

PLANTS OF THE BEACH AND DUNES

The plant life of the beach and foredune areas are characterized by the xerophytes that are capable of tolerating arid conditions. The sandy soils are coarse textured and well drained. Soil moisture is limited by the inability of the sand particles to absorb adequate water to support most plant life. For the same reason, the absence of adequate silt, clay, and organic material in the sandy profile does not provide a suitable storehouse for plant nutrients. The effects of wind and water serve to constantly shift the sands and the salt spray from off the water, making survival difficult. The primary inhabitant of this area is dunegrass or beachgrass. It is a well-adapted plant due to the dense root system that both anchors the plant and stabilizes the sand around it. Other plants commonly found among the dunegrass are: sedge, seabeach panic-grass, seaside goldenrod, beach pea, sandbur, and sea rocket. They are of little value as an agricultural commodity or as cover for wildlife.



Dune Grass and Phragmites

The transitional area on the landward side of the dunes provides a more suitable habitat protected from strong winds and the associated shifting sand and salt spray. Here we find the mesophytes. The particular plants in these areas are dependent on the exposure, soil types, and availability of moisture. The flora varies, or intergrade, from the foredune varieties to the beach heather and shrub communities according to conditions. The beach heather community is the beginning of the mesic area. It is a low growing (less than one foot), spreading plant with smaller, waxy covered leaves to conserve water. This is intermingled with some of the dunegrass and sedges mentioned before, as well as herbs and wildflowers including: little bluestem, dusty miller, switchgrass, seaside spurge, and prickly pear. The transition to a vine and shrub community begins as we progress farther inland from the shore influence. The vines, such as Virginia creeper and poison ivy, develop complex root structures and tolerate

poorer soil and moisture conditions. Shrub species include bayberry, beach plum, inkberry, rugosa rose, and shadbush. These exhibit the smaller leaves and/or thicker epidermal coverings characteristic of plants in this environment. There are a few smaller tree species along the bayshore that are found in areas where there is more available moisture and protection from the wind. Pitch pine, sassafras, red maple, red cedar, black cherry, locust, and American holly are common species, and vary according to climatic factors.

The cover provided by the diverse plant communities is home to a limited number of smaller mammals and a large population of bird life. The value of this cover is primarily stabilization of the shoreline. This ecosystem has evolved over time to protect our shoreline. The plants need the dunes, and vice-versa.

Species List

Beach pea (*Lathyrus japonicus*)
Cocklebur (*Xanthium strumarium*)
Dunegrass (*Ammophila breviligulata*)
Dusty miller (*Artemisia stellarina*)
Long-spined sandbur (*Cenchrus longispinus*)
Saltwort (*Salsola kali*)
Sandbur (*Cenchrus tribuloides*)
Sandgrass (*Triplasis purpurea*)
Sea-beach panic-grass (*Panicum amarum*)
Sea rocket (*Cakile edentula*)
Seaside goldenrod (*Solidago sempervirens*)
Seaside spurge (*Euphorbia polygonifolia*)
Sedge (*Carex kobomugi*)
Switchgrass (*Panicum virgatum*)
American holly (*Ilex opaca*)
Bayberry (*Myrica pensylvanica*)
Beach heather (*Hudsonia tomentosa*)
Beach pinweed (*Lechea maritima*)
Beach plum (*Prunus maritima*)
Black cherry (*Prunus serotina*)
Common greenbriar (*Smilax rotundifolia*)
Gray's cyperus (*Cyperus grayii*)

Highbush blueberry (*Vaccinium corymbosum*)

Honey locust (*Gleditsia triacanthos*)

Little bluestem (*Schizachyrium scoparium*)

Pitch pine (*Pinus rigida*)

Poison ivy (*Toxicodendron radicans*)

Prickly pear (*Opuntia humifusa*)

Red cedar (*Juniperus virginia*)

Sassafras (*Sassafras albidum*)

Scrub oak (*Quercus ilicifolia*)

Sea-beach three-awn (*Aristida tuberculosa*)

Shadbush (*Amelanchier canadensis*)

Trailing wild bean (*Strophostyles helvola*)

Virginia creeper (*Parthenocissus quinquefolia*)

Winged sumac (*Rhus copalina*)



Raccoon

ANIMALS OF THE BEACH AND DUNES

Animals of the beach and dunes are a richly diverse group. From the simplest multicellular creatures, the sponges, to the highly evolved birds and mammals, the animal species present here reflect all sorts of adaptations to their unique environment. And, there are also the generalists, like the raccoons, who are at home in many different ecosystems. Included in the description of the beach animals are the marine creatures that inhabit the waters of the bay.

