



Town of Hempstead
Dept. Conservation & Waterways

Marine Nature Study Area

Trail Guide



Town of Hempstead
Department of Conservation and Waterways



A MESSAGE FROM SUPERVISOR

KATE MURRAY

Friends,

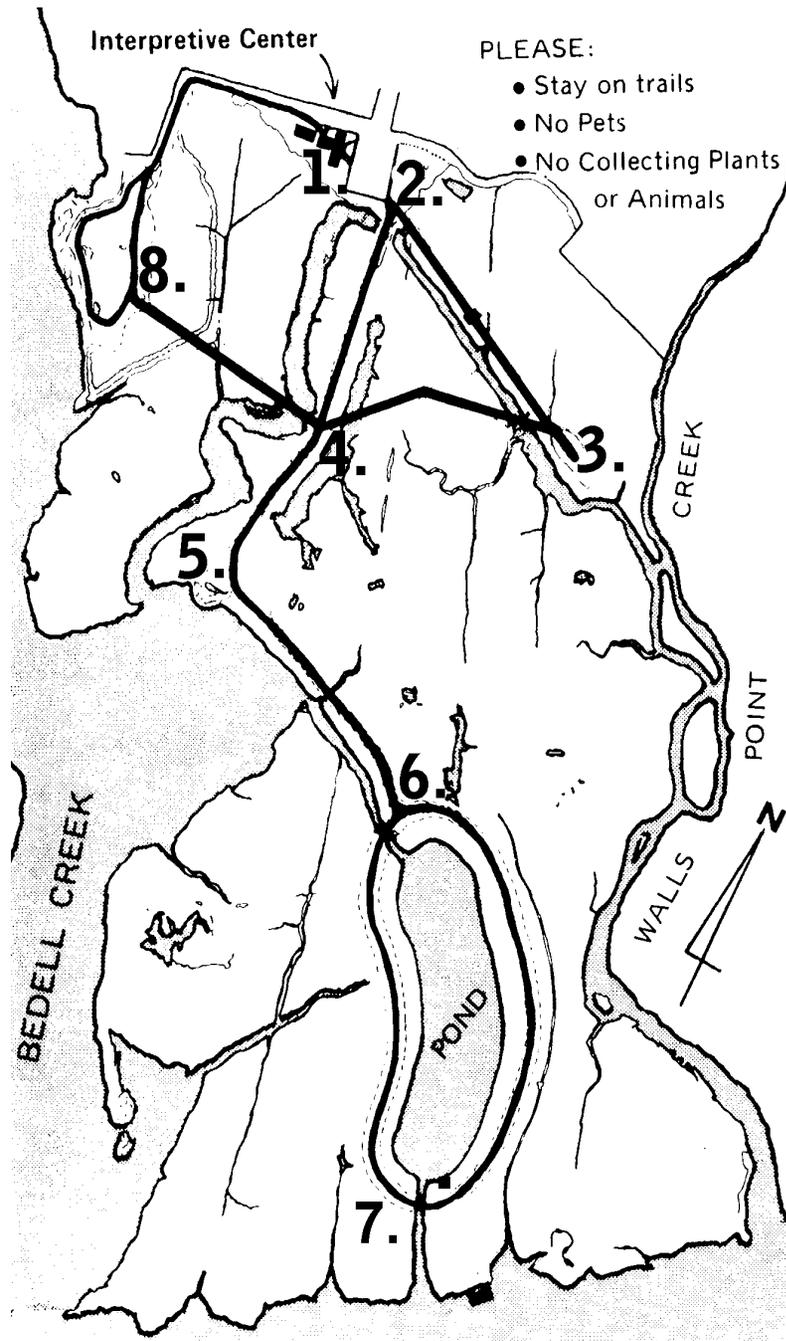
The Town of Hempstead's Marine Nature Study Area in Oceanside offers a beautiful and serene setting to enjoy the wonder of our unspoiled environment. The facility allows visitors to observe and study indigenous wildlife in pristine surroundings.

This informative trail guide was prepared by the Department of Conservation and Waterways to provide detailed descriptions of all the fascinating aspects of nature to be enjoyed at the study area. As you walk amidst the estuaries, salt marshes and sand dunes, this guide will present details and descriptions on all plant and animal species to be seen.

Hopefully your visit to the Marine Nature Study Area will further your appreciation of our environment and the precious natural resources our township works so hard to preserve. I hope you will return often to the study area, and I invite you to bring along family and friends to share the unforgettable wonders of nature.

Sincerely,

Kate Murray
KATE MURRAY
Supervisor



- PLEASE:
- Stay on trails
 - No Pets
 - No Collecting Plants or Animals

FOREWARD

The Town of Hempstead's Marine Nature Study Area is a 52 - acre preserve devoted to environmental education and natural history. Located in Oceanside, New York, the Study Area is bounded on the south by Middle Bay, on the east by Walls Point Creek, on the west by Bedell Creek, and on the north by a housing development. It is a facility of the Town's Department of Conservation and Waterways.

Since its official opening on Earth Day in April 1970, the Marine Nature Study Area has been visited by thousands of elementary school, high school and college students who have taken advantage of the free-guided tour service provided. Scout troops, garden clubs and special interest groups have also availed themselves of this service. The Study Area is a popular site for individuals and families seeking a quiet and peaceful outdoor experience and it is well used by dedicated bird watchers. To date over 250 bird species have been observed and recorded in the area.

The Marine Nature Study Area is divided into 8 instruction sites, each of which deals with a different aspect of the marine environment. At each site visual aids are installed that describe a particular topic. Subjects covered include the tides, Long Island's glacial geology, barrier beach and estuarine formations, ecology of the estuary, micro and macro algae, bird life, migration, the bay community, and barrier beach fauna and flora.

In developing the Marine Nature Study Area, alteration of the salt marsh was minimal. A main path and several boardwalks were constructed to enable access to the marsh while at the same time preventing damage to the fragile plant communities and animal life. A pond was created to attract migratory waterfowl and shorebirds. A variety of plants that are beneficial to wildlife were introduced on the upland fringe.

To complement the outdoor features, there is an interpretive center at the Study Area, which contains tanks with live specimens of marine life and displays on pertinent subjects.

The Marine Nature Study Area is staffed by personnel trained in biology and ecology who are thoroughly familiar with the estuarine ecosystem and with the environmental issues of the times. They conduct the guided tours for organized groups and are available to assist visitors who seek information about the fauna and flora of the area.

This guidebook is provided to enable visitors to the area to learn about the salt marsh and the vital role it plays in the life of the marine environment.

INTRODUCTION

This guide to the Town of Hempstead Marine Nature Study Area at Oceanside, New York, is designed for use in conjunction with visual aids installed throughout the facility, enabling visitors to conduct self-guided tours.

Before beginning the self-guided tour, let us remind you that the salt marsh ecosystem is extremely fragile. Even the impact of a footstep can destroy essential plant life. We ask, therefore, that you stay on the paths and boardwalks, and do not disturb any plants or wildlife. Your cooperation in preserving the Marine Nature Study Area is appreciated.

VISUAL AID 1: ORIENTATION MAP/ MARSH PROFILE

The tour begins at the orientation map at the south edge of the parking field. Locations of visual aids and numbered stations are given, and the pattern of boardwalks and paths is shown.

There are four basic zones of the salt marsh: Submerged, Intertidal, Supratidal, and Fringed Zone. These zones not necessarily in a "neat" order from low to high but are dependent on marsh topography.

1. **Submerged Zone:** This zone is always flooded whether or not is high or low tide. The dominant plant forms are marine algae.
2. **Intertidal Zone:** This area is subject to flooding at high tides which occurs twice a day every 12 ½ hrs. The dominant plant form is salt marsh cord grass, *Spartina alterniflora*.
3. **Supratidal Zone:** This area is flooded only at the Spring Tides. The dominant plant form is salt meadow grass cord grass, *Spartina patens*.
4. **Fringe Zone:** This area is flooded only during extreme weather conditions. The dominant plant form is Giant Reed, *Phragmites australis*.



VISUAL AID 2: THE TIDES

The continuous ebb and flow of salt water - the tides - is the principle force that determines the nature and controls the life of the salt marsh. Tides are caused by the gravitational attraction of the moon and sun on the waters that cover 70 percent of its surface. Because of the rhythmic rise and fall of tidal waters, specific zones have been established for the flora and fauna of the area.

This visual aid illustrates how the tides are formed, explains tidal cycles and timing, and defines spring tides and neap tides.



TIDAL POOLS

There are two small tidal pools at the beginning of the boardwalk. The water level fluctuates with the ebb and flow of the tides, and varied marine life such as the killifishes (*Fundulus and Cyprinidon*), and the fiddler crab (*Uca pugnax*) live in and around the shallow waters. At low tide, when the muddy banks are exposed, burrows of the fiddler crabs are revealed and these small scavengers can be seen in great numbers. Also at low tide, ribbed mussel (*Modiolus demissus*) that inhabit the muddy bottom reveal their presence attached to the masses of the salt marsh cord grass.



OBSERVATION PLATFORM

Midway along the boardwalk, by the benches, this platform affords a panoramic view of the salt marsh and its small channels. The two main channels are natural slices through which bay waters flow on each tide. The straight, narrow, connecting channels are manmade; they were dug years ago as mosquito control ditches. Their purpose is to increase drainage of the marsh at each low tide, thus depriving the salt marsh mosquito (*Aedes sollicitans*) of the standing water it needs to breed and develop. Also to help us with the insect control we encourage tree swallows to nest in the salt marsh. You may have noticed, birdhouses scattered



throughout the salt marsh these are our swallow boxes. A pair of swallows can feed on approximately 4000 insects per day.

The observation platform is an ideal place to view the acres of salt marsh cord grass, which is the dominant vegetation of the intertidal zone and most abundant floral species of the salt marsh. Cord grass plays a vital role as one of the first links in the estuarine food chain, while at the same time providing a habitat for a multitude of small creatures. Many of the insects of the marsh live on or

among the grass as do small mollusks, including periwinkles (*Littorina irrorata* and *L. saxatius*), and saltmarsh snails (*Melampus bidentatus*), that migrate up and down cord grass stems as the tides rise and fall.

VISUAL AID 3: SALTMARSH ECOSYSTEM

The third visual aid is located at the end of the boardwalk. Under the broad title, "Salt Marsh Ecosystem," it describes the physical formation of the marsh, illustrates the more important plants, and explains the essential producer - consumer - decomposer relationship that forms the life-sustaining detritus food chain. For those who wish to gain a fundamental understanding of the estuarine ecosystem, this is the most important of the visual aids.

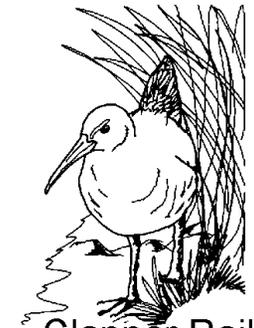
BRIDGE AND MUD FLATS

Certain parts of the marsh are best examined when the tide is low. This is particularly true of the mud flats and creek bed below the first boardwalk bridge. The creek bed here is an ideal place to observe two of the ecosystems important scavengers. Numerous mud snails (*Ilyanassa obsoleta*), appearing to be scattered olive pits' on the surface of the flat, are a major primary consumer feeding on decaying plant and animal material. Another primary consumer to be seen here is the fiddler crab. Both of these creatures



Mud Snail

are prey for other marsh animals, and thus provide a link in the food chain connecting flora and fauna. Some of the higher order consumers such as marsh birds imprint their tracks in the creek bottom while searching for food. One such marsh bird is the clapper rail (*Rallus longirostris*) that primarily feeds on fiddler crabs. Often seen scurrying along the creek beds, the rails disappear into the marsh grass at the first sign of danger.



Clapper Rail

ALGAE POND

At the end of the boardwalk you come upon shallow pond that is influenced regularly by the tides. Abnormally high tides flood this pond, but ebbing tides do little, thus providing a constant water level. This makes the pond an excellent place to study some of the macro algae, the larger seaweeds, which grow in the estuary.

In the spring, two green algae, species of *Cladophora* and *Enteromorpha*, flourish in the pond. By early summer, the growth is dense, and exhibits an interesting phenomenon. The sunny days of summer stimulate the process of photosynthesis and the generation of oxygen, which is a product of that process. The algae mass then rises to the surface of the water, buoyed by the bubbles of oxygen being produced as a result of photosynthesis. At sunset, oxygen production ceases, the algae mass sinks to the bottom.

As summer progresses, the pond temperature increases until the algae die and are broken down by decomposer organisms. At this time, the mass of dead algae assumes different colors, ranging from milky blue to pink. During the decaying process, much of the oxygen in the pond is depleted and, unless it is replenished through natural aeration by the wind, some of the smaller marine creatures in the pond also perish.

VISUAL AID 4: MARINE ALGAE

Visual aid 4 is situated next to the algae pool. It deals with macro algae, the large seaweeds that are found in the tidal waters throughout the estuary. Zones in which the various large seaweeds are to be found are indicated.

This visual aid also illustrates some of the micro algae or phytoplankton that are important elements of the producer level of the marine food chain. The process of photosynthesis is also explained.

MAIN PATH

Thick patches of spike grass (*Distichlis spicata*) grow on either side of the main path through the study area. This grass thrives at higher elevations than the salt marsh cord grass. While spike grass is tolerant of high salinity, it cannot withstand more than occasional flooding of spring tides. Spike grass is frequently found



Spike
Grass

in association with salt meadow cord grass (), the principle plant of the high marsh. A native marsh plant, sea lavender (*Limonium nashii*) has also become well established along the edge of the main path. In early summer its broad-basal leaves appear, and later in the summer clusters of flowers give the appearance of lavender mist.



Sea
Lavender

VISUAL AID 5: BIRDS OF THE STUDY AREA

Visual aid 5, which is located next to an expanse of tidal shallow, is devoted to identification of the more common birds encountered in the area. It identifies the long-legged waders such as egrets and herons, and the smaller sandpipers and plovers that feed on the marsh and tidal shallows and in the creeks.

THE STUDY AREA POND

While walking along the path on the east side of the pond, careful observation will reveal the herons, egrets, and other wading birds that hunt for food in the shallow pond waters. This two-acre pond was created during the development of the Marine Nature Study Area to serve as a stop-off point for migratory waterfowl, as well as to provide a foraging ground for shorebirds such as the yellowlegs, herons, and snowy egrets. These long-legged, spear-billed birds feed on killifishes and other small fishes that inhabit the pond during much of the year

WATERFOWL

Long Island is directly beneath the Atlantic flyway, a major migration path followed by ducks, geese, and other migratory birds that summer in northern breeding grounds and winter in southern regions. The Nature Study Area is, therefore, an ideal place to observe these birds in late fall, winter and early spring.

VISUAL AID 6: GULLS AND TERNS

This visual aid describes important characteristics of bird life that frequent the salt marsh and bay including gulls, terns, and skimmers.

VISUAL AID 7: THE BAY COMMUNITY

Sheltered from the ocean by barrier beaches, the bay is a shallow, calm extension of the sea, which is extremely important to the vast number of creatures including man. The bay, and the marshes within it, is essential to the life of the sea.

The marsh to the south of the pond is the boundary separating the Marine Nature Study Area from Middle Bay.

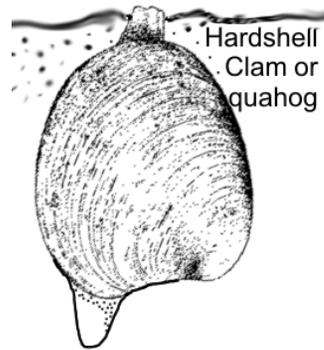
Tidal waters flow through Middle Bay from nearby Jones Inlet, thus giving life to the estuary and the rich assortment of marine organisms it produces. The visual aid at this station is devoted to the bay community. It describes some of the marine life including finfish and shellfish that inhabit the bay.



Mummichog
(Common Killie)

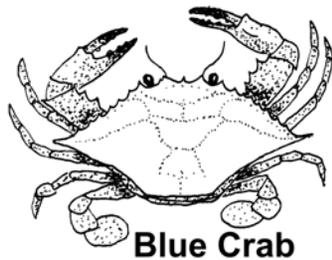
A great diversity of animals feed in the nutrient-rich waters adjacent to the salt marshes. Many spawn here and their eggs or larvae drift with the currents. Because so many larval fish develop in the bays, these are called the nurseries of the sea.

Fauna ranging from primitive invertebrates to advanced vertebrates are present in these waters. Sponges, the most primitive animals, are found attached to rocks and pilings. Coelenterates such as the



Hardshell
Clam or
quahog

jellyfish drift in the currents and catch plankton. Sea anemones, looking flower-like, attach themselves to piers and catch their food with stinging tentacles. Worms of all types including sand and bloodworms burrow in the mud for protection from their many



Blue Crab

predators.

The mollusks of the area comprise a variety of bivalves including clams, mussels and oysters which are filter feeders, gastropods such as whelks and other snails, and the squid which is one of the most advanced invertebrates.

Echinoderms are represented by the sea stars that move on tube feet and are strong enough to pull open a clam. Because they prey upon bivalves, the sea stars are a problem in shellfish harvest areas.

The arthropods constitute one of the largest phyla in the bay; crabs, shrimp and barnacles are the most visible members of this group

The abundant finfish, birds and mammals that populate the bay waters and marshes represent

vertebrates, animals with backbones. The fishes dominate the waters of the bay and sea. They have



Atlantic Silverside
(Spearing)

adapted in many ways to enable them to exist in a variety of niches. Many pelagic fishes spawn in the bay and their offspring thrive in the plankton rich waters.



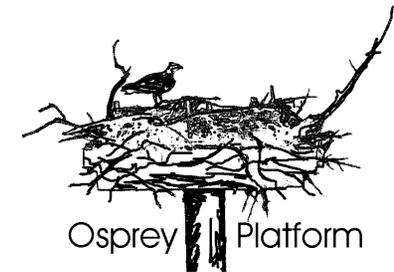
Harbor Seal

Mammals, including man, frequent the bay. Harbor seals spend 1 time here in late winter and an occasional whale may come in from the sea.

Man, however, is the mammal that makes the most use of and derives the greatest benefit from the community.

OSPREY PLATFORM

Osprey (*Pandion haliaetus*) platforms are one of the reasons the osprey has returned from the brink of extinction. After the ban on DDT the osprey populations have been increasing year after



Osprey Platform

year. Since the coastline has been extensively changed to make room for homes large dead trees are far and few between. The platforms allow the osprey to return to their historical nesting sites along the south shore of Long Island.

ALTERED AND UNDISTURBED AREAS

Common Mullein



The tour route leads back north from visual aid 7 along the west side of the pond, utilizing the elevated path that was constructed with material removed from the marsh to form the pond. This path represents an altered marsh environment. Many of the plants that colonized edges of the elevated path are species generally found on altered wetland salt marshes. The common mullein (*Verbascum thapsus*), a "fuzzy" green plant

growing to heights of five feet and showing a club of yellow flowers. You can also find what appear to be “mutated dandelions.” These large plants are Bull thistle. It creates a bright purple flower that eventually turns into a dandelion-like seed heads. These seeds attract American goldfinch in late summer and fall. In contrast, the acres of salt marsh west of the pond, which is an undisturbed environment, has an extensive growth of salt marsh cord grass, a natural salt marsh plant.

GREEN-HEADFLY BOX



Greenhead Fly Trap

As you walk along the trail you will notice a large brown box out in the salt marsh. These boxes are Greenhead flytraps. Female greenhead flies feed on the bellies of large mammals: deer, cattle, horses, etc. In theory the large brown four-legged box resembles one of

these creatures, attracting the fly by shape alone. The bottom of the box has a funnel that the flies enter and can't get out. The top is screened tight to prevent the flies from escaping. The flies eventually exhaust themselves and the flies quickly become dehydrated and die.

RIBBED MUSSELS AND MUSKRATS

As you walked back past of the bird board and back on the main trail you're going to take the second boardwalk bridge west opposite of visual aid 4. One place to observe the mussels in the study area is along the banks of the creek that this bridge crosses. The ribbed mussel is one of the most numerous bivalves of the marsh. Examine any marsh bank and you will find the mussels burrowed in among the marsh grass roots. Ribbed mussels, like the clams and oysters, are filter feeders. They draw water through the inhalant side of the siphon by cilia to the gills where nutrients, and especially microorganisms are concentrated. The intricate structure of the gills provides for passage of oxygen from the water into the blood stream of the

mussel. After food and oxygen are extracted from the water, it is expelled through the exhalant side of the siphon. The mussels themselves are a food source for higher-order consumer animals. For example, gulls drop the mussels on the boardwalks to crack the shells to get to animal inside. Unlike its close relative, the edible blue mussel (*Mytilus edulis*), the bank mussel is not a palatable food for man, but is sometimes used as bait by fishermen.



Blue Mussel

Pausing quietly on the bridge might afford a glimpse of the wary muskrat (*Ondatra zibethica*). The muskrat is



Muskrat

a common sight, swimming in the creek or gnawing on the roots and stems of the marsh grass in this area. These harmless marsh animals usually live in dens that may be located under an embankment with an underwater entrance.

SALICORNIA

On the open, boggy ground as you walked on the boardwalks, you might have noticed a low- growing, fleshy plant that is of both biological and historical interest. This plant is glasswort or salt pickle (*Salicornia europaea*). It is a pioneer plant that enriches the layer on which it becomes established through the process of growth and decay. After the glasswort has enriched the area in which it has grown, it will be replaced by higher order vegetation such as salt marsh cord grass. The early settlers on Long Island used glasswort as a substitute for a pickle. If gathered at the peak of its growth when it is fresh and green, the plant makes a tasty relish.



Glasswort

SALT MEADOW CORD GRASS

The salt meadow cord grass (*Spartina patens*) grows among expanses of the salt marsh cord grass, in numerous places throughout the study area. The flat circular patches of *S. patens* make it easy to identify.

Unlike its close relative, salt marsh cord grass, the salt meadow cord grass grows in places that are not regularly flooded by daily tides. Like the spike grass, it can tolerate periodic flooding as by a spring tides; therefore, we know that the area where *S. patens* is growing differs from the surrounding area in substrate type, drainage, and elevation preventing regular daily flooding.

During colonial times, farmers and settlers found various uses for both species of *Spartina* grass including roof thatching, cattle fodder, and garden mulch. In some areas along the east coast, salt meadow cord grass is still harvested and sold to gardeners as salt hay.

Salt
Meadow
Cord
Grass



VISUAL AID 8: SAND DUNE COMMUNITY

The barrier beach is an integral part of the estuarine system on Long Island's south shore. It functions to protect the bay, marsh islands, and upland from ocean storms, and it ensures the conditions of relatively calm and shallow waters that are necessary for the development of tidal wetlands. Breaks or discontinuities in the barrier beaches are the inlets through which ocean water flows to the bay on incoming tides. Ebbing tides carry nutrients produced from marsh plants by

decomposers to the near shore ocean waters.

In order to demonstrate the transition from the marsh and bay to the barrier beach, an example sand dune community was created on the western edge of the study area. The last in the series of visual aids is located at

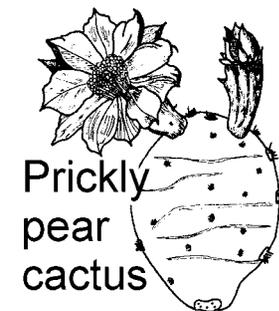


Poison Ivy



Beach
Grass

decay of succeeding generations, the sand is enriched with organic material and eventually is capable of supporting the next order of plants in a succession. Be on the lookout for poison ivy (*Rhus radicans*), a typical and widespread plant of the barrier beach. Other plant species in a typical dune community include: Pitch Pine (*Pinus rigida*), beach plum (*Prunus maritime*), bayberry (*Myrica pennylvanica*), sea rocket (*Cakile edentula*), Prickly pear cactus (*Opuntia humifusa*) and beach pea (*Lathyrus japonicus*).



Prickly
pear
cactus

this station. It describes the process of dune formation and the changing shoreline habitats of the south shore. It also illustrates the natural profile of an undisturbed barrier beach complete with plants and animals.

After studying the visual aid, follow the trail around the dune and examine the typical plants growing there. Of particular importance is the beach grass (*Ammophila breviligulata*) that helps stabilize the dunes by means of its extensive root system. By growth, death and



Pitch Pine

In most cases, the plants that thrive in the dune community have one thing in common; the ability to survive in the harsh environment of extreme dryness and heat, windblown sand, and salt spray. These conditions would be fatal to most plants, and to counter them the dune vegetation possesses extensive root systems that reach deep for

moisture and anchor them firmly. Their thick waxy leaves are able to withstand wind and salt damage and prevent moisture loss.

The dune community also hosts small nocturnal animals like the meadow vole, the house mouse and the white-footed mouse, which escape the severe environment by burrowing during the day. The diamond-back terrapin (*Malaclemys terrapin*), the turtle of the estuary, lays its eggs in the sand dune. On an actual, undisturbed barrier beach, the animal population would be more varied. We might expect to see cottontail rabbits, opossums, red fox and, as on Fire Island, whitetail deer.



Diamondback
Terrapin

SANDY BEACH

The small sandy beach on Bedell Creek at the northwest corner of the Study Area is ideal place to observe the horseshoe crab (*Limulus polyphemus*). Horseshoe crabs frequent the area and provide an interesting form for study. Fossil traces indicate that this creature has been on the earth about 300 million years.



Horseshoe
Crab

Although it is menacing in appearance, the horseshoe crab is quite harmless. It is really not a crab at all, but is more closely related to the spiders. It is a scavenger and, therefore, beneficial to the environment.

Because of its special properties, the blue blood of the horseshoe crab has become a valuable diagnostic tool in medical science; small amounts of the blood are extracted without harm to the animal.

During the full moon tides of spring, female crabs plow shallow holes in the sand near the high tide line and deposit their eggs. The smaller males cling to the shells of the spawning females and fertilize the eggs.

The substrate of the lower beach is habitat for another of the Study Area's fauna. The soft-shelled clam (*Mya*

arenaria) is common here and can be detected at low tide by the jets of water being expelled. This is the steamer clam much valued as a seafood delicacy.



Soft
Shell
Clam

CONCLUDING THE TOUR

The path from the dune community back to the parking field passes through an area of upland fringe that supports a wide variety of native and introduced plant species. Of the over 250 different floral species found in the study area, more than half grow in this upland fringe protected from the saltwater. I hope you enjoyed your visit to the Marine Nature Study Area, and hope you return for many more.

CONTRIBUTORS (in alphabetical order)

Jim Browne

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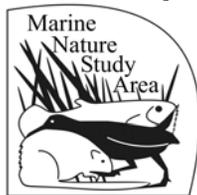
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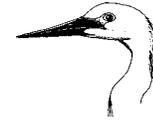
Marine Nature Study Area

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Some Birds of the Marine Nature Study Area



Great Egret



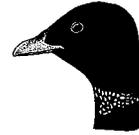
Snowy Egret



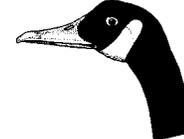
Black-crowned
Night Heron



Yellow-crowned
Night Heron



Brant



Canada Goose



Black Skimmer



Common Tern



Glossy Ibis



Osprey



Willet



Least Tern



Common
Yellowthroat



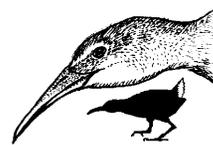
White-throated
Sparrow



Red-winged
Blackbird



Belted Kingfisher



Clapper Rail



Semipalmated
Plover



Black-bellied Plover



Northern Harrier



Herring Gull



Killdeer



Laughing gull



Tree Swallow