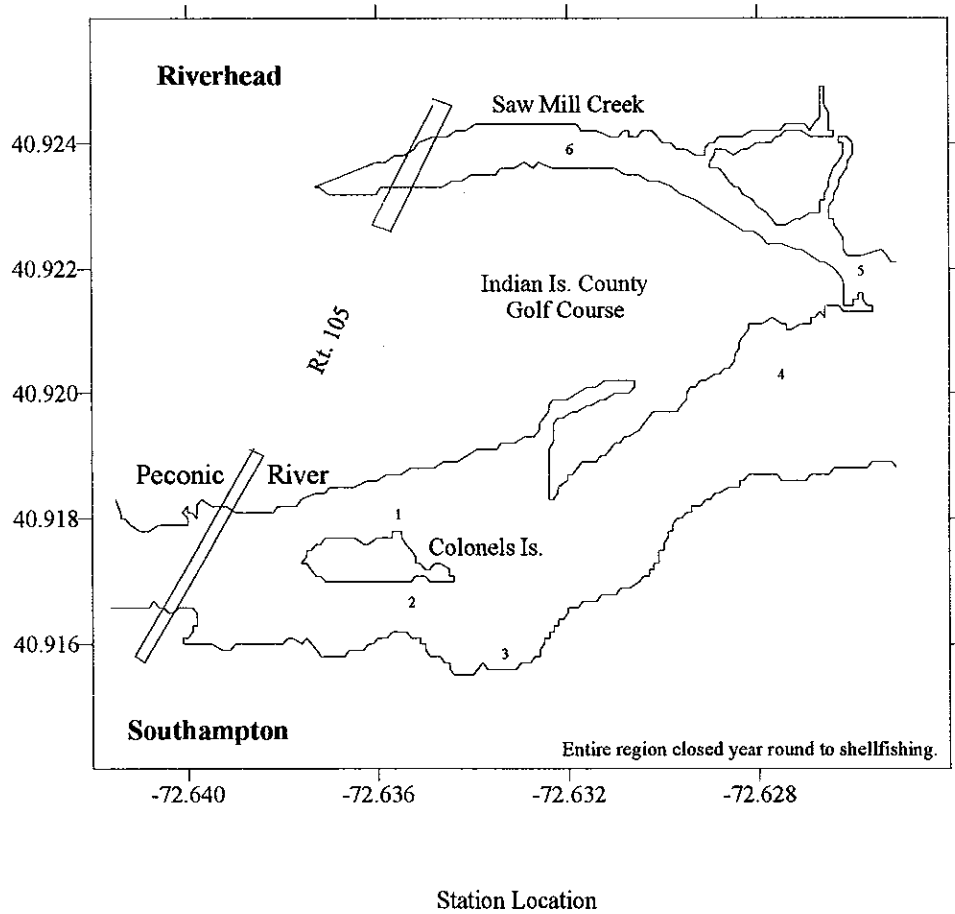


Figure 2  
24

Table 2. Data for Figure 2.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.6356	40.9181
2	72.6353	40.9167
3	72.6333	40.9158
4	72.6275	40.9203
5	72.6258	40.9219
6	72.6319	40.9239

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	1.33	0.00	0.67	2.00	4.00
2	3.33	2.67	1.33	0.67	8.00
3	0.00	0.00	0.00	0.00	0.00
4	2.00	4.00	5.33	8.67	20.00
5	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	1.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0

Predators  
Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	1
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	1.33	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.67
4	0.00	0.00	0.00	0.00	1	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00

Sediment Type and Sediment Surface Number ranges from 1 = sand to 5 = mud. (0 = No record)			
Station	Sediment	Surface	
1	1.5		UI
2	1.5		UI
3	1	St	UI
4	2		
5	5		
6	5		UI

Miscellaneous Number per 9.29 sq. meters.		
Station	Hairy Cucumber	Other <i>Ma</i>
1	0.00	0.67
2	0.00	0.00
3	0.00	0.00
4	0.00	0.00
5	0.00	0.00
6	0.00	0.00

## Region 2

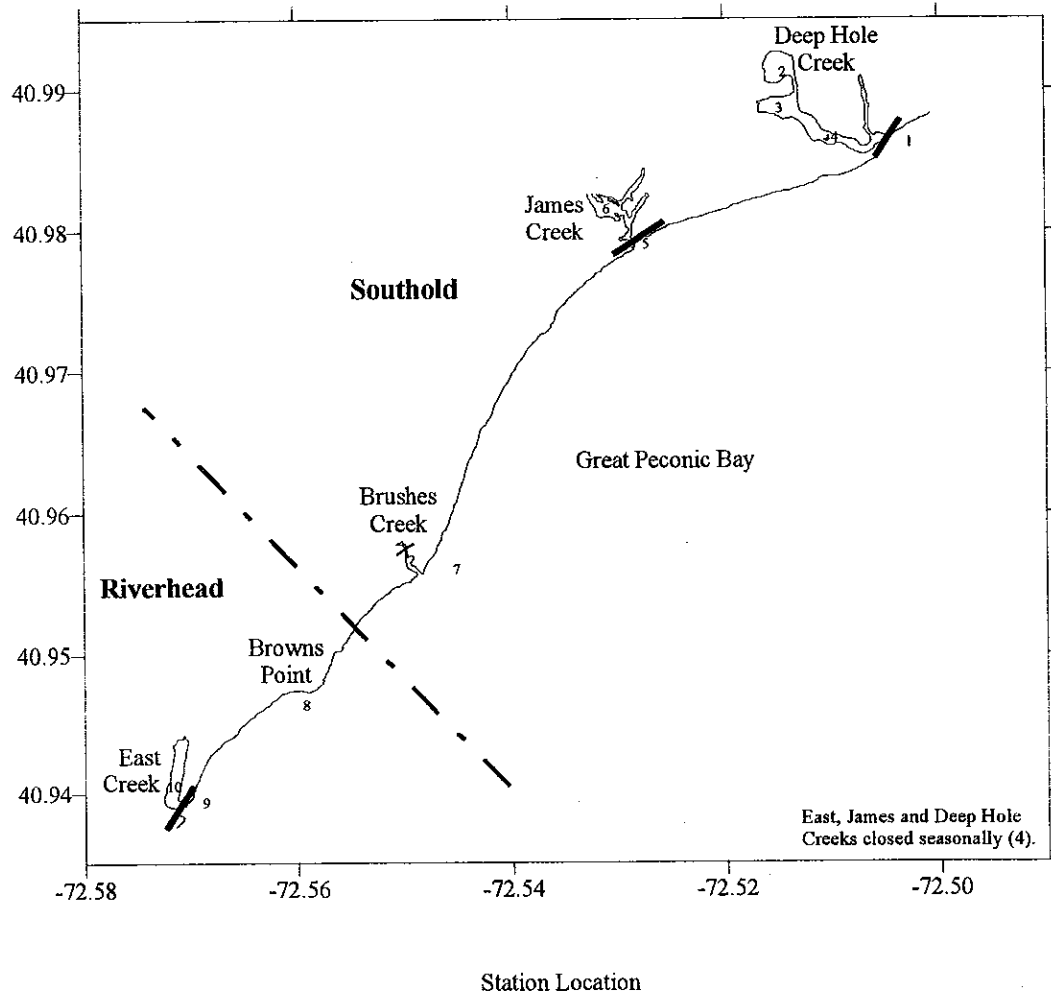


Figure 3  
26



Table 3-1. Data for Figure 3.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.5024	40.9867
2	72.5144	40.9909
3	72.5144	40.9893
4	72.5100	40.9866
5	72.5276	40.9794
6	72.5311	40.9815
7	72.5449	40.9563
8	72.5594	40.9465
9	72.5695	40.9401
10	72.5704	40.9413

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	0.00	1.33	1.33
2	0.00	0.00	0.00	1.33	1.33
3	2.67	0.00	2.00	1.33	6.00
4	0.00	0.67	0.67	3.33	4.67
5	0.67	0.00	0.00	0.67	1.33
6	0.00	3.33	2.00	6.00	11.33
7	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00
9	0.67	0.00	0.00	0.00	0.67
10	7.33	0.00	0.67	0.00	10.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	1.33	0.00
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	2.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	1.0	0.0	0.0
5	2.0	1.0	0.0
6	0.0	0.0	0.0
7	2.0	1.0	0.0
8	1.0	1.0	0.0
9	1.0	1.0	0.0
10	2.0	0.0	0.0

Table 3-2. Data for Figure 3.

Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	1
3	0.00	0.00	0.00	0.00	0.00	1
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.67	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.00	0.00	0
10	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	1.33	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	8.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	4.67	0.00	0.00	0.00	0	0.00
8	1.33	0.00	0.00	0.00	0	0.00
9	0.00	0.00	0.00	0.00	0	0.00
10	9.33	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	3.0	
2	5.0	
3	5.0	<i>Ag</i>
4	5.0	
5	4.0	
6	5.0	<i>Ul</i>
7	0	
8	0	
9	1.5	Gr, Pt
10	2.0	<i>Ul</i>

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	1.33	BS
6	0.00	0
7	0.67	BS
8	0.00	BS
9	0.00	0.67 RM
10	0.00	42.00 RM

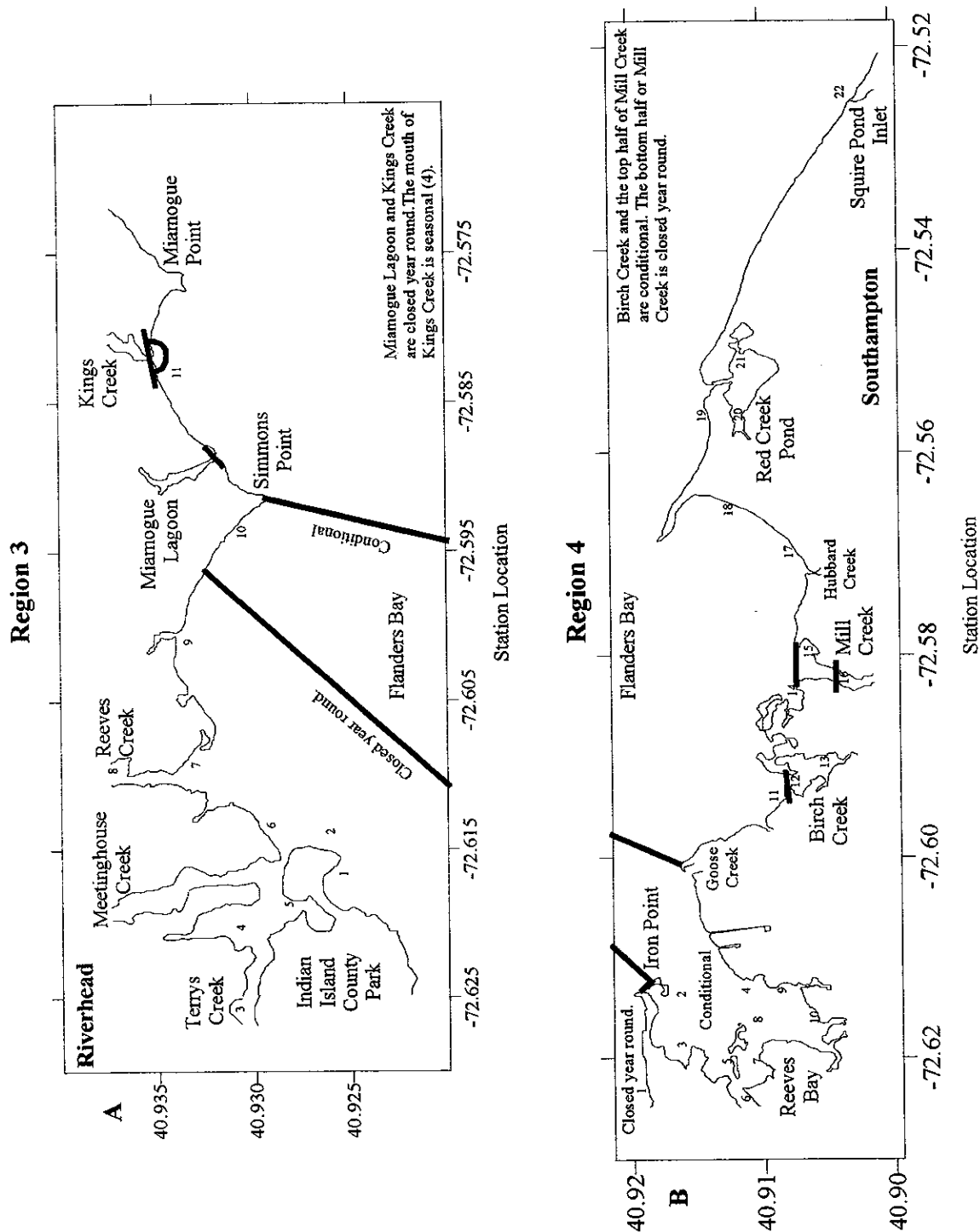


Figure 4  
29

Table 4a-1. Data for Figure 4a.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.6163	40.9253
2	72.6129	40.9260
3	72.6257	40.9310
4	72.6200	40.9310
5	72.6186	40.9283
6	72.6132	40.9290
7	72.6086	40.9334
8	72.6094	40.9375
9	72.6008	40.9336
10	72.5932	40.9306
11	72.5828	40.9339

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	2.00	0.00	0.00	2.00	4.00
2	0.00	0.00	0.00	0.67	0.67
3	0.67	0.00	0.67	0.67	2.00
4	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.67	14.67	16.00
7	0.00	0.00	0.00	8.00	8.00
8	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.67	0.67
10	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	2.00	2.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.67	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	0.0	0.0	0.0
2	1.0	1.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	2.0	0.0	0.0
7	0.0	1.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	1.0	0.0	0.0

Table 4a-2. Data for Figure 4a.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	1
2	0.00	0.00	0.67	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	1
4	0.00	0.00	0.00	0.00	0.00	1
5	0.00	0.00	0.00	0.00	0.00	0
6	0.67	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.67	0.00	0.00	1
8	0.00	0.00	0.00	0.00	0.00	1
9	0.00	0.00	0.00	0.00	0.00	0
10	0.00	0.00	0.00	0.00	0.00	1
11	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	0	0.00
2	0.67	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	0	0.67
6	2.00	0.00	0.67	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	0.00	0.00	0.00	0.00	0	0.00
9	0.00	0.00	0.00	0.00	0	0.00
10	1.33	0.00	0.00	0.00	0	0.00
11	1.33	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	4.0	UI
2	0	
3	5.0	UI
4	2.0	UI
5	2.0	UI
6	0	
7	2.0	
8	2.0	UI
9	0	
10	0	
11	0	

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.00	0
10	0.00	0
11	0.67	0

Table 4b-1. Data for Figure 4b.

Station Locations			Hard Clam					
Station	Longitude	Latitude	Station	Seed	Number per 9.29 sq. meters.			
	Degrees (W)	Degrees (N)			Littleneck	Cherrystone	Chowder	Total
1	72.6231	40.9194	1	0.67	0.00	0.00	4.67	5.33
2	72.6136	40.9164	2	0.67	0.00	0.00	8.67	12.00
3	72.6186	40.9164	3	2.67	0.00	0.67	3.33	6.67
4	72.6131	40.9114	4	0.00	0.00	0.00	2.67	2.67
5	72.6203	40.9131	5	2.00	1.33	0.00	3.33	6.67
6	72.6242	40.9111	6	4.00	2.67	0.67	0.00	7.33
7	72.6203	40.9103	7	2.00	0.67	0.00	0.00	2.67
8	72.6161	40.9106	8	0.67	0.00	0.67	1.33	2.67
9	72.6133	40.9089	9	0.00	0.00	0.00	3.33	3.33
10	72.6161	40.9064	10	1.33	1.33	0.00	0.00	2.67
11	72.5940	40.9094	11	0.00	0.00	0.00	0.67	0.67
12	72.5928	40.9078	12	0.00	0.00	0.00	3.33	3.33
13	72.5903	40.9053	13	0.00	0.00	0.00	2.00	2.00
14	72.5834	40.9076	14	0.00	0.67	0.00	7.33	8.67
15	72.5783	40.9054	15	1.33	0.67	4.00	4.67	11.33
16	72.5819	40.9036	16	0.00	0.00	0.67	2.67	3.33
17	72.5699	40.9078	17	1.33	0.67	0.00	0.00	2.00
18	72.5655	40.9127	18	0.00	0.00	0.67	1.33	2.00
19	72.5571	40.9092	19	0.00	0.00	0.00	0.67	0.67
20	72.5557	40.9119	20	0.00	0.00	1.33	0.67	2.00
21	72.5511	40.9121	21	0.00	0.67	0.67	0.00	1.33
22	72.5247	40.9040	22	0.00	0.00	0.00	0.67	0.67

Competitors I					Competitors II			
Number per 9.29 sq. meters.					Number range from 0 = none present to 3 = heavy coverage.			
Station	Oyster	Scallop	Razor Clam	Blood Ark	Station	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton
1	0.00	0.00	0.00	0.00	1	0.5	1.0	0.0
2	0.00	0.00	0.00	0.00	2	2.0	0.0	0.0
3	0.00	0.00	0.00	0.00	3	1.0	1.0	0.0
4	0.00	0.00	0.00	0.00	4	1.0	1.0	0.0
5	0.00	0.00	0.00	0.00	5	0.0	0.0	0.0
6	0.00	0.00	0.00	0.00	6	0.0	0.0	0.0
7	0.00	0.00	0.00	0.00	7	0.0	0.0	0.0
8	0.00	0.00	0.00	0.00	8	0.0	0.0	0.0
9	0.00	0.00	0.00	0.00	9	1.0	1.0	0.0
10	0.00	0.00	0.00	0.00	10	0.0	0.0	0.0
11	0.00	0.00	0.00	0.00	11	1.0	0.0	0.0
12	0.00	0.00	0.00	0.00	12	0.0	0.0	0.0
13	0.00	0.00	0.00	0.00	13	0.0	0.0	0.0
14	0.00	0.00	0.00	0.00	14	1.0	0.0	0.0
15	0.00	0.00	0.67	0.67	15	1.5	0.0	0.0
16	0.00	0.00	0.67	0.00	16	0.0	0.0	0.0
17	0.00	0.00	0.00	0.00	17	2.0	1.0	0.0
18	0.00	0.00	0.00	0.00	18	0.5	0.0	0.0
19	0.00	0.00	0.00	0.00	19	2.0	1.0	0.0
20	0.00	0.00	0.00	0.00	20	0.0	0.0	0.0
21	0.00	0.00	0.00	0.00	21	0.5	1.0	0.0
22	0.00	0.00	0.00	0.00	22	1.0	1.0	0.0

Table 4b-2. Data for Figure 4b.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.67	0.00	0.00	0
2	0.00	0.00	2.67	0.67	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	1
7	0.00	0.00	0.00	0.00	0.00	1
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.00	0.00	1
10	0.00	0.00	0.00	0.00	0.00	0
11	0.00	0.00	0.00	0.00	0.00	0
12	0.00	0.00	0.00	0.00	0.00	0
13	0.00	0.00	0.00	0.00	0.00	0
14	0.00	0.00	0.67	0.00	0.00	0
15	0.00	0.00	0.00	0.00	0.00	0
16	0.00	0.00	0.00	0.00	0.00	0
17	0.00	0.00	0.00	0.00	0.00	0
18	0.00	0.00	0.00	0.67	0.00	0
19	0.00	0.00	0.00	0.00	0.00	0
20	0.00	0.00	0.00	0.00	0.00	0
21	0.00	0.00	0.00	0.00	0.00	0
22	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	0	0.67
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	1	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	0.00	0.00	0.00	0.00	0	0.00
9	0.00	0.00	0.00	0.00	1	0.00
10	0.00	0.00	0.00	0.00	0	0.00
11	0.67	0.00	0.00	0.00	0	0.00
12	0.00	0.00	0.00	0.00	0	0.00
13	0.00	0.00	0.00	0.00	0	0.00
14	0.67	0.00	0.00	0.00	0	0.00
15	0.67	0.00	0.00	0.00	0	0.00
16	0.00	0.00	0.00	0.00	0	0.00
17	0.00	0.00	0.00	0.00	0	0.00
18	0.67	0.00	0.00	0.00	0	0.00
19	1.33	0.00	0.00	0.00	0	0.00
20	0.00	0.00	0.00	0.00	0	0.00
21	0.00	0.00	0.00	0.00	0	0.00
22	0.67	0.00	0.00	0.00	0	0.00

Table 4b-3. Data for Figure 4b.

Sediment Type and Sediment Surface Number ranges from 1 = sand to 5 = mud. (0 = No record)				Miscellaneous Number per 9.29 sq. meters.		
Station	Sediment	Surface		Station	Hairy Cucumber	Other
1	2.0	<i>Ul, Gr</i>		1	0.00	0
2	0	Gr		2	0.00	0
3	1.5			3	0.00	0
4	2.0	Sh	<i>Gr</i>	4	0.00	0
5	4.5	Pt	<i>Gr</i>	5	0.67	0
6	4.0		<i>Ul, Gr</i>	6	0.00	0
7	4.0			7	0.00	0
8	4.0		<i>Gr</i>	8	0.00	0
9	5.0			9	0.00	0
10	4.0			10	0.00	0
11	2.0			11	0.00	0
12	2.0			12	0.00	0
13	2.0			13	0.00	0
14	2.0			14	0.00	0
15	0	Gr		15	0.00	0
16	4.0			16	0.00	0
17	0			17	0.00	0
18	0			18	0.00	0
19	0	Gr		19	0.00	0
20	5.0			20	0.00	0
21	5.0			21	0.00	0.67 RM
22	0			22	0.00	<i>B sp.</i>



# Region 5

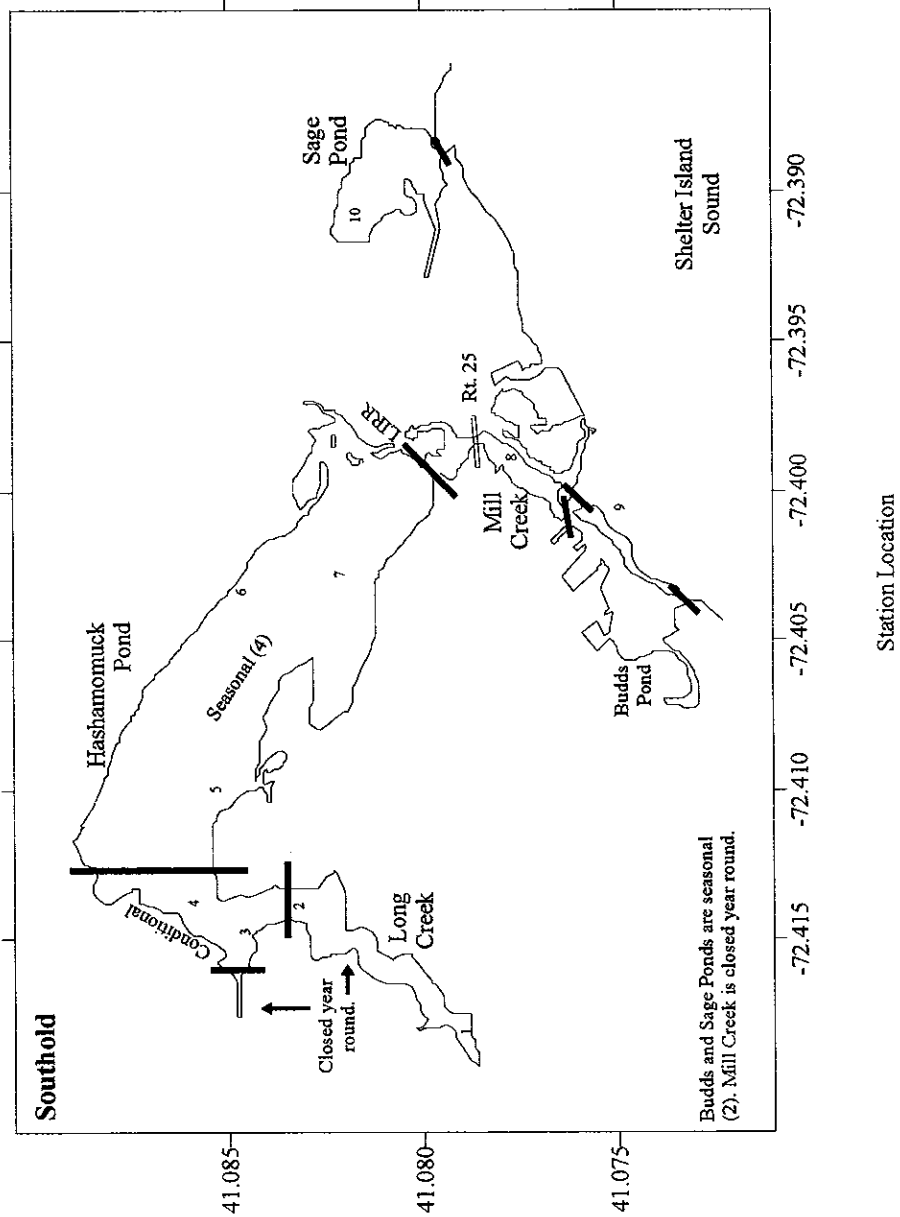


Figure 5  
35

Table 5-1. Data for Figure 5.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.4182	41.0789
2	72.4160	41.0833
3	72.4147	41.0846
4	72.4138	41.0859
5	72.4099	41.0853
6	72.4031	41.0848
7	72.4028	41.0822
8	72.3982	41.0778
9	72.3974	41.0754
10	72.3909	41.0819

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	2.00	0.00	0.00	0.00	2.00
2	3.33	5.33	3.33	0.00	12.00
3	0.00	5.33	8.00	1.33	14.67
4	0.00	1.33	0.67	1.33	3.33
5	4.00	15.33	1.33	0.67	21.33
6	0.67	0.67	0.67	7.33	12.67
7	10.00	0.00	0.67	1.33	12.00
8	1.78	1.33	0.44	1.33	6.67
9	1.33	0.67	0.00	0.00	2.00
10	0.67	0.00	0.00	0.00	0.67

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.67	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.67	0.00	0.00
6	0.00	0.00	0.67	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	0.44	0.00
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	1.0	0.0	0.0
6	0.0	0.0	0.0
7	1.0	1.0	0.0
8	2.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0

Table 5-2. Data for Figure 5.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.67	0.00	0
10	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.67	0.00	0.00	0	0.00
6	1.33	0.67	0.67	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	0.44	0.00	0.00	0.00	1	0.00
9	0.00	0.00	0.00	0.00	0	0.00
10	0.00	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	5.0	
2	5.0	
3	4.0	
4	5.0	
5	4.0	Gr
6	2.0	Co
7	2.0	Ag
8	2.0	Sh,Gr
9	4.0	
10	5.0	

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	As
7	0.00	0
8	0.44	BBS
9	0.00	0
10	0.00	0

# Region 6

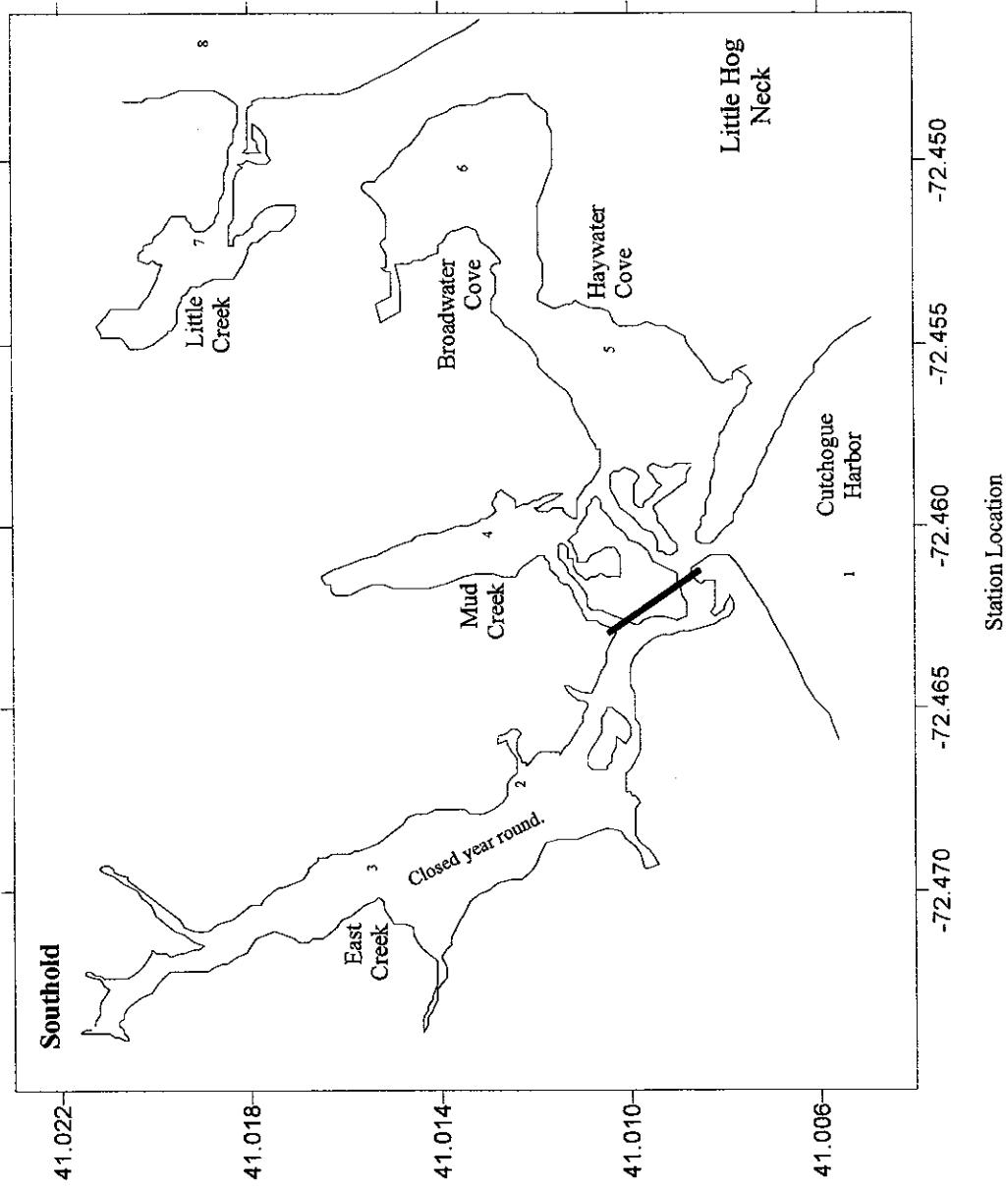


Figure 6  
38

Table 6-1. Data for Figure 6.

Station Locations			Hard Clam Number per 9.29 sq. meters.					
Station	Longitude Degrees (W)	Latitude Degrees (N)	Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	72.4613	41.0053	1	0.00	0.00	0.00	0.67	0.67
2	72.4671	41.0125	2	1.33	0.67	0.67	2.67	5.33
3	72.4693	41.0156	3	0.00	0.00	0.00	0.00	0.00
4	72.4596	41.0131	4	0.00	0.00	0.00	0.00	0.00
5	72.4553	41.0106	5	0.00	0.00	0.00	0.67	0.67
6	72.4502	41.0136	6	1.33	0.00	1.33	0.67	3.33
7	72.4520	41.0190	7	0.00	0.00	0.00	0.00	0.00
8	72.4466	41.0190	8	0.67	0.00	0.00	0.00	0.67

Competitors I Number per 9.29 sq. meters.					Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	Oyster	Scallop	Razor Clam	Blood Ark	Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	0.00	0.00	0.00	0.00	1	0.0	0.0	0.0
2	0.00	0.00	0.00	0.00	2	0.0	0.0	0.0
3	0.00	0.00	0.00	0.00	3	0.0	0.0	0.0
4	0.00	0.00	0.00	0.00	4	0.0	0.0	0.0
5	0.00	0.00	0.00	0.00	5	0.0	0.0	0.0
6	0.00	0.00	0.00	0.00	6	0.0	0.0	0.0
7	0.00	0.00	0.00	0.00	7	0.0	0.0	0.0
8	0.00	0.00	0.67	0.00	8	1.5	0.0	0.0

Table 6-2. Data for Figure 6.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.67	0.00	0.00	0
2	0.00	0.00	0.67	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.67	0.00	0.00	0
Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.67	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	2.67	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	0	
2	4.0	
3	5.0	Ul
4	5.0	Ul,Dg
5	5.0	Sh
6	5.0	
7	5.0	Ul,Dg
8	2.0	Gr

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	B sp.

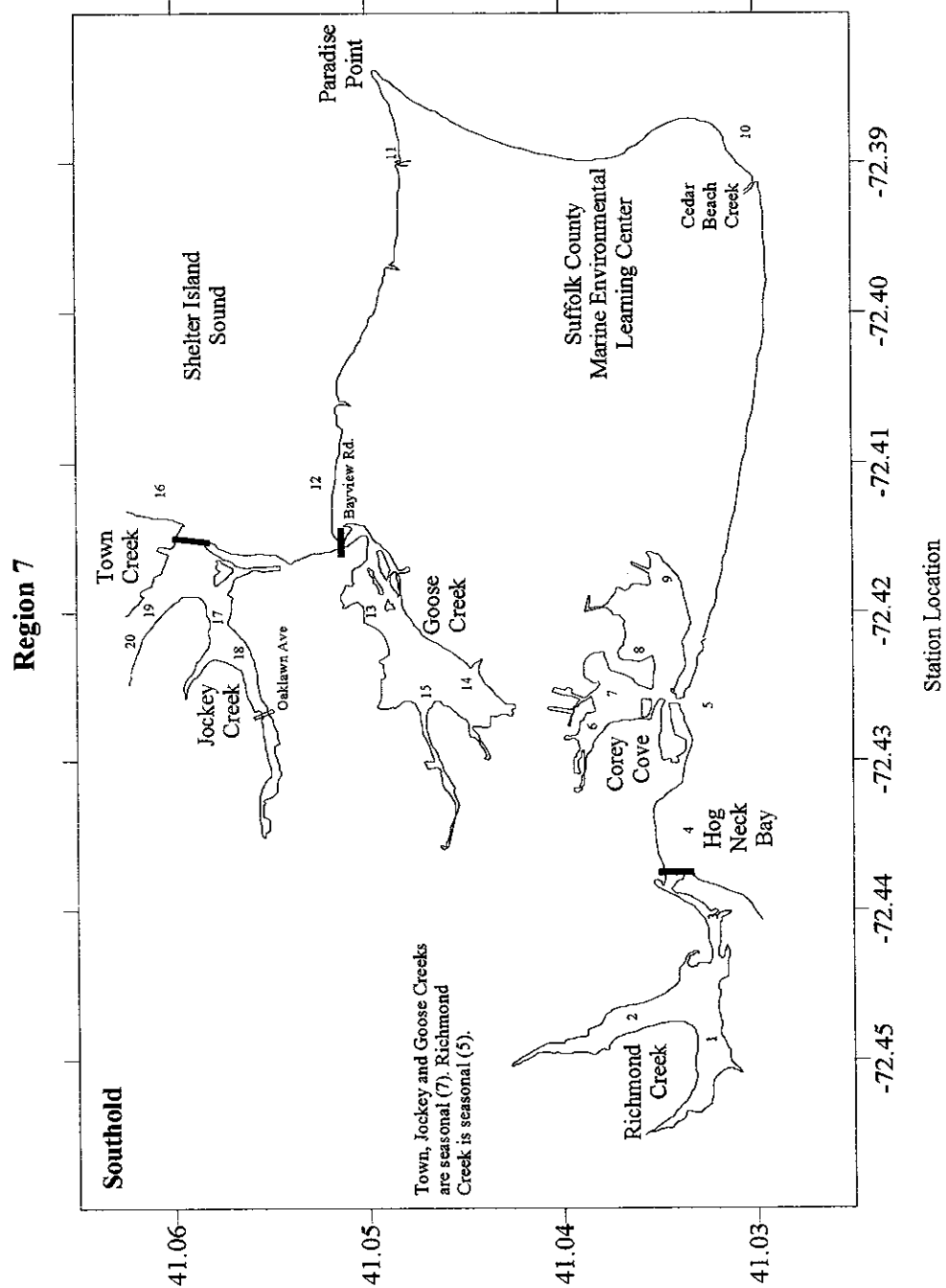


Figure 7  
41

Table 7-1. Data for Figure 7.

Station Locations			Hard Clam					
Station	Longitude	Latitude	Number per 9.29 sq. meters.					Total
	Degrees (W)	Degrees (N)	Seed	Littleneck	Cherrystone	Chowder		
1	72.4486	41.0326	0.00	0.00	0.00	0.00	0.00	0.00
2	72.4466	41.0367	0.00	0.00	0.00	0.67	0.67	0.67
3	72.4400	41.0323	0.00	0.00	0.00	2.00	2.00	2.00
4	72.4347	41.0337	0.00	0.00	0.00	0.00	0.00	0.00
5	72.4264	41.0327	0.00	0.00	0.00	0.00	0.00	0.00
6	72.4271	41.0388	0.67	0.00	1.33	1.33	3.33	3.33
7	72.4256	41.0374	0.00	0.00	0.00	0.67	0.67	0.67
8	72.4225	41.0366	0.00	0.00	0.00	0.00	0.00	0.00
9	72.4176	41.0349	0.00	0.00	0.67	4.67	5.33	5.33
10	72.3880	41.0311	0.67	0.00	0.00	0.00	0.67	0.67
11	72.3893	41.0488	0.00	0.00	0.00	1.33	1.33	1.33
12	72.4110	41.0528	0.00	0.00	0.00	0.67	0.67	0.67
13	72.4200	41.0498	7.33	11.33	4.00	1.33	25.33	25.33
14	72.4248	41.0448	0.00	3.33	6.00	5.33	14.67	14.67
15	72.4258	41.0473	0.00	0.00	0.00	0.00	0.00	0.00
16	72.4119	41.0609	0.00	0.00	0.00	5.33	5.33	5.33
17	72.4204	41.0580	0.00	4.00	2.67	2.00	8.67	8.67
18	72.4230	41.0566	2.67	7.33	3.33	2.67	16.00	16.00
19	72.4199	41.0616	0.00	3.33	0.00	0.67	4.00	4.00
20	72.4221	41.0625	0.00	0.00	0.67	0.67	1.33	1.33

Competitors I					Competitors II			
Station	Number per 9.29 sq. meters.				Number range from 0 = none present to 3 = heavy coverage.			
	Oyster	Scallop	Razor Clam	Blood Ark	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton	
1	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
2	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
3	0.00	0.00	0.00	0.00	1.0	0.0	0.0	
4	0.00	0.00	1.33	0.00	2.0	1.0	0.0	
5	0.00	0.00	0.00	0.00	2.0	1.0	0.0	
6	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
7	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
8	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
9	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
10	0.00	0.00	0.00	0.00	3.0	1.0	2.0	
11	0.00	0.00	0.67	0.00	2.0	1.0	0.0	
12	0.00	0.00	0.00	0.00	1.0	0.0	0.0	
13	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
14	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
15	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
16	0.00	0.00	0.00	0.00	2.0	1.0	0.0	
17	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
18	0.00	0.00	0.00	0.00	1.0	0.0	0.0	
19	0.00	0.00	0.00	0.00	0.0	0.0	0.0	
20	0.00	0.00	0.00	0.00	0.0	0.0	0.0	



Table 7-2. Data for Figure 7.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	1
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.00	0.00	0
10	0.67	0.00	0.00	0.00	0.00	0
11	0.00	0.00	0.67	0.00	0.67	0
12	0.00	0.00	0.00	0.00	0.00	0
13	0.00	0.00	0.00	0.00	0.00	0
14	0.00	0.00	0.00	0.00	0.00	0
15	0.00	0.00	0.00	0.00	0.00	0
16	0.00	0.00	0.00	0.00	0.00	0
17	0.00	0.00	0.00	0.00	0.00	0
18	0.00	0.00	0.00	0.00	0.00	0
19	0.00	0.00	0.00	0.00	0.00	0
20	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.67	0.67	0.00	0.00	0	0.00
4	4.67	0.00	0.00	0.00	0	0.00
5	3.33	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	1.33	0.00	0.00	0.00	0	0.00
9	0.00	0.00	0.00	0.00	0	0.00
10	4.00	2.00	0.00	0.00	1	0.00
11	0.67	0.67	0.00	0.00	0	0.00
12	3.33	0.00	0.00	0.00	0	0.00
13	0.00	0.00	0.00	0.00	0	0.00
14	0.00	0.00	0.00	0.00	0	0.00
15	0.00	0.00	0.00	0.00	1	0.00
16	2.67	1.33	0.00	0.00	0	0.00
17	0.00	0.00	0.00	0.00	0	0.00
18	0.00	0.00	0.00	0.00	1	0.00
19	0.00	0.00	0.00	0.00	0	0.00
20	0.00	0.00	0.00	0.00	0	0.00

Table 7-3. Data for Figure 7.

Sediment Type and Sediment Surface				Miscellaneous		
Number ranges from				Number per 9.29 sq. meters.		
1 = sand to 5 = mud. (0 = No record)				Hairy		
Station	Sediment	Surface		Station	Cucumber	Other
1	5.0	<i>Ul</i>		1	0.00	0
2	5.0	<i>Ul</i>		2	0.00	0
3	4.0			3	4.67	0
4	1.0	Gr, Sh		4	0.00	<i>B sp.</i> , As
5	0	Gr		5	0.00	<i>B sp.</i>
6	2.0			6	0.00	0
7	4.0			7	0.00	0
8	3.0			8	0.00	0
9	4.0			9	0.00	0
10	0	Gr	<i>La, Co, Gr</i>	10	0.00	0
11	4.5	Gr	<i>Co, La</i>	11	0.00	WEC
12	2.0			12	0.00	0
13	5.0	Sh		13	0.00	0
14	5.0	Sh	<i>Ul Ag</i>	14	0.00	0
15	5.0	Sh	<i>Ul</i>	15	0.00	0
16	1.0			16	0.00	<i>B sp.</i>
17	4.0			17	0.00	0
18	4.0	<i>Ul</i>		18	11.33	0
19	5.0			19	0.00	0
20	5.0			20	0.00	0

## Region 8

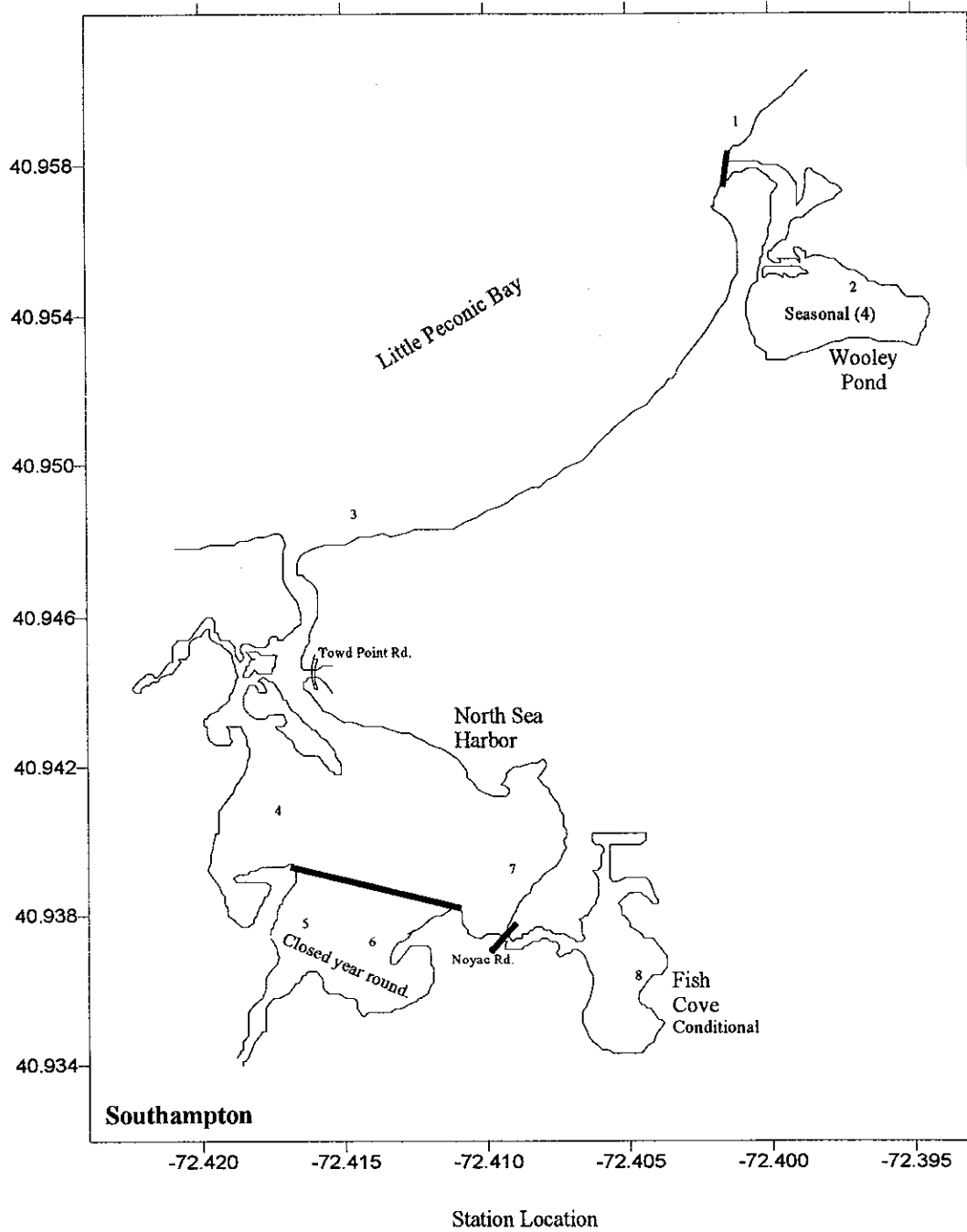


Figure 8  
45

Table 8-1. Data for Figure 8.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.4000	40.9592
2	72.3968	40.9550
3	72.4148	40.9491
4	72.4172	40.9409
5	72.4164	40.9378
6	72.4140	40.9372
7	72.4090	40.9392
8	72.4047	40.9365

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	0.00	0.00	0.00
2	0.67	0.00	0.67	0.67	2.00
3	0.00	0.00	0.00	0.00	0.00
4	1.33	0.67	0.67	0.00	2.67
5	0.00	0.00	0.00	0.00	0.00
6	0.00	6.67	4.00	4.67	16.00
7	0.67	6.67	0.00	0.00	7.33
8	0.00	0.00	2.00	0.67	2.67

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.67
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton
1	2.0	1.0	0.0
2	0.0	0.0	0.0
3	2.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	1.0	0.0	0.0

Table 8-2. Data for Figure 8.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0
Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	4.00	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	3.33	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	1	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	0.00	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	0	Gr
2	4.0	
3	0	Gr
4	5.0	Gr
5	5.0	
6	5.0	
7	5.0	
8	5.0	Gr

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.67	0
8	0.00	0

## Region 9

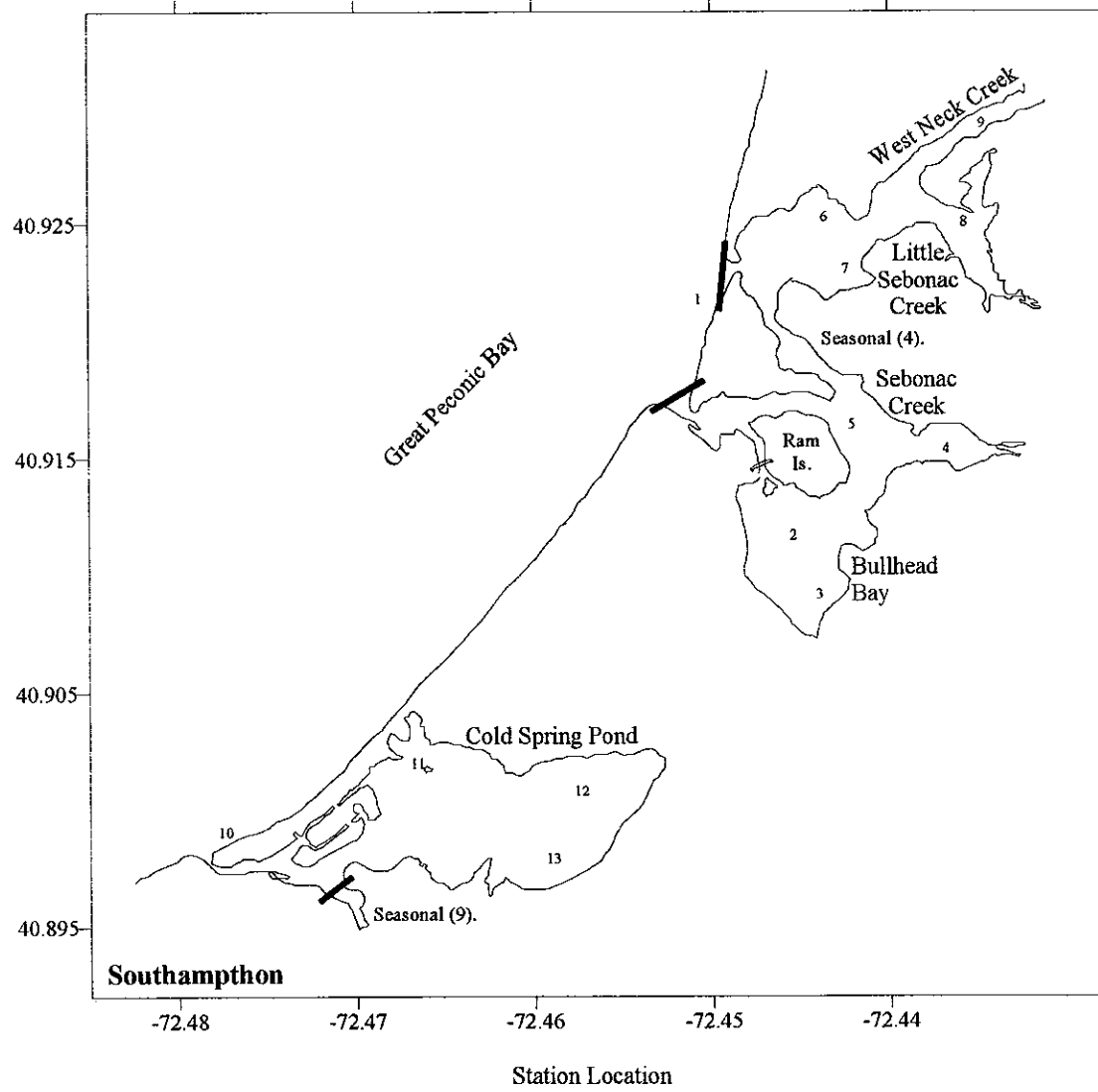


Figure 9  
48

Table 9-1. Data for Figure 9.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.4508	40.9219
2	72.4453	40.9119
3	72.4439	40.9092
4	72.4368	40.9155
5	72.4419	40.9164
6	72.4435	40.9253
7	72.4422	40.9231
8	72.4356	40.9251
9	72.4348	40.9294
10	72.4774	40.8990
11	72.4657	40.9021
12	72.4576	40.8993
13	72.4585	40.8980

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	2.00	2.00
6	0.67	0.00	0.00	0.67	1.33
7	0.00	0.00	0.00	0.00	0.00
8	0.00	1.33	0.00	0.67	2.00
9	0.67	0.00	0.00	1.33	2.67
10	0.00	0.00	0.00	0.00	0.00
11	12.67	6.00	2.00	0.00	20.67
12	0.67	0.00	0.67	2.00	3.33
13	0.00	0.00	2.00	0.00	2.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.67	4.67
12	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.67

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	2.0	1.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	1.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	1.0	0.0	0.0
9	2.0	1.0	0.0
10	2.0	0.0	0.0
11	2.0	1.0	0.0
12	1.0	0.0	0.0
13	0.0	0.0	0.0

Table 9-2. Data for Figure 9.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	1
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	1
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.67	2.67	0.00	0
10	0.00	0.00	0.00	0.00	0.00	0
11	0.67	0.00	0.00	0.00	0.00	0
12	0.00	0.00	0.00	0.00	0.00	0
13	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	2.67	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.67	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	1	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	0.00	0.00	0.00	0.00	0	0.00
9	0.67	0.00	0.00	0.00	1	0.67
10	6.67	0.00	0.00	0.00	0	0.00
11	4.00	2.67	0.00	0.00	1	0.00
12	0.00	0.00	0.00	0.00	0	0.00
13	0.00	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	0	Gr
2	5.0	Zo
3	0	Zo
4	5.0	Zo
5	4.0	Sh
6	5.0	Sh
7	4.0	Sh
8	5.0	
9	1.0	Gr
10	0	Gr
11	2.0	
12	4.0	
13	4.0	

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.67	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.67	0
10	0.67	0
11	0.67	As, 0.67 RM
12	0.00	0
13	0.00	0



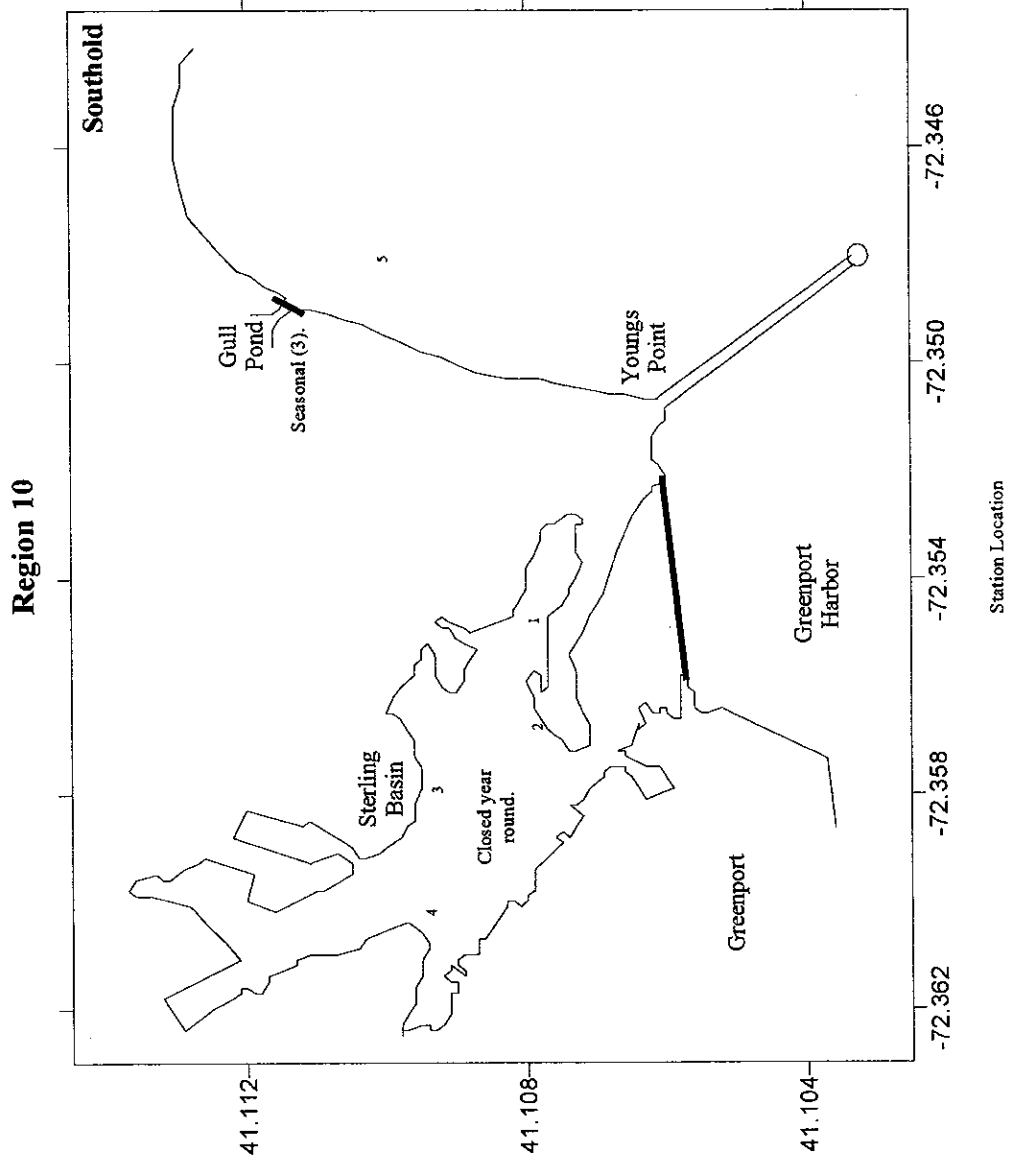


Figure 10  
51

Table 10. Data for Figure 10.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.3544	41.1083
2	72.3567	41.1083
3	72.3581	41.1096
4	72.3600	41.1095
5	72.3476	41.1099

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	4.00	2.00	3.33	2.67	12.67
2	1.33	2.67	0.67	1.33	6.00
3	0.00	0.67	0.67	1.33	2.67
4	0.00	0.57	1.71	1.71	4.00
5	1.33	0.00	0.00	0.67	2.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.67	0.00
2	0.00	0.00	0.00	0.67
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula formicata</i>	<i>Crepidula plana</i>	Chiton
1	1.0	0.0	0.0
2	1.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	1.0	0.0	0.0

Predators  
Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.67	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.67	0.00	0
Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	0	0.00
2	0.00	0.67	0.00	0.00	1	0.67
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.67	0.00	0.00	0.00	0	0.00

Sediment Type and Sediment Surface Number ranges from 1 = sand to 5 = mud. (0 = No record)		
Station	Sediment	Surface
1	4.0	Gr
2	4.0	Gr
3	4.5	
4	4.0	
5	0	

Miscellaneous Number per 9.29 sq. meters.		
Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	B sp.

# Region 11

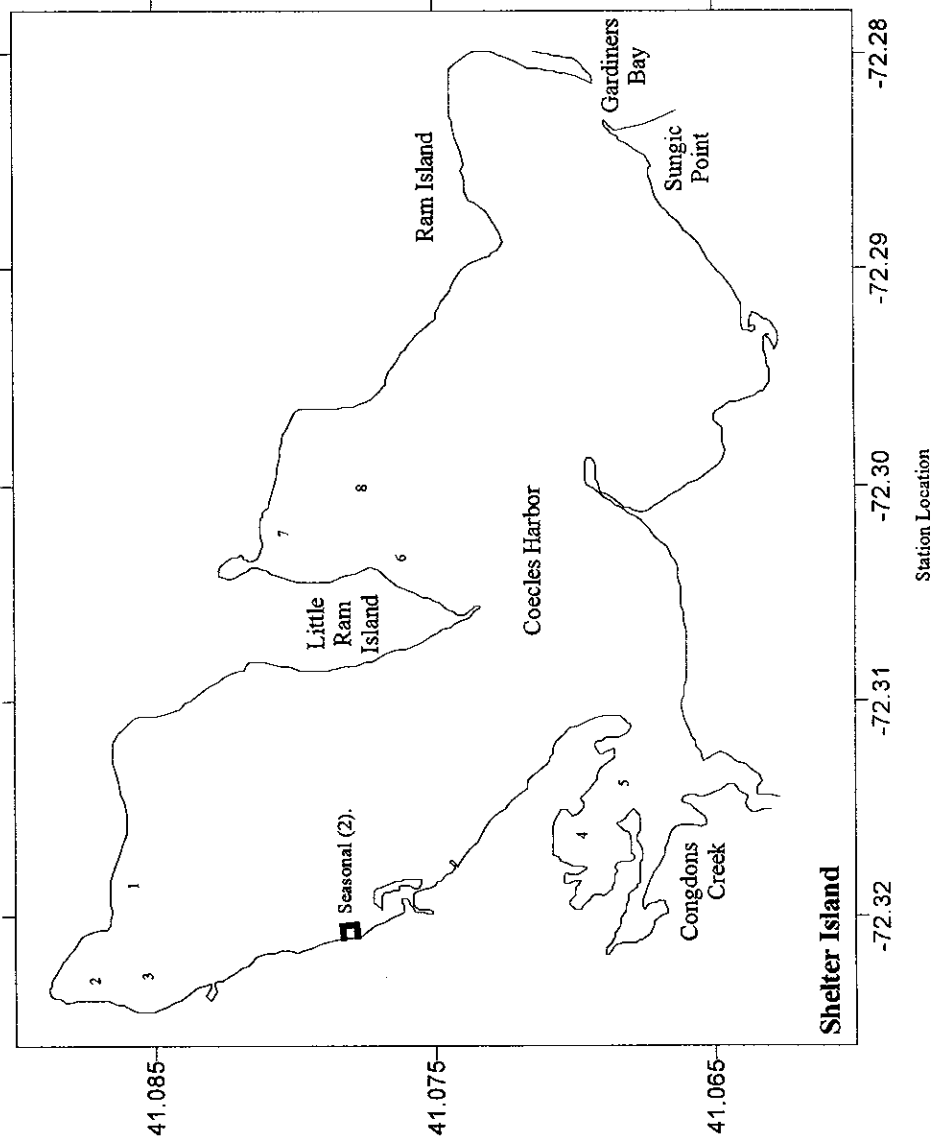


Figure 11  
53

Table 11-1. Data for Figure 11.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.3181	41.0862
2	72.3231	41.0874
3	72.3228	41.0855
4	72.3161	41.0700
5	72.3140	41.0686
6	72.3035	41.0764
7	72.3023	41.0806
8	72.2994	41.0781

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	1.33	0.00	0.00	1.33	2.67
2	1.33	0.00	0.00	0.00	1.33
3	0.67	0.00	0.00	2.67	3.33
4	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	2.00	2.00
7	0.67	0.00	4.00	2.00	6.67
8	0.00	0.67	0.00	0.00	0.67

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	3.33	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	2.00	0.00
8	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	2.0	1.0	0.0
2	0.5	0.0	0.0
3	0.5	1.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	1.0	0.0	0.0
7	2.0	0.0	0.0
8	0.0	0.0	0.0

Table 11-2. Data for Figure 11.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.67	0.00	0
3	0.00	0.00	0.00	0.00	0.67	0
4	0.00	0.00	0.00	0.00	0.00	1
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	1.33	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.67	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	1	0.00
8	0.00	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	2.0	
2	4.0	
3	3.0	
4	5.0	Zo
5	5.0	Zo
6	4.0	
7	2.0	
8	5.0	

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0.67 Ma
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0

## Region 12

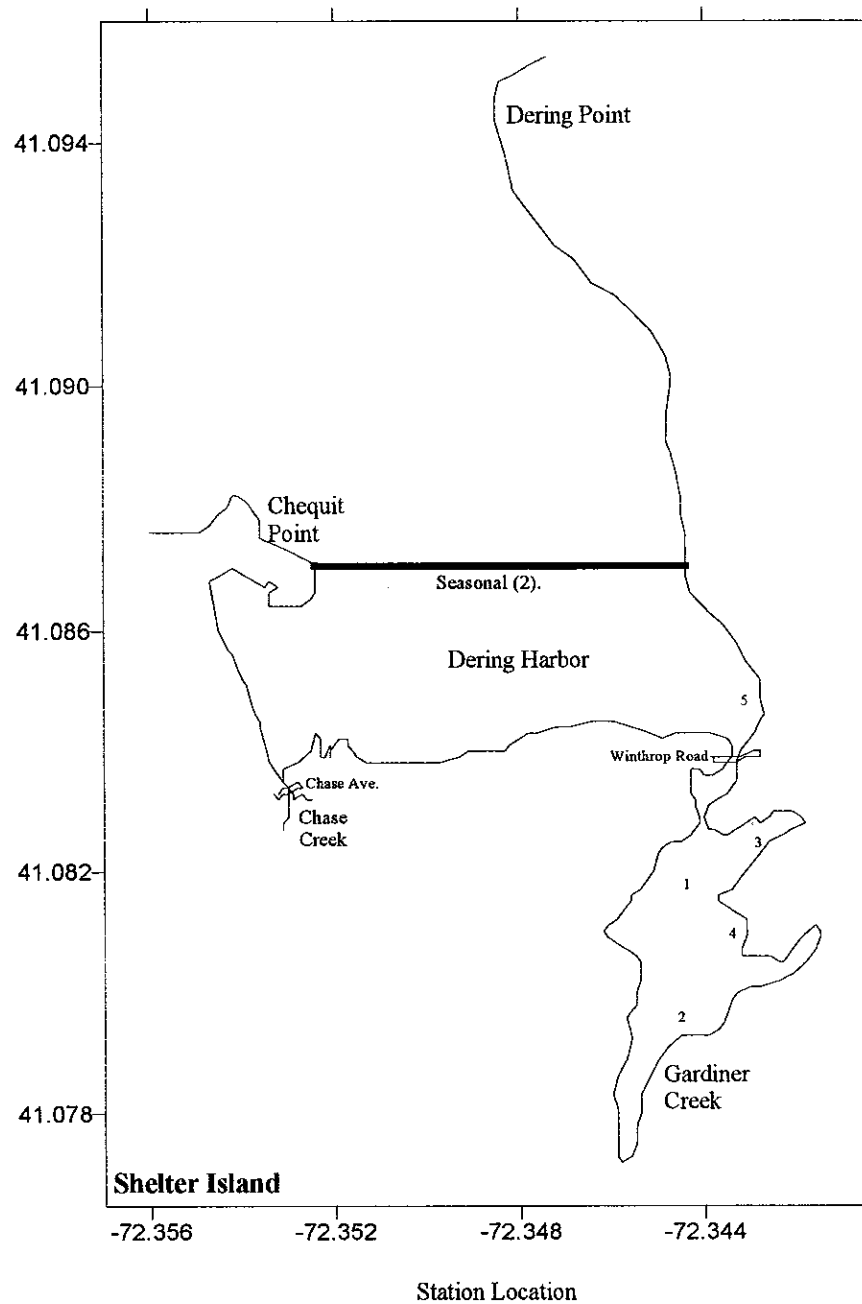


Figure 12  
56

Table 12. Data for Figure 12.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.3444	41.0818
2	72.3445	41.0797
3	72.3428	41.0825
4	72.3431	41.0810
5	72.3427	41.0849

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	4.67	2.00	6.67
2	0.00	0.00	0.00	1.33	1.33
3	0.00	0.00	0.00	0.67	0.67
4	0.00	0.00	0.67	1.33	2.00
5	1.33	0.67	0.00	1.33	4.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.67	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.67	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	2.0	1.0	0.0

Predators  
Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	1	0.00
4	0.00	0.00	0.00	0.00	1	0.00
5	0.67	0.00	0.00	0.00	0	0.00

Sediment Type and Sediment Surface Number ranges from 1 = sand to 5 = mud. (0 = No record)		
Station	Sediment	Surface
1	2.0	Dg
2	5.0	
3	5.0	Ag
4	5.0	Dg
5	2.0	

Miscellaneous Number per 9.29 sq. meters.		
Station	Hairy Cucumber	Other
1	0.00	0.67 <i>Ma</i>
2	2.00	0
3	0.00	0
4	2.00	0
5	0.00	0

### Region 13

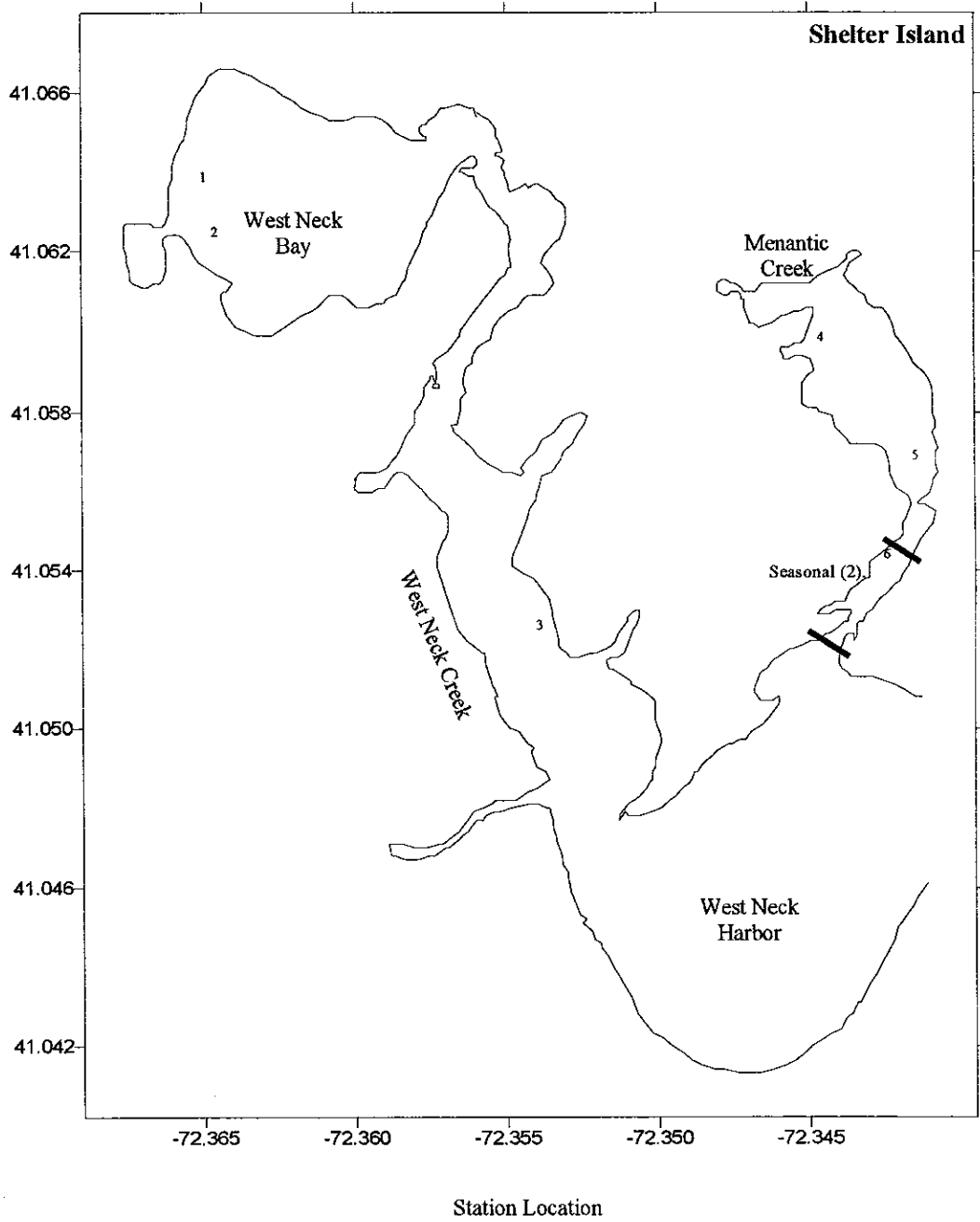


Figure 13  
58



Table 13. Data for Figure 13.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.3652	41.0642
2	72.3646	41.0626
3	72.3535	41.0526
4	72.3439	41.0589
5	72.3413	41.0571
6	72.3439	41.0549

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.67	2.00	4.00	6.67
2	0.74	1.48	2.22	0.74	5.19
3	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.67	0.67
5	0.00	0.00	0.00	0.00	0.00
6	0.00	0.67	0.67	1.33	2.67

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0

Predators  
Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.67	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	1	0.67
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	1	0.00
4	0.00	0.00	0.00	0.00	0	1.33
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00

Sediment Type and Sediment Surface Number ranges from 1 = sand to 5 = mud. (0 = No record)		
Station	Sediment	Surface
1	2.0	
2	2.0	
3	5.0	Wt
4	5.0	
5	3.0	
6	4.0	

Miscellaneous Number per 9.29 sq. meters.		
Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0

# Region 14

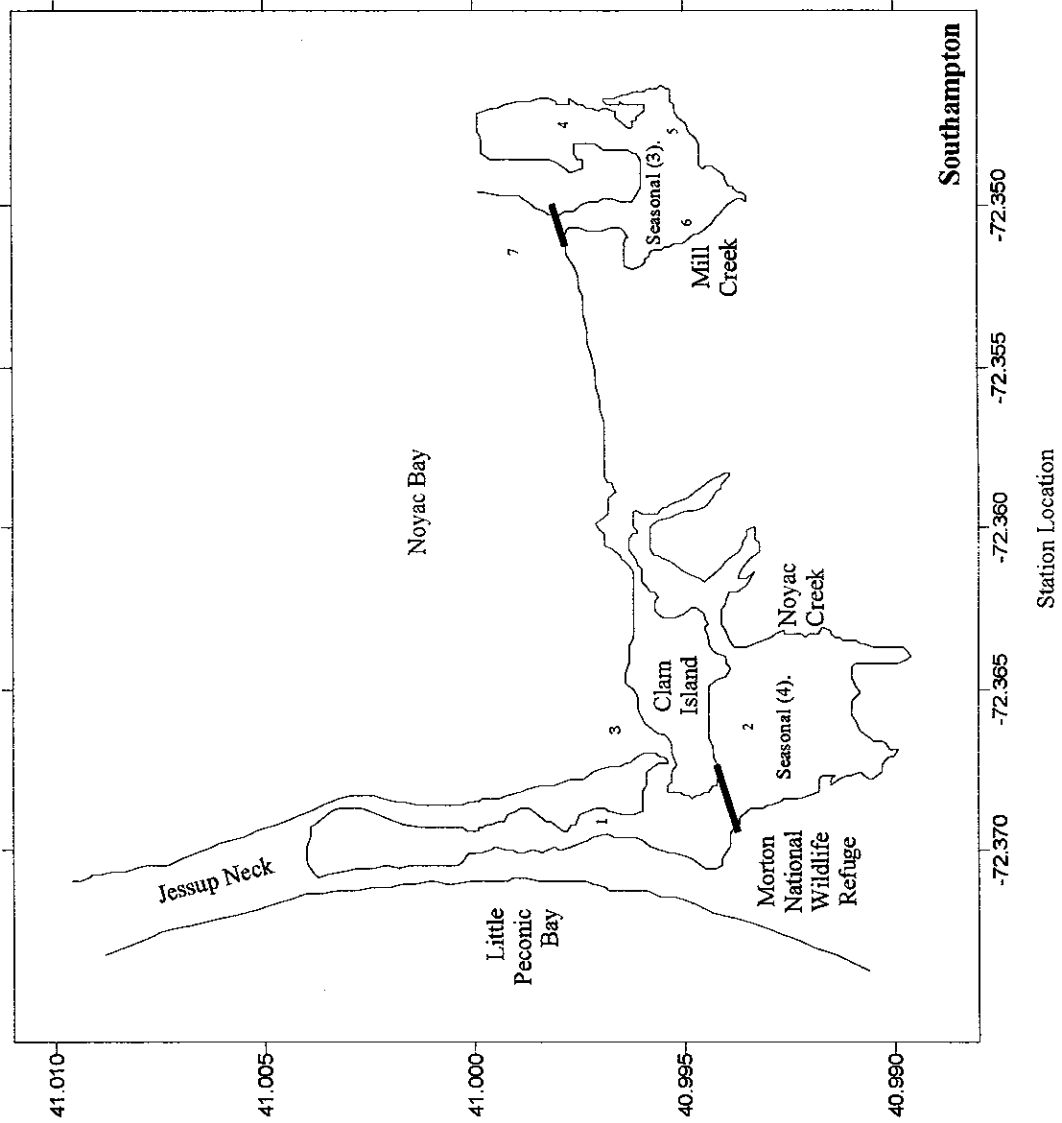


Figure 14  
60

Table 14-1. Data for Figure 14.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.3691	40.9971
2	72.3660	40.9936
3	72.3664	40.9968
4	72.3476	40.9980
5	72.3476	40.9953
6	72.3666	40.9950
7	72.3514	40.9992

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	0.00	8.00	8.00
2	2.67	2.00	0.00	0.00	4.67
3	0.67	0.00	0.00	0.00	0.67
4	0.00	1.33	0.00	0.67	2.00
5	0.67	0.00	0.67	4.00	5.33
6	0.00	2.00	3.33	2.00	7.33
7	0.00	0.00	0.00	0.00	0.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.67	0.00
2	0.00	0.00	0.67	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	1.33	0.00
7	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	2.0	0.0	0.0
2	1.0	1.0	0.0
3	2.0	0.0	0.0
4	1.0	0.0	0.0
5	0.0	0.0	0.0
6	1.0	0.0	0.0
7	2.0	1.0	0.0

Table 14-2. Data for Figure 14.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	2.67	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.67	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	2.0	
2	3.5	<i>Zo</i>
3	0	Gr
4	4.0	
5	4.0	
6	5.0	
7	0	Gr

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	<i>As</i>
7	0.00	<i>As</i>

# Region 15

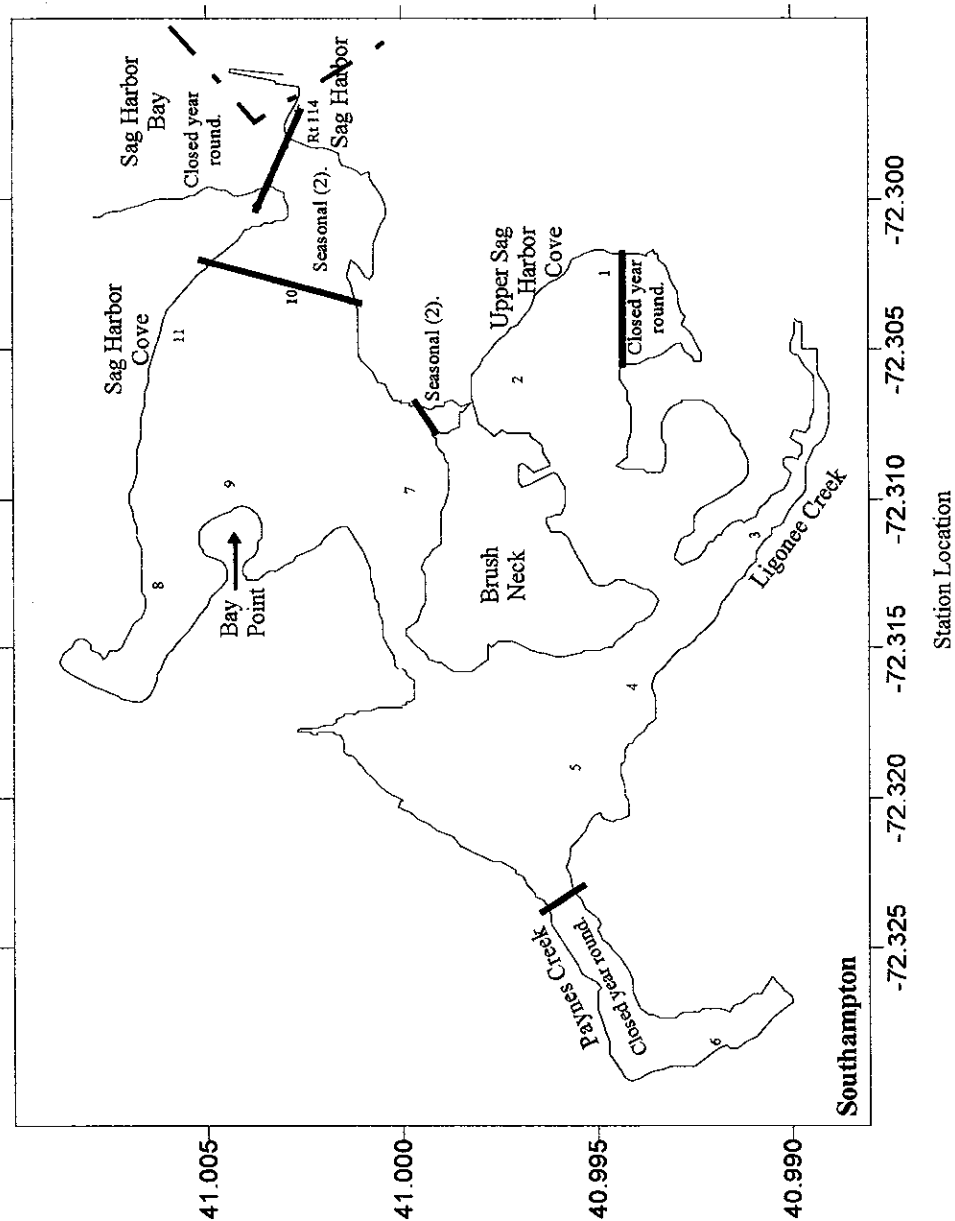


Figure 15  
63

Table 15-1. Data for Figure 15.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.3019	40.9950
2	72.3060	40.9973
3	72.3110	40.9910
4	72.3165	40.9941
5	72.3190	40.9956
6	72.3274	40.9923
7	72.3099	41.0000
8	72.3123	41.0068
9	72.3093	41.0046
10	72.3033	41.0030
11	72.3043	41.0060

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	1.33	1.33	4.00	6.67
2	1.33	0.00	0.00	4.67	6.00
3	3.33	2.67	0.00	2.67	8.67
4	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	1.33	1.33
6	7.33	2.67	5.33	5.33	20.67
7	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.67	4.00	4.67
9	0.00	0.00	0.00	0.67	0.67
10	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.67	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	5.33	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.5	1.0	0.0
5	0.5	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.5	0.0	0.0
9	0.0	0.0	0.0
10	1.0	1.0	0.0
11	0.0	0.0	0.0

Table 15-2. Data for Figure 15.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.00	0.00	0
10	0.00	0.00	0.00	0.00	0.00	0
11	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	1	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	2.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	0.00	0.00	0.00	0.00	0	0.00
9	0.00	0.00	0.00	0.00	0	0.00
10	0.00	0.00	0.00	0.00	0	0.00
11	0.00	0.67	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	4.0	
2	5.0	
3	2.0	
4	2.0	
5	2.0	
6	3.5	
7	2.0	Sh
8	4.0	
9	5.0	Sh
10	2.0	
11	4.0	

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	5.33 <i>Ma</i>
2	0.00	82.67 <i>Ma</i> , 1.33 FAW
3	0.00	5.33 <i>Ma</i>
4	0.00	0
5	0.67	0
6	0.00	41.33 <i>Ma</i>
7	0.00	0
8	0.00	0
9	0.00	0
10	0.00	0
11	0.00	0

## Region 16

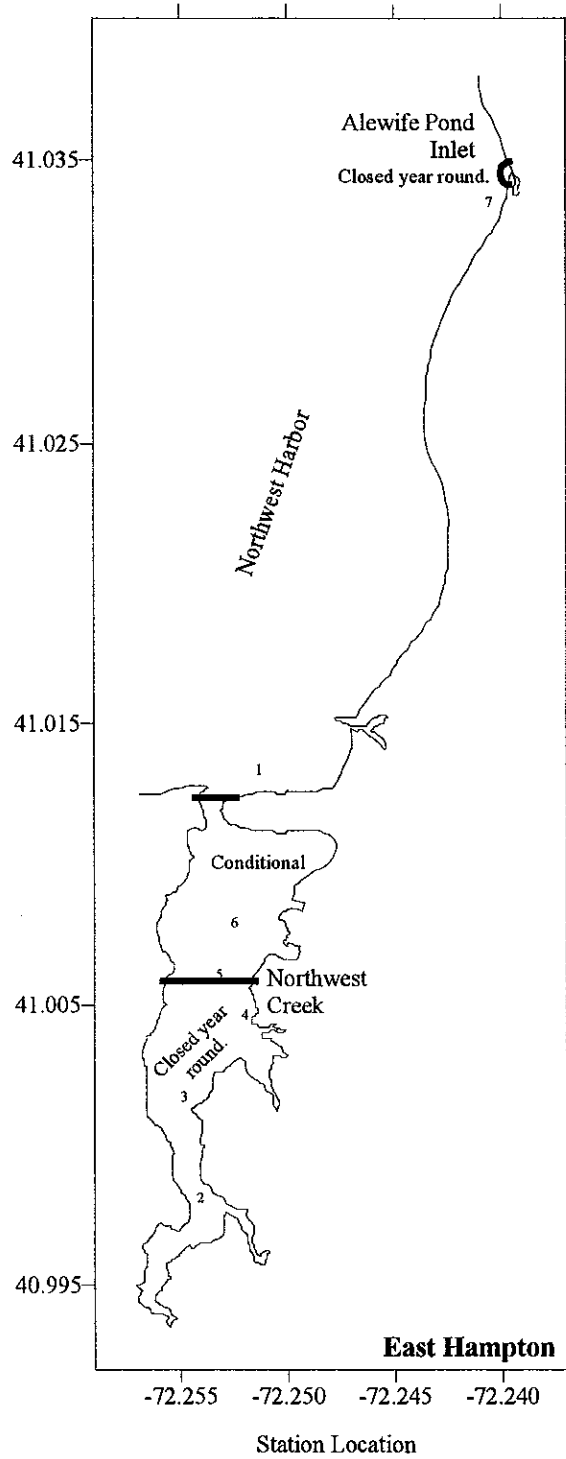


Figure 16  
66



Table 16-1. Data for Figure 16.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.2513	41.0134
2	72.2538	40.9984
3	72.2549	41.0019
4	72.2516	41.0046
5	72.2530	41.0063
6	72.2525	41.0080
7	72.2403	41.0334

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.67	0.00	0.67	1.33
3	0.00	0.67	0.00	0.00	0.67
4	0.00	0.00	0.67	3.33	4.00
5	0.67	0.00	0.00	1.33	2.00
6	0.00	0.00	0.00	3.33	4.67
7	0.00	0.00	1.33	0.67	2.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	2.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	1.5	1.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.5	1.0	0.0
6	0.0	0.0	0.0
7	0.5	0.0	0.0

Table 16-2. Data for Figure 16.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	2.67	0.00	0.00	0.00	0	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	0	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	1	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	3.0	
2	5.0	
3	5.0	
4	4.0	
5	4.0	
6	2.0	
7	1.5	Zo

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	0
2	0.00	0
3	3.33	0
4	0.67	0
5	0.67	0
6	0.00	0
7	0.00	0

## Region 17

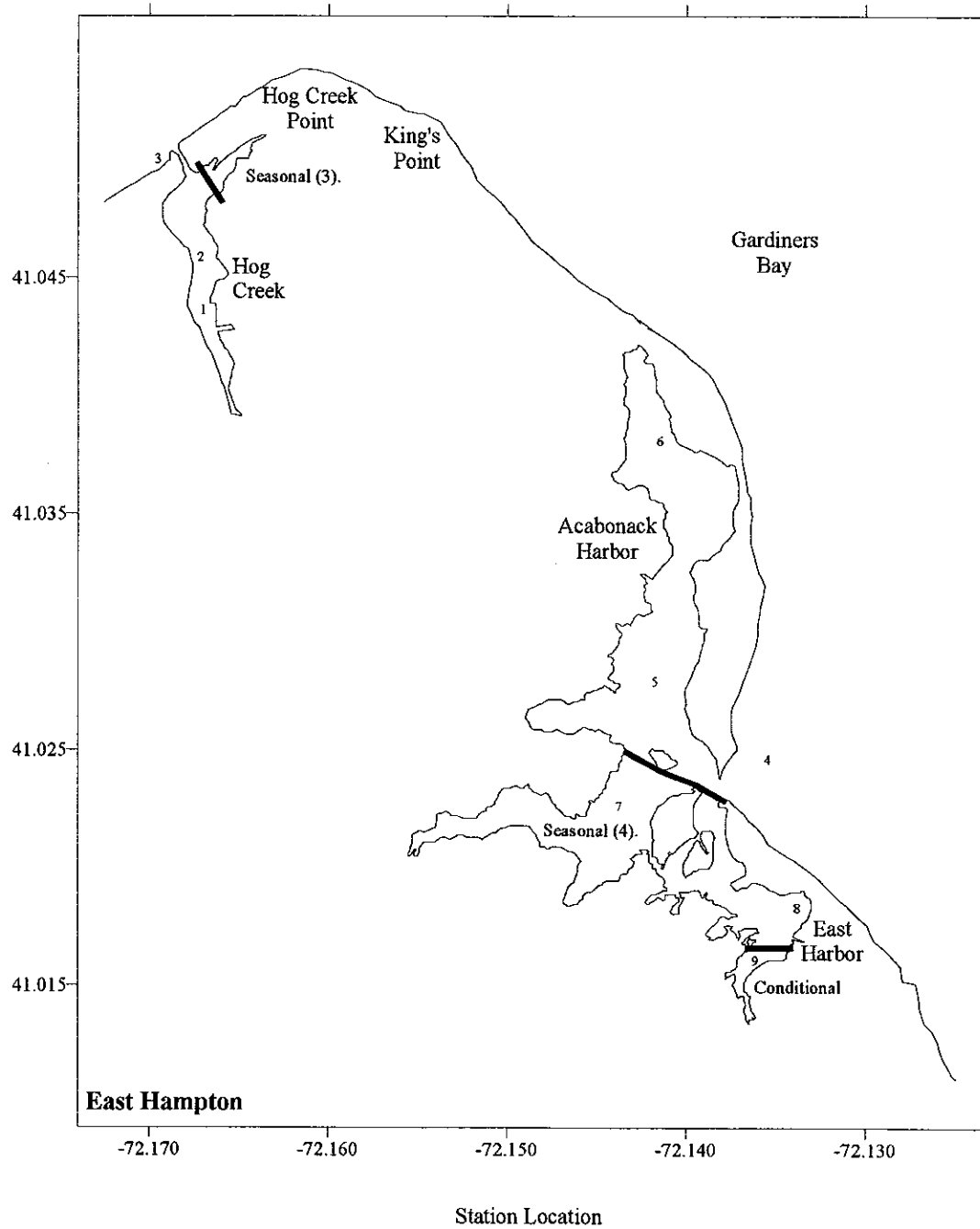


Figure 17  
69

Table 17-1. Data for Figure 17.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.1668	41.0438
2	72.1670	41.0460
3	72.1693	41.0499
4	72.1356	41.0247
5	72.1418	41.0279
6	72.1415	41.0380
7	72.1438	41.0226
8	72.1336	41.0185
9	72.1359	41.0159

Hard Clam					
Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.67	0.67	1.33
6	0.00	1.33	0.00	0.00	1.33
7	0.00	0.00	0.00	0.67	0.67
8	0.00	0.67	1.33	0.00	2.00
9	0.00	0.00	0.67	2.67	3.33

Competitors I				
Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00

Competitors II			
Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	1.5	0.0	0.0
4	2.0	1.0	0.0
5	1.0	0.0	0.0
6	0.0	0.0	0.0
7	0.5	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0

Table 17-2. Data for Figure 17.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	1
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.67	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	1
9	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	1	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	1.33	0.00	0.00	0.00	0	0.67
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	0	0.00
8	0.00	0.00	0.00	0.00	0	0.00
9	0.00	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	5.0	<i>Zo</i>
2	5.0	<i>Zo</i>
3	0	Gr
4	0	
5	3.0	
6	5.0	
7	5.0	
8	4.0	
9	4.5	

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	2.00	0.67 <i>Mb</i>
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	2.00	0
8	0.00	0
9	0.00	0

Table 18-1. Data for Figure 18.

Station Locations			Hard Clam					
Station	Longitude	Latitude	Number per 9.29 sq. meters.					Total
	Degrees (W)	Degrees (N)	Seed	Littleneck	Cherrystone	Chowder		
1	72.1999	41.0292	0.00	0.00	0.00	4.00		4.00
2	72.2021	41.0304	0.00	0.00	0.00	1.33		1.33
3	72.2025	41.0274	0.00	0.00	0.00	7.33		7.33
4	72.2004	41.0175	0.00	0.00	0.00	0.00		0.00
5	72.1858	40.9999	0.00	0.00	0.00	0.00		0.00
6	72.1897	41.0061	0.00	0.00	0.67	5.33		6.00
7	72.1844	41.0101	1.33	0.00	0.00	0.67		2.00
8	72.1823	41.0130	1.33	0.00	0.00	0.67		2.67
9	72.1814	41.0157	0.00	0.00	0.00	0.00		0.00
10	72.1815	41.0187	0.00	0.00	0.00	4.00		6.00
11	72.1818	41.0217	2.67	0.00	0.00	0.00		2.67
12	72.1837	41.0211	0.00	0.00	0.00	1.33		1.33
13	72.1832	41.0228	0.00	0.00	0.00	0.00		0.00
14	72.1832	41.0244	0.00	0.00	0.00	0.00		0.00
15	72.1819	41.0231	0.00	0.00	0.00	0.00		0.00
16	72.1813	41.0428	0.67	0.00	0.00	0.00		0.67

Competitors I					Competitors II			
Number per 9.29 sq. meters.					Number range from 0 = none present to 3 = heavy coverage.			
Station	Oyster	Scallop	Razor Clam	Blood Ark	Station	<i>Crepidula fornicata</i>	<i>Crepidula plana</i>	Chiton
1	0.00	0.00	0.00	0.00	1	3.0	1.0	0.0
2	0.00	0.00	0.00	0.00	2	1.0	0.0	0.0
3	0.00	0.00	0.00	0.00	3	2.0	1.0	0.0
4	0.00	0.00	0.00	0.67	4	1.0	0.0	0.0
5	0.00	0.00	0.00	0.00	5	0.0	0.0	0.0
6	0.00	0.00	0.00	0.00	6	2.5	0.0	0.0
7	0.00	0.00	0.00	0.00	7	2.0	0.0	0.0
8	0.00	0.00	0.00	0.00	8	2.0	0.0	0.0
9	0.00	0.00	0.00	0.00	9	2.0	0.0	0.0
10	0.00	0.00	0.00	0.00	10	2.0	0.0	0.0
11	0.00	0.00	0.00	1.33	11	2.0	0.0	0.0
12	0.00	0.00	0.67	0.00	12	1.0	1.0	0.0
13	0.00	0.00	0.00	0.00	13	2.0	1.0	0.0
14	0.00	0.00	1.33	0.00	14	2.0	0.0	0.0
15	0.00	0.00	0.00	0.00	15	2.5	0.0	0.0
16	4.00	0.00	1.33	0.00	16	2.0	1.0	0.0

Table 18-2. Data for Figure 18.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.00	0.00	0
10	0.00	0.00	0.00	0.00	0.00	0
11	0.00	0.00	0.00	0.00	0.00	0
12	0.00	0.00	0.67	0.00	0.00	0
13	0.00	0.00	0.00	0.00	0.00	0
14	0.00	0.00	0.00	0.00	0.00	0
15	0.00	0.00	0.00	0.00	0.00	0
16	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	0.00	0.00	1	0.00
2	0.00	0.67	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	1	0.00
5	0.00	0.67	0.00	0.00	1	0.00
6	0.00	0.00	0.00	0.00	1	0.00
7	0.00	0.00	0.00	0.00	1	0.00
8	0.00	0.00	0.00	0.00	1	0.00
9	0.00	0.00	0.00	0.00	0	0.00
10	0.00	0.00	0.00	0.00	0	0.00
11	0.00	0.00	0.67	0.00	0	0.00
12	0.67	0.00	0.00	0.00	0	0.00
13	2.67	0.00	0.67	0.00	0	0.00
14	4.00	0.00	0.00	0.00	0	0.00
15	1.33	0.00	0.00	0.00	1	0.00
16	2.00	0.67	0.00	0.00	1	0.00

Table 18-3. Data for Figure 18.

Sediment Type and Sediment Surface			
Number ranges from			
1 = sand to 5 = mud. (0 = No record)			
Station	Sediment	Surface	
1	2.0	<i>En</i>	
2	5.0		
3	1.0		
4	3.0	<i>Zo</i>	
5	5.0	<i>Zo</i>	
6	2.0		
7	0	Gr	<i>Co</i>
8	0	Gr	
9	0	Ro	
10	0		
11	0	<i>Co</i>	
12	0		
13	1.0		
14	1.0	Sh	
15	1.0	Ro	<i>Co</i>
16	0		

Miscellaneous		
Number per 9.29 sq. meters.		
Hairy		
Station	Cucumber	Other
1	0.00	<i>As</i>
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	<i>As</i>
8	0.00	<i>As</i>
9	0.00	0.67 <i>Ll</i>
10	0.00	BS
11	0.00	BS, <i>B</i> sp., 1.33 <i>Ll</i> , 0.67 GC
12	0.00	BS
13	0.00	0
14	0.00	0.67 <i>Ss</i>
15	0.00	1.33 GC
16	0.00	0



# Region 19

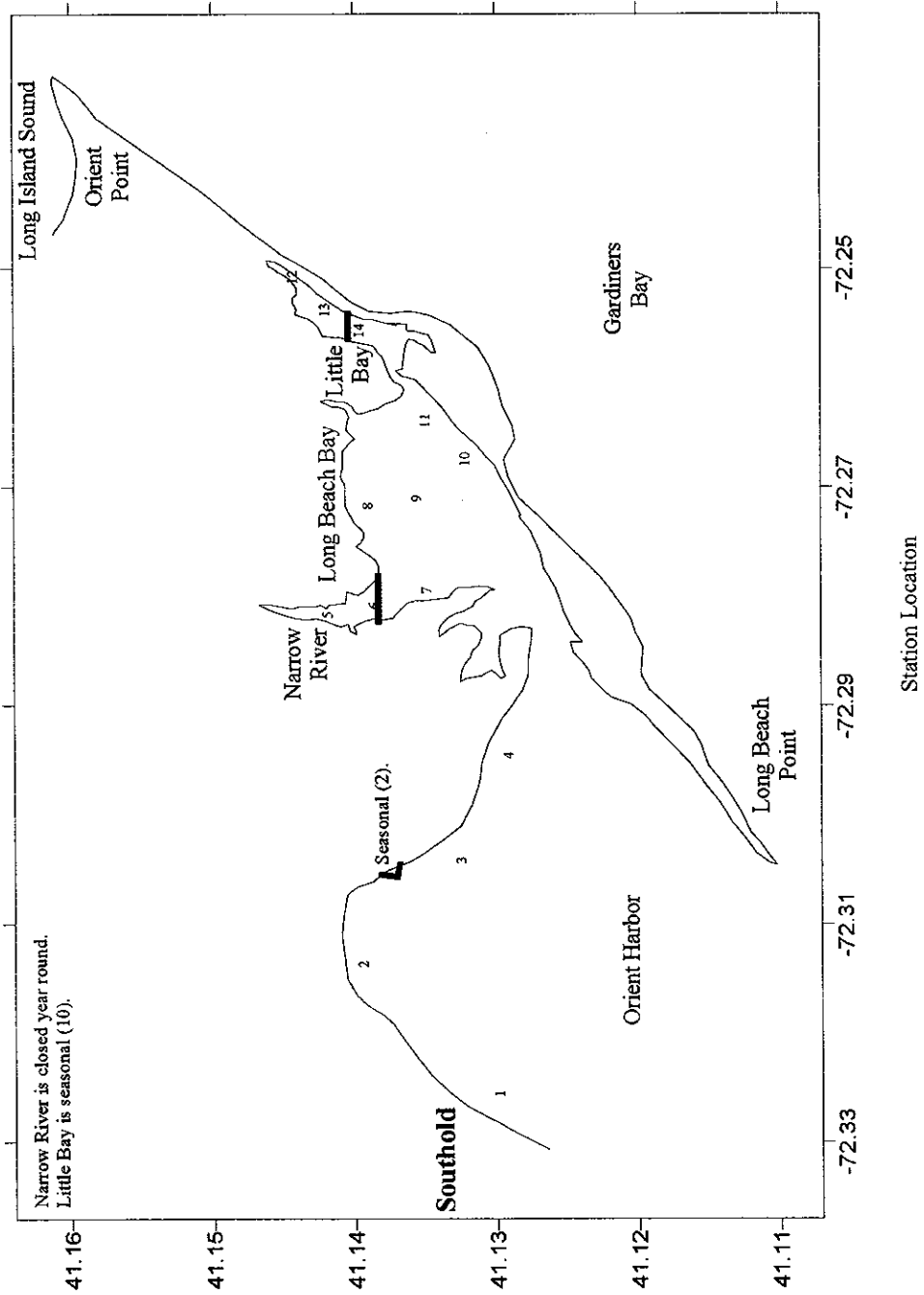


Figure 19  
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Table 19-1. Data for Figure 19.

Station Locations		
Station	Longitude Degrees (W)	Latitude Degrees (N)
1	72.3262	41.1301
2	72.3138	41.1401
3	72.3033	41.1331
4	72.2943	41.1296
5	72.2816	41.1421
6	72.2809	41.1389
7	72.2800	41.1352
8	72.2715	41.1396
9	72.2709	41.1360
10	72.2677	41.1324
11	72.2643	41.1352
12	72.2519	41.1441
13	72.2538	41.1421
14	72.2554	41.1395

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.67	0.00	0.00	0.00	0.67
2	2.00	0.00	0.00	2.00	4.00
3	3.33	2.00	0.00	1.33	6.67
4	0.67	0.00	0.00	0.00	0.67
5	0.00	0.67	0.00	0.00	0.67
6	1.33	2.00	0.67	2.67	6.67
7	0.00	0.67	0.00	0.00	0.67
8	0.00	0.67	0.00	4.67	5.33
9	0.00	0.00	0.00	0.67	0.67
10	0.67	0.00	2.00	2.67	5.33
11	0.00	0.00	0.00	2.00	2.00
12	0.67	0.67	0.00	0.67	2.00
13	2.67	2.67	1.33	0.00	7.33
14	0.00	0.00	0.00	0.00	0.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.67	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	1.33	0.00	0.00
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	2.0	0.0	0.0
2	2.0	1.0	0.0
3	1.0	0.0	0.0
4	1.0	0.0	0.0
5	0.0	0.0	0.0
6	1.0	0.0	0.0
7	1.0	0.0	0.0
8	2.0	0.0	0.0
9	2.0	0.0	0.0
10	2.0	0.0	0.0
11	2.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0

Table 19-2. Data for Figure 19.

## Predators

Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.67	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	1
4	0.00	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0.00	1
8	0.00	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.00	0.00	0
10	0.00	0.00	0.00	0.00	0.00	0
11	0.00	0.00	0.00	0.00	0.00	0
12	0.00	0.00	0.00	0.00	0.00	0
13	0.00	0.00	0.67	0.00	0.00	0
14	0.00	0.00	0.00	0.00	0.00	0

Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	0.00	0.00	1.33	0.00	1	0.00
2	0.00	0.00	0.00	0.00	0	0.00
3	0.00	0.00	0.00	0.00	0	0.00
4	0.00	0.00	0.00	0.00	1	0.00
5	0.00	0.00	0.00	0.00	0	0.00
6	0.00	0.00	0.00	0.00	0	0.00
7	0.00	0.00	0.00	0.00	1	0.00
8	0.00	0.00	0.00	0.00	1	0.00
9	0.00	0.00	0.00	0.00	0	0.00
10	0.00	0.00	0.00	0.00	1	0.00
11	0.00	0.67	0.00	0.00	1	0.00
12	0.00	0.00	0.00	0.00	0	0.00
13	0.00	0.00	0.00	0.00	0	0.00
14	0.00	0.00	0.00	0.00	0	0.00

## Sediment Type and Sediment Surface

Number ranges from

1 = sand to 5 = mud. (0 = No record)

Station	Sediment	Surface
1	2.0	Zo
2	2.0	Zo
3	2.0	Zo
4	2.0	Zo
5	5.0	Ul
6	5.0	
7	2.0	Zo
8	2.0	Co
9	4.5	
10	2.0	
11	2.0	Co
12	4.0	
13	2.0	
14	2.0	

## Miscellaneous

Number per 9.29 sq. meters.

Station	Hairy Cucumber	Other
1	0.00	1.33 SSBS, 2.00 RM, 8.67 Ct
2	0.00	0
3	2.00	As, 1.33 SSBS, 2.00 Ct, 2.00 MEC
4	0.00	As
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	As
9	0.00	0
10	0.00	As
11	0.00	0
12	0.00	0
13	0.00	0
14	0.00	0

Table 20. Data for stations not within any region.

Station 1. Outside of West Creek, Southold.

Station 2. Outside of Downs Creek, Southold.

Station 3. Outside of Fresh Pond, East Hampton.

Station Locations		
	Longitude	Latitude
Station	Degrees (W)	Degrees (N)
1	72.4857	40.9893
2	72.4944	40.9889
3	72.1123	40.9972

Hard Clam Number per 9.29 sq. meters.					
Station	Seed	Littleneck	Cherrystone	Chowder	Total
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.67	0.67
3	0.00	0.00	0.00	0.00	0.00

Competitors I Number per 9.29 sq. meters.				
Station	Oyster	Scallop	Razor Clam	Blood Ark
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00

Competitors II Number range from 0 = none present to 3 = heavy coverage.			
Station	<i>Crepidula forficata</i>	<i>Crepidula plana</i>	Chiton
1	1.0	1.0	0.0
2	2.0	0.0	0.0
3	0.0	0.0	0.0

Predators  
Number per 9.29 sq. meters, except for Mud Snail, Mud Crab: 0 = absence, 1 = presence.

Station	Oyster Drill I	Oyster Drill II	Knobbed Whelk	Channeled Whelk	Moon Snail	Mud Snail
1	0.00	0.00	0.00	0.00	0.00	1
2	0.00	0.67	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0
Station	Lady Crab	Spider Crab	LCHC	FCHC	Mud Crab	Horseshoe Crab
1	2.67	0.00	0.00	0.00	0	0.00
2	3.33	0.00	0.00	0.00	0	0.00
3	1.33	0.00	0.00	0.00	0	0.00

Sediment Type and Sediment Surface Number ranges from 1 = sand to 5 = mud. (0 = No record)		
Station	Sediment	Surface
1	1.0	Gr
2	1.0	Gr
3	0.0	

Miscellaneous Number per 9.29 sq. meters.		
Station	Hairy Cucumber	Other
1	0.67	BS, B sp.
2	0.00	BS
3	0.00	0

Table 21. Economic Evaluation

East Hampton: Eastern seasonal closure area in Three Mile Harbor, 101 acres.

	Seed	Littleneck	Cherrystone	Chowder	Total
Number of clams per 100 Sq. ft.	0.86	0.00	0.00	0.76	2.00
Total number of clams	37711	0	0	33520	87991
Value (dollars)		\$0	\$0	\$4,022	\$4,022

Shelter Island: Gardiners Creek, 27 acres.

	Seed	Littleneck	Cherrystone	Chowder	Total
Number of clams per 100 Sq. ft.	0.00	0.00	1.33	1.33	2.67
Total number of clams	0	0	15682	15682	31363
Value (dollars)		\$0	\$2,195	\$1,882	\$4,077

Southampton: Reeves Bay, 245 acres.

	Seed	Littleneck	Cherrystone	Chowder	Total
Number of clams per 100 Sq. ft.	1.48	0.67	0.22	2.52	5.19
Total number of clams	158107	71148	23716	268781	553373
Value (dollars)		\$12,807	\$3,320	\$32,254	\$48,381

Southold: Sterling Basin, 55 acres.

	Seed	Littleneck	Cherrystone	Chowder	Total
Number of clams per 100 Sq. ft.	1.33	1.48	1.60	1.76	6.33
Total number of clams	31944	35367	38219	42212	151734
Value (dollars)		\$6,366	\$5,351	\$5,065	\$16,782

# Appendix A

## Species List and Abbreviations

Agardh's Red Weed	<i>Agardhiella tenera</i>	Ag
American Oyster	<i>Crassostrea virginica</i>	
Atlantic Horseshoe Crab	<i>Limulus polyphemus</i>	
Atlantic Oyster Drill	<i>Urosalpinx cinerea</i>	Oyster Drill I
Atlantic Surf Clam	<i>Spisula solidissima</i>	Ss
Baltic Macoma	<i>Macoma balthica</i>	Mb
Barnacle	<i>Balanus</i> spp.	B sp.
Bay Scallop	<i>Argopecten irradians</i>	
Black-Fingered Mud Crab	<i>Panopeus hebstii</i>	
Blood Ark	<i>Anadara ovalis</i>	
Boring Sponge	<i>Cliona celata</i>	BS
Burrowing Brittle Star	<i>Amphioplus abditus</i>	BBS
Channeled Whelk	<i>Busycon canaliculatum</i>	
Common Jingles	<i>Anomia simplex</i>	As
Common Periwinkle	<i>Littorina littorea</i>	Ll
Common Razor Clam	<i>Ensis directus</i>	
Common Sea Star	<i>Asterias forbesii</i>	
Common Slipper Shell	<i>Crepidula fornicata</i>	
Common Spider Crab	<i>Libinia emarginata</i>	
Ditch Grass	<i>Ruppia maritima</i>	Dg
Eelgrass	<i>Zostera marina</i>	Zo
False Anglewing	<i>Petricola pholadiformis</i>	FAW
Flat Slipper Shell	<i>Crepidula plana</i>	
Flatclaw Hermit Crab	<i>Pagurus pollicaris</i>	FCHC
Graceful Red Weed	<i>Gracilaria foliifera</i>	Gr
Green Crab	<i>Carcinus maenas</i>	GC
Green Fleece	<i>Codium fragile</i>	Co
Hairy Cucumber	<i>Sclerodactyla briarus</i>	
Hard Clam	<i>Mercenaria mercenaria</i>	
Hollow Green Weed	<i>Enteromorpha</i> spp.	En
Kelp	<i>Laminaria</i> spp.	La
Knobbed Whelk	<i>Busycon carica</i>	
Lady Crab	<i>Ovalipes ocellatus</i>	
Longwrist Hermit Crab	<i>Pagurus longicarpus</i>	LCHC
Macoma Eggcockle	<i>Laevicardium mortoni</i>	MEC
New England Dog Whelk	<i>Ilyanassa trivittata</i>	Mud Snail
Northern Moon Snail	<i>Lunatia heros</i>	
Red Chiton	<i>Ischnochiton ruber</i>	
Ribbed Mussel	<i>Geukensia demissa</i>	RM
Sea Lettuce	<i>Ulva lactuca</i>	Ul
Short-Spined Brittle Star	<i>Ophioderma brevispinum</i>	SSBS
Softshell Clam	<i>Mya arenaria</i>	Ma
Tellin Semele	<i>Cumingia tellinoides</i>	Ct
Thick-lip Drill	<i>Eupleura caudata</i>	Oyster Drill II

## Sediment Surface Characteristics

Gravel	Gr
Peat	Pt
Rock	Ro
Shell	Sh
Worm Tubes	Wt

**Appendix B**

**Length Data Tabulated by Species  
and Station.**

# Hard Clam by Region, Station (Width x Length in mm)

R=1, S=1		R=1, S=2		R=1, S=4		R=2, S=1		R=2, S=2		R=2, S=3		R=2, S=4	
w	l	w	l	w	l	w	l	w	l	w	l	w	l
15	30	13	26	38	68	18	25	36	66	43	77	44	86
17	32	13	24	42	80	20	33	37	72	44	83	63	116
40	82	13	23			23	43	38	68	44	86		
41	79	13	25			26	51	38	69	45	81		
42	75	22	41			29	56	39	70	46	81		
47	83	29	57			29	54	39	75	46	86		
		32	62			32	59	40	72	47	90		
		33	64			32	61	42	80	47	93		
		34	63			34	62	42	77	49	92		
		37	76			36	66	42	74	54	94		

R=2, S=5		R=2, S=6		R=2, S=9		R=2, S=10		R=3, S=1		R=3, S=2		R=3, S=3	
w	l	w	l	w	l	w	l	w	l	w	l	w	l
16	28	26	50	43	76	11	22	13	24	24	44	16	30
52	92	27	49	46	87			15	28	27	49	22	39
		30	61	47	90			15	29	29	50	23	45
		31	57	47	90			15	26	31	56	41	80
		34	68	48	91			16	31	39	70	48	83
		35	65	49	94			16	30			50	93
		36	64	56	104			17	30				
		37	70					17	33				
		41	73					17	33				
		41	75					21	37				

R=3, S=6		R=3, S=7		R=3, S=9		R=3, S=11		R=4, S=1		R=4, S=2	
w	l	w	l	w	l	w	l	w	l	w	l
40	77	50	95	58	107	43	76	53	94	53	104
41	78	51	103	58	111	44	79	53	97		
43	74	51	90	58	97	46	84			45	84
43	85	51	89			46	83			48	84
43	78	52	91			48	89			48	90
47	82	52	89			48	91			49	90
47	90	52	97			48	89			49	90
48	84	53	100			50	90			50	87
48	83	56	99			50	93			52	93
48	90	57	100			53	94			56	102

R=4, S=3		R=4, S=4		R=4, S=5		R=4, S=6		R=4, S=7		R=4, S=8		R=4, S=9		R=4, S=10		R=4, S=11	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
16	30	48	86	20	38	22	45	35	65	20	34	14	26	46	90	24	47
17	33	53	95	22	39	22	40			22	41	37	68	46	93	24	44
19	38	53	96	24	44	23	41			24	42	42	76	47	85	27	52
22	41	56	112	32	58	23	43			25	47	44	80	50	94	29	54
36	72			33	59	23	42							51	97		
43	79			43	76	24	42										
46	89			45	80	25	50										
47	92			47	78	25	45										
50	86			48	78	26	49										
50	89			50	87	28	50										



# Hard Clam by Region, Station (Width x Length in mm)

R=4, S=12		R=4, S=13		R=4, S=14		R=4, S=15		R=4, S=16		R=4, S=17		R=4, S=18		R=4, S=19	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
46	87	42	72	33	67	52	93	18	35	43	87	40	83	20	37
47	89	43	85	43	80	52	95	22	42	45	81	41	81	22	41
50	89	47	90	43	78			34	67	47	85	41	83	25	48
53	98			45	87			35	69	48	95	51	95		
53	96			45	85			35	70	49	100	54	99		
				47	78			35	73	53	90				
				47	85			38	75						
				48	90			40	78						
				50	90			40	81						
				51	95			42	81						

R=4, S=20		R=4, S=21		R=4, S=22		R=5, S=1		R=5, S=2		R=5, S=3		R=5, S=4	
w	l	w	l	w	l	w	l	w	l	w	l	w	l
35	67	33	65	62	114	13	24	17	32	33	59	28	47
38	69	38	75			19	35	20	36	33	56	28	50
42	85					20	37	22	42	34	66	29	51
								22	42	35	69	31	56
								24	46	36	63	31	60
								26	52	36	61	32	61
								26	47	37	65	33	62
								31	54	39	70	33	62
								32	55			35	68
								33	61			35	64

R=5, S=5		R=5, S=6		R=5, S=7		R=5, S=8	
w	l	w	l	w	l	w	l
20	37	26	47	30	56	37	72
22	42	27	54	31	60	45	88
23	48	28	52	31	55		
23	43	28	51	31	60		
24	47	28	52	31	60		
24	46	28	56	31	60		
25	46	29	54	32	60		
25	48	29	48	33	57		
25	46	30	56	33	60		
26	48	30	52	35	60		

R=5, S=9		R=5, S=10		R=6, S=1		R=6, S=2		R=6, S=5		R=6, S=6		R=6, S=8		R=7, S=2		R=7, S=3		R=7, S=6	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
22	41	24	47	55	105	13	35	45	84	12	25	12	21	50	91	41	78	16	30
24	44					19	35			18	33					52	101	36	63
32	60					32	63			35	68					55	94	40	84
						37	72			40	74							48	92
						42	82			48	91							49	96
						50	90												
						53	101												
						57	107												

# Hard Clam by Region, Station (Width x Length in mm)

R=7, S=7 R=7, S=9 R=7, S=10 R=7, S=11 R=7, S=12 R=7, S=13

w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
54	101	35	70	14	27	50	90	50	92	16	30	24	44	30	54
		40	73			51	90			17	30	25	43	30	51
		41	82							17	32	25	46	30	55
		44	80							18	34	27	52	30	53
		45	86							20	36	27	49	31	56
		45	85							20	39	28	49	31	53
		45	83							20	37	29	53	31	62
		50	93							20	35	29	51	31	55
										22	38	30	56	34	66
										22	41	30	53	35	62

R=7, S=14 R=7, S=16 R=7, S=18 R=7, S=19 R=7, S=20

w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
32	60	38	71	50	93	51	84	34	65	15	29	30	54	42	75	26	51
32	59	40	71	53	94	53	90	34	66	15	26	32	57	43	75	30	57
34	59	40	73			54	93	34	67	16	32	32	60	47	87	30	52
34	60	40	67			54	98	35	66	17	34	33	63	47	92	30	57
34	65	43	78			57	97	37	67	26	47	34	62			32	58
35	66	44	75			61	103	37	68	27	54	38	70			46	86
36	61	44	85			62	94	39	73	29	54	39	70				
36	69	46	78			26	47	42	74	29	54	40	78				
36	68	47	86			30	55	42	77	30	60	40	82				
37	66	49	86			30	53	47	90	30	51	40	75				

R=8, S=2 R=8, S=4 R=8, S=6 R=8, S=7 R=8, S=8 R=9, S=5 R=9, S=6

w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
38	76	16	28	25	45	35	67	43	84	20	41	34	63	35	66	50	87
45	85	20	41	27	53	36	72	43	80	25	47			39	80	50	87
		25	47	30	58	37	71	44	84	26	50			40	83	57	89
		38	75	30	60	37	70	46	90	27	52			42	70		
				30	53	38	72			29	56						
				31	57	39	74			30	56						
				31	60	42	78			31	58						
				33	61	42	89			32	59						
				33	64	43	87			33	62						
				33	67	43	87			34	66						

R=9, S=8 R=9, S=9 R=9, S=11 R=9, S=12 R=9, S=13 R=10, S=1

w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
33	67	17	30	8	15	18	32	26	47	37	70	20	39	35	70	17	32
33	66	50	97	12	23	19	34	27	49			35	67	40	81	18	34
43	79	52	98	13	25	19	34	28	52			47	93	40	82	19	38
				14	26	20	37	29	47			48	91			19	36
				15	27	21	38	29	55			50	92			20	39
				15	27	21	39	29	59							21	39
				15	27	22	40	31	62							24	47
				16	30	24	42	31	58							28	52
				17	30	24	43	35	67							33	60
				17	30	25	45	36	68							34	61

# **Hard Clam by Region, Station (Width x Length in mm)**

R=10, S=2		R=10, S=3		R=10, S=4		R=10, S=5		R=11, S=1		R=11, S=2		R=11, S=3		R=11, S=6		R=11, S=7		R=11, S=8	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
16	30	25	47	33	61	17	32	11	19	14	25	21	41	43	77	35	64	33	63
17	30	39	68	39	80	20	34	16	30	17	32	48	90	48	90	36	62		
31	59	41	76	40	75	60	107	57	93			48	93	57	100	39	76		
32	58	49	88	40	74			59	99			51	92			40	78		
33	65			42	77							57	104			40	76		
34	66			47	81											40	75		
36	67			47	79											42	83		
41	72															42	77		
47	88															49	89		

R=12, S=1		R=12, S=2		R=12, S=3		R=12, S=4		R=12, S=5		R=13, S=1		R=13, S=2		R=13, S=4		R=13, S=6	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
36	73	45	85	42	81	39	75	13	23	31	62	18	34	50	96	25	48
37	78	45	85			42	77	16	27	35	68	28	52			35	71
37	75					47	85	29	57	39	81	31	64			57	111
37	77							57	93	40	75	35	73			61	111
38	74							59	99	42	78	38	75				
39	68									43	87	40	82				
39	78									44	86	41	79				
41	84									45	91						
47	92									45	90						
50	84									47	92						

R=14, S=1		R=14, S=2		R=14, S=3		R=14, S=4		R=14, S=5		R=14, S=6		R=15, S=1		R=15, S=2	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
45	82	54	100	12	21	16	29	25	50	19	36	25	47	47	88
47	93	56	102	19	32			26	51	39	84	25	48		
48	88			20	37			46	87	42	92	33	63		
50	89			20	35					47	78	38	77		
50	95			25	47					49	92	39	78		
51	98			25	49					50	85	39	75		
52	93			31	63					50	93	40	80		
52	98									51	97	40	83		
53	106											44	80		
53	94											45	80		

R=15, S=3		R=15, S=5		R=15, S=6		R=15, S=8		R=15, S=9		R=16, S=2	
w	l	w	l	w	l	w	l	w	l	w	l
19	35	44	82	45	88	15	28	22	41	37	68
19	37	50	97	50	97	16	28	27	47	40	79
20	35	51	92			16	29	27	49	40	80
22	40					18	33	29	55	41	76
23	45					18	32	34	66	42	85
27	50					19	33	35	62	42	79
29	60					20	36	36	68	43	81
32	58					22	40	37	74	43	80
33	65					22	40	37	68	45	82
41	79					22	42	37	71	46	87

# Hard Clam by Region, Station (Width x Length in mm)

R=16, S=3		R=16, S=4		R=16, S=5		R=16, S=6		R=16, S=7		R=17, S=5		R=17, S=6		R=17, S=7		R=17, S=8		R=17, S=9	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
32	63	39	77	14	26	41	84	36	69	37	68	28	54	42	81	31	59	40	79
		42	88	44	79	41	82	39	70	43	79	30	55			40	82	41	84
		44	91	47	85	42	79	48	102							40	77	42	86
		46	84			49	90											47	93
		46	85			50	98											49	98
		48	92			50	101												
						51	88												

R=18, S=1		R=18, S=2		R=18, S=3		R=18, S=6		R=18, S=7		R=18, S=8		R=18, S=10		R=18, S=11		R=18, S=12	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
47	85	42	75	40	78	62	114	39	75	13	23	15	27	44	86	13	24
54	106	45	85	42	81			45	91	19	34	16	27	44	79	14	26
55	97			46	80			48	96	45	81	43	88	47	78	15	27
57	103			47	92			48	89					47	85	18	31
61	116			47	88			51	92					53	95		
62	113			48	88			52	95					58	109		
				48	84			52	95								
				50	90			52	91								
				54	99			53	96								
				56	99												

R=18, S=16		R=19, S=1		R=19, S=2		R=19, S=3		R=19, S=4		R=19, S=5		R=19, S=6		R=19, S=7		R=19, S=8		R=19, S=9	
w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l	w	l
13	25	11	15	11	20	9	17	18	34	25	43	20	38	31	57	25	43	67	102
				50	92	13	22					23	48			50	94		
				60	102	15	23					25	47			51	89		
						20	37					27	51			53	87		
						30	56					31	55			53	102		
						32	55					36	62			56	94		
						32	58					45	82			58	96		
						42	75					46	78			58	98		
						43	75					52	84						
												55	97						

R=19, S=10		R=19, S=11		R=19, S=12		R=19, S=13		R=20, S=2	
w	l	w	l	w	l	w	l	w	l
18	36	53	91	24	44	14	27	52	102
37	67	62	95	31	58	14	26		
38	70	64	104	44	86	17	32		
40	74					23	45		
50	86					25	47		
56	99					25	45		
59	101					29	55		
60	95					32	67		
						35	65		
						35	67		

**Soft Shell Clam, Scallop and Oyster**  
by Region, Station (Length, or Width x Length in mm)

**Soft Shell Clam**

R=1 R=11 R=12 R=15 R=15  
S=1 S=4 S=1 S=1 S=2

16	20	18	15	23	26	27	27	28	28	30	30	31	32	33	34	37
			22	23	27	27	27	28	29	30	30	31	32	33	34	37
			27	24	27	27	27	28	29	30	30	32	32	33	34	37
			27	24	27	27	27	28	29	30	30	32	32	33	35	37
			28	25	27	27	27	28	29	30	30	32	32	33	35	37
			28	25	27	27	27	28	29	30	30	32	33	34	35	38
			30	25	27	27	27	28	29	30	31	32	33	34	35	38
			35	25	27	27	28	28	29	30	31	32	33	34	35	38
				25	27	27	28	28	29	30	31	32	33	34	36	
				26	27	27	28	28	29	30	31	32	33	34	37	

R=15 R=15  
S=3 S=6

26	19	37	46	54
30	30	37	47	55
32	33	37	48	58
33	33	40	48	62
33	34	41	49	62
35	34	42	50	63
42	35	43	50	64
	35	44	51	
	35	44	52	
	36	45	53	

**Scallop** (legal scallops > 57 mm.)

R=5 R=5 R=19 R=19  
S=3 S=5 S=1 S=8

45	52	52	51
			51

**Oyster** (legal oysters > 127 mm. combined)

R=18, S=16  
w l combined

38	47	85
54	71	125
57	65	122
58	79	137
64	79	143
65	84	149

**Razor Clam and Blood Ark**  
by Region, Station (Length in mm)

**Razor Clam**

R=4, S=16   R=6, S=8   R=7, S=4   R=11, S=1   R=15, S=5   R=16, S=1

37	116	103	79	84	152
			82	98	
			83		

**Blood Ark**

R=4, S=15   R=8, S=4   R=9, S=11   R=9, S=13   R=10, S=5   R=18, S=4   R=18, S=11

29	21	25	30	30	26	25	28
		28	31				32
		29	32				
		30					

**Oyster Drills, Moon Snail, Channeled Whelk, Knobbed Whelk and Common Periwinkle  
by Region, Station (Length in mm)**

**Oyster Drill I**

R=7, S=10

19
----

**Oyster Drill II**

R=20, S=2

23
----

**Moon Snail**

R=7, S=11   R=11, S=3

39
----

65
----

**Channeled Whelk**

R=4, S=2

115
-----

R=4, S=18

85
----

R=5, S=9

69
----

R=9, S=9

37
----

40
----

45
----

48
----

R=10, S=5

155
-----

R=11, S=2

160
-----

R=19, S=2

64
----

**Knobbed Whelk**

R=1, S=4

70
----

170
-----

R=2, S=5

136
-----

R=3, S=2

90
----

R=3, S=7

90
----

R=4, S=1

129
-----

R=4, S=2

99
----

100
-----

117
-----

118
-----

R=4, S=14

102
-----

R=6, S=1

152
-----

R=6, S=2

181
-----

R=6, S=8

108
-----

R=7, S=11

41
----

R=9, S=9

115
-----

R=10, S=2

90
----

R=13, S=1

132
-----

R=17, S=4

116
-----

R=18, S=1

147
-----

R=19, S=13

80
----

**Common Periwinkle**

R=18, S=11

22
----

23
----

**Lady Crab by Region, Station (Length in mm)**

R=2 S=1	R=2 S=5			R=2 S=7		R=2 S=8	R=2 S=10			R=3 S=2	R=3 S=6	R=3 S=10	R=3 S=11	R=4 S=11
46	42	53	57	38	55	43	43	49	53	49	44	47	46	52
47	48	54	75	38		43	43	50	56		48	47	51	
	50	55		40			47	50	57		48			
	52	55		44			47	51						
	52	55		49			48	53						

R=4 S=14	R=4 S=15	R=4 S=18	R=4 S=19	R=4 S=22	R=5 S=6	R=5 S=8	R=6 S=1	R=6 S=8	R=7 S=3	R=7 S=4		R=7 S=5	R=7 S=8
42	60	47	48	46	37	58	59	36	43	42	50	43	41
			50		47		60	40		44	52	43	43
								45		46		45	
								47		46		47	
										48		69	

R=7 S=10		R=7 S=11	R=7 S=12	R=7 S=16	R=8 S=1		R=8 S=3	R=9 S=1	R=9 S=9	R=9 S=10		R=9 S=11		R=10 S=5
41	71	30	40	40	41	69	50	53	49	38	47	47	62	55
43			50	40	45		52	53		41	51	48		
46			50	44	47		57	55		42	53	52		
47			62	57	52		67	59		42	53	53		
52					60					45	55	61		

R=12 S=5	R=14 S=1	R=14 S=3	R=16 S=1	R=17 S=4	R=18 S=12	R=18 S=13	R=18 S=14		R=18 S=16	R=19 S=14	R=20 S=1	R=20 S=2	R=20 S=3
48	46	58	44	53	41	47	43	60	48	41	44	44	44
	51		45	57		53	44		51		45	47	64
	57		60			69	47				48	50	
	76						48				57	52	
							57					56	



**Spider Crab, Horseshoe Crab and Green Crab**  
by Region, Station (Length in mm)

**Spider Crab**

R=5	R=5	R=7	R=7	R=7	R=7	R=9	R=9	R=10	R=11	R=11	R=15	R=15	R=18
S=5	S=6	S=3	S=10	S=11	S=16	S=4	S=11	S=2	S=1	S=6	S=3	S=11	S=2
68	61	39	27	39	53	52	27	47	52	60	53	50	63
			36	59	65		33		56		57		
			41				51				58		
							59						

R=18 R=18 R=19  
S=5 S=6 S=11

9	39	51

**Horseshoe Crab**

R=1	R=3	R=4	R=9	R=10	R=13	R=17
S=3	S=5	S=1	S=9	S=2	S=1	S=4
150	225	150	150	200	190	284

**Green Crab**

R=18 R=18  
S=11 S=15

54	58
	59

# Appendix C.

## Presence of *Mercenaria mercenaria notata*

Region - Station Number	Figure	Heterozygous/ Homozygous	Width (mm)	Length (mm)
2 - 10	2	Homozygous	27	49
2 - 10	2	Homozygous	31	56
2 - 10	2	Heterozygous	29	50
8 - 6	8	Heterozygous	43	87
10 - 1	10	Homozygous	24	47
16 - 6	16	Homozygous	41	84
16 - 6	16	Heterozygous	41	82

## Appendix D

### Shellfish Closure Area Comparisons (between all compatible stations)

# Shellfish Closure Area Comparisons

## Region 4

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Conditional	15	1.33	0.67	4.00	4.67	11.33
Closed	16	0.00	0.00	0.67	2.67	3.33

## Region 5

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Seasonal	5,6,7	4.89	5.33	0.89	3.11	15.33
Conditional	3,4	0.00	3.33	4.33	1.33	9.00
Closed	1,2,8	2.37	2.22	1.26	0.44	6.89

## Region 6

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	4,5,6	0.44	0.00	0.44	0.44	1.33
Closed	2,3	0.67	0.33	0.33	1.33	2.67

## Region 8

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	4,7	1.00	3.67	0.33	0.00	5.00
Conditional	8	0.00	0.00	2.00	0.67	2.67
Closed	5,6	0.00	3.33	2.00	2.33	8.00

## Region 13

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	4,5	0.00	0.00	0.00	0.33	0.33
Seasonal	6	0.00	0.67	0.67	1.33	2.67

## Region 14

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	1	0.00	0.00	0.00	8.00	8.00
Seasonal	2	2.67	2.00	0.00	0.00	4.67

# Shellfish Closure Area Comparisons

## Region 15

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	1,2,3,4,5, 7,8,9,10,11	0.47	0.40	0.20	1.73	2.80
Closed	6	7.33	2.67	5.33	5.33	20.67

## Region 16

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Conditional;	5,6	0.33	0.00	0.00	2.33	3.33
Closed	2,3,4	0.00	0.44	0.22	1.33	2.00

## Region 17

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	5,6	0.00	0.67	0.33	0.33	1.33
Seasonal	7,8	0.00	0.33	0.67	0.33	1.33
Conditional	9	0.00	0.00	0.67	2.67	3.33

## Region 18

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	1,2,3,4, 12,13,14	0.00	0.00	0.00	2.00	2.00
Seasonal	5,6,7,8,9,10 11,15,16	0.67	0.00	0.07	1.19	2.22

## Region 19

Closure Status	Stations	Seed	Littleneck	Cherrystone	Chowder	Total
Open	7,8,9,10, 11,14	0.11	0.22	0.33	1.67	2.33
Seasonal	12,13	1.67	1.67	0.67	0.33	4.67
Closed	5,6	0.67	1.33	0.33	1.33	3.67