SPONGES (PHYLUM PORIFERA)

Although sponges are multicellular creatures, they lack organs, having instead specialized cells for specific tasks. They are considered to be the most primitive of multicellular animals, falling somewhere between a colony of cells and a true multicellular creature. Their bodies are porous to allow water to carry food in and wastes out. Found all over the world on ocean floors, most sponges are found in shallow waters near coasts. A few species are found in fresh water.

Only one species of sponge is found in the bayshore area: the Red Bearded Sponge (*Microciona prolifera*). They are found in shallow waters, attached to hard surfaces.

ANEMONES, HYDROIDS AND JELLYFISH (PHYLUM CNIDARIA)

These simple animals are of two general shapes, medusoid and polypoid, both of which are radially symmetrical. The medusoid shape is what we think of as the classical jellyfish shape, roughly similar to a mushroom cap. Movement is by contracting and expelling water through their mouth. Polyps are roughly cylindrical and grow attached to a surface. Their mouth is at the free end, generally surrounded by tentacles. Jellyfish usually live in open waters, but they are frequently found in the bay in the summertime. Anemones are found in shallow bay waters attached to rocks and other submerged surfaces. Coral grows in colonies and is found in the bay, also attached to hard surfaces.

These animals are equipped with stinging cells, or nematocysts, which are used to defend against predators and to subdue prey.

Species List

Striped Anemone (*Haliplanella luciae*)
Ghost Anemone (*Diadumene leucolena*)
Frisled Anemone (*Metridium senile*)
Lion's Mane (Red Jellyfish) (*Cyanea capillata*)
Star Coral (*Astrangia danae*)
Tubularian Hydroid (*Tubularia crocea*)

COMB JELLIES (PHYLUM CTENOPHORA)

These creatures are similar to jellyfish, but they do not sting. They are usually clear and sac-shaped, sometimes with lobes or tentacles. Some are biolumi-

nescent, and none attach to surfaces - they are planktonic. These are found in bay waters as well as in the coastal ocean.

Species List

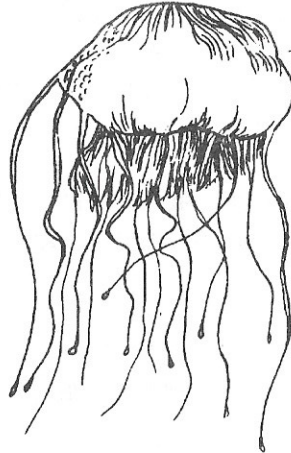
Leidy's Comb Jelly (*Mnemiopsis leidy*)

Sea Gooseberry (*Pleurobrachia pileus*)

RIBBON WORMS (PHYLUM RHYNCHOCOELA)

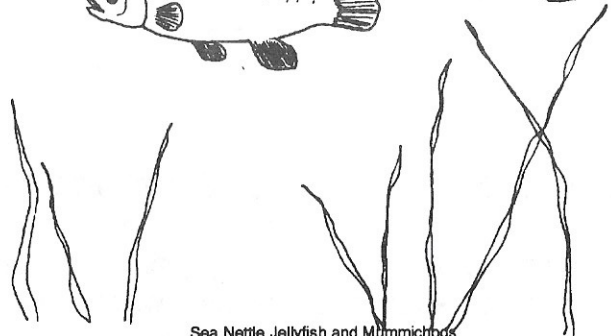
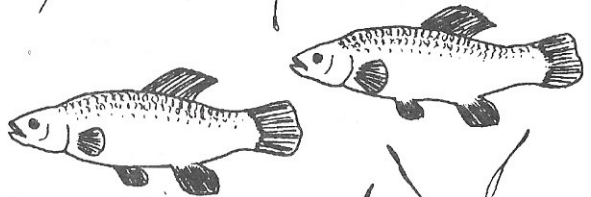
These creatures are worms, having no appendages. This group is unsegmented and smooth (compare with the Segmented Worms, following). At their front end is a mouth which contains a proboscis, or snout, which is used to catch prey. They live in shallow water and often burrow in mud or sand.

There is only one species found in the bayshore area, the Milky Ribbon Worm, *Cerebratulus lacteus*.



SEGMENTED WORMS (PHYLUM ANNELIDA)

This group includes worms having bodies made up of segments. On each segment are setae, or hair-like projections. Some can grow rather large. Some are parasitic; others burrow into the bottom mud or sand of intertidal areas; and some live on plants.



Sea Nettle Jellyfish and Mummichogs

Species List

Capitellid Thread Worm (*Capitella capitata*)
Blood Worm (*Glycera americana*)
Lumbrinerid Thread Worm (*Lumbrineris fragilis*)
Bamboo Worm (*Clymenella torquata*)
Rosy Magelonas (*Magelona rosea*)
Clam Worm (*Nereis virens*) (very similar to *N. succinea*)
Clam Worm (*Nereis succinea*) (very similar to *N. virens*)
Trumpet Worm (*Petinaria gouldii*)
Fan Worm (*Sabella microphthalma*)
Sand Builder Worm (*Sabellaria vulgaris*)

STARFISH AND SAND DOLLARS (PHYLUM ECHINODERMATA)

The adults of this group are radially symmetrical, and the larvae are bilaterally symmetrical. Starfish and sand dollars inhabit coastal marine environments, but only the starfish is found along the bayshore. Most of them are able to regenerate severed body parts. They have an internal spiny skeleton, made up of plates that are held together by muscle and other body tissue. Starfishes have no head, and will crawl in any direction, having an eyespot on the end of each arm. They breathe through skin gills, small projections protected by spines. Starfish feed mainly on bivalve mollusks, attaching themselves to the shells and slowly pulling them slightly open. Then the starfish squeezes its stomach into the mollusk and begins digesting it inside its own shell.

Species List

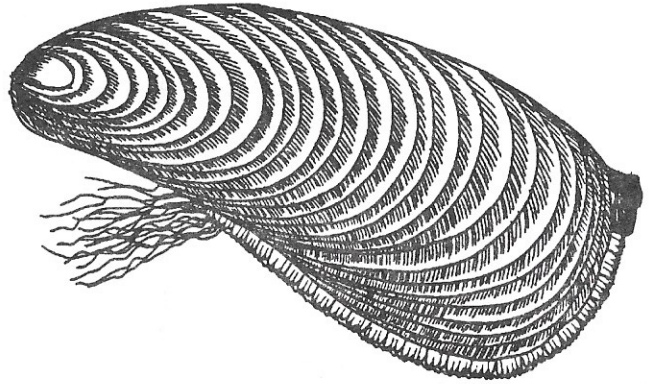
Eastern Common Starfish (*Asterias forbesi*)

MOLLUSKS (PHYLUM MOLLUSCA)

There are three types of mollusks: gastropods, bivalves, and cephalopods. The gastropods have one shell or none, and include, for example, snails, periwink-

kles, slugs and whelks. The bivalves have two shells and include clams and mussels, among others. The third type of mollusk, the cephalopods, include the octopus and squid. Most mollusks must live under water or in areas that are frequently flooded. Most people have seen mussels growing thickly on the footings of a dock. Mollusks have gills that enable them to take oxygen out of the water for respiration.

Bivalves are filter feeding herbivores, living mostly on microscopic algae. They collect food particles with their gills. Particles are sorted according to size; food is swept into the mouth, and other particles, like sand, are rejected. Bivalves are not very mobile; they either attach themselves to a surface (e.g., mussels) or live in the sand and move very slowly. Some, like the bay scallop, are free swimmers.



Ribbed Mussel

Gastropods are the largest group of mollusks. They are more mobile than the bivalves. Most species are aquatic. However, many snails have evolved to live on the land, having lost their gills. And, many have returned to living in the water, but must return to the surface periodically to replenish their air supply. The diet of the gastropods is varied.

Cephalopods are for the most part found in the open sea, but juvenile squid are sometimes found near shore areas.

Species List

- Common Periwinkle (*Littorina littorea*)
- Channeled Whelk (*Busycon canaliculatum*)
- Knobbed Whelk (*Busycon carica*)
- Atlantic Oyster Drill (*Urosalpinx cinerea*)
- Thick-Lipped Oyster Drill (*Eupleura caudata*)

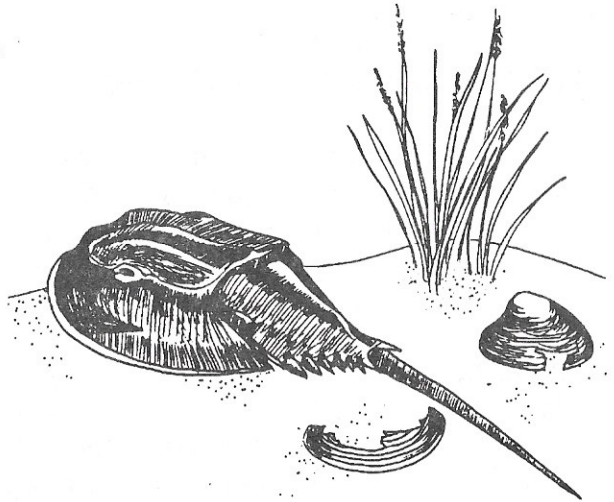
- Eastern Mud Nassa (*Ilyanassa obsoletus*)
- Three-Lines Basket Shell (*Nassarius trivittatus*)
- Atlantic Moon Snail (*Polinices duplicatus*)
- Common Jingle Shell (*Anomia simplex*)
- Transverse Ark (*Anadara transversa*)
- Chestnut Astarte (*Astarte castanea*)
- Common Slipper Shell (*Crepidula fornicata*)
- White Slipper Shell (*Crepidula plana*)
- Dwarf Surf Clam (*Mulinia lateralis*)
- Soft Clam (Steamer) (*Mya arenaria*)
- Ribbed Mussel (*Modiolus demissus*)
- Blue Mussel (*Mytilus edulis*)
- American Oyster (*Crassostrea virginica*)
- Bay Scallop (*Aequipecten irradians*)
- False Angel Wing (*Petricola poladiformis*)
- Common Razor Clam (*Ensis directus*)
- Quahog (Cherrystone) (*Mercenaria mercenaria*)

CRUSTACEANS (PHYLUM ARTHROPODA, CLASS CRUSTACEA)

Crustaceans include crabs, crayfish, lobsters, barnacles, shrimp, *Daphnia*. Most are aquatic, but some have adapted to life on the land, like the pillbugs and some crabs.

Crustaceans have segmented bodies, and many have a carapace, or shell, that protects their body.

Crustaceans have antennae, which serve a sensory function. They also have a number of pairs of legs, but the first pair of legs often has claws or pincers which aid in catching and breaking up food. Some are filter feeders, straining plankton and other food particles from the water. Others are carnivores, omnivores, and scavengers. Most crustaceans have gills and need to live in the water. The terres-



Horseshoe Crab

trial crustaceans have lost their gills and take oxygen directly from the air.

Species List

Northern Rock Barnacle (*Balanus balanoides*)
Rock Crab (*Cancer irroratus*)
Sand Shrimp (*Crangon septemspinosa*)
Mole Crab (*Emerita talpoida*)
Horseshoe Crab (*Limulus polyphemus*) (Class Arachnida)
Spider Crab (*Libinia emarginata*)
Ghost Crab (*Ocypode quadrata*)
Fiddler Crab (*Uca pugnax*)
Flat-Clawed Hermit Crab (*Pagurus pollicaris*)
Common Shore Shrimp (*Palaemonetes pugio*)
Blue Crab (*Callinectes sapidus*)
Green Crab (*Carcinus maenas*)
Lady Crab (*Ovalipes ocellatus*)
Black-Fingered Mud Crab (*Panopeus herbstii*)
White-Fingered Mud Crab (*Rhithropanopeus harrisi*)
American Lobster (*Homarus americanus*)

FISHES (PHYLUM CHORDATA)

Fishes are vertebrates, having bony or cartilaginous skeletons with a backbone. There are three major classes of fishes: the jawless fish, including lampreys and hagfish; the cartilaginous fishes, including sharks and skates; and the bony fishes, including trout, bass, and most of the familiar fresh and saltwater fishes. Fish live in the water, using gills to obtain oxygen. Their diets vary.

Not all fishes spend their entire lives in the salt marsh or shallow bay waters. Many species spawn in salt marshes and estuaries, where the young fry can find shelter. Others may be present in marshes and estuaries only seasonally, when food is plentiful here. Salt marshes can support large populations of plankton, which of course, are vitally important in maintaining a healthy fish population so vital to commercial and recreational interests.

Species List

Hogchoker (Sole) (*Trinectes maculatus*)
American Eel (*Anguilla rostrata*)
Atlantic Silverside (Shiner) (*Menidia menidia*)
Toadfish (*Opsanus tau*)
Silver Gar (*Tylosurus marinus*)
Windowpane (*Scophthalmus aquosus*)
Summer Flounder (Fluke) (*Paralichthys dentatus*)
Sand Shark (*Mustelus canis*)
Hickory Shad (*Alosa mediocris*)
Alewife (*Alosa pseudoharengus*)
American Shad (*Alosa sapidissima*)
Atlantic Menhaden (*Brevoortia tyrannus*)
Grubby (*Myoxocephalus aeneus*)
Longhorn Sculpin (*Myoxocephalus octodecemspinosus*)
Bay Anchovy (*Anchoa mitchilli*)
Atlantic Tomcod (*Microgadus tomcod*)
Red Hake (*Urophycis chuss*)
Four-Spined Stickleback (*Apeltes quadracus*)
Three-Spined Stickleback (*Gasterosteus aculeatus*)
Tautog (*Tautoga onitis*)
Cunner (*Tautoglabrus adspersus*)
Silver Hake (Whiting) (*Merluccius bilinearis*)
White Perch (*Morone americana*)
Striped Bass (*Morone saxatilis*)
Mullet (*Mugil cephalus*)
Weakfish (*Cynoscion regalis*)
Winter Flounder (*Pseudopleuronectes americanus*)
Sheepshead Minnow (*Cyprinodon variegatus*)
Bluefish (*Pomatomus saltatrix*)
Northern Kingfish (*Menticirrhus saxatilis*)
Atlantic Croaker (*Micropogon undulatus*)
Black Drum (*Pogonias cromis*)
Butterfish (*Peprilus triacanthus*)
Northern Seahorse (*Hippocampus hudsonius*)
Northern Pipefish (*Syngnathus fuscus*)

Northern Puffer (*Sphoeroides maculatus*)
Northern Sea Robin (*Prionotus carolinus*)
Striped Sea Robin (*Prionotus evolans*)
Atlantic Sturgeon (*Acipenser oxyrhynchus*)
Shortnose Sturgeon (*Acipenser brevirostrum*)
White Perch (*Morone americana*)

REPTILES (PHYLUM CHORDATA, CLASS REPTILIA)

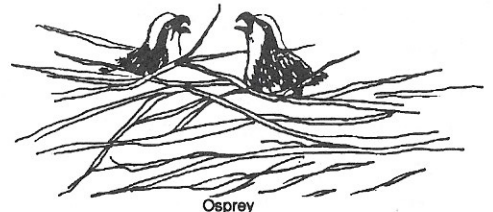
Reptiles are animals who breathe air for their entire lives, whereas amphibians (not found on the beach or dunes) begin their lives as aquatic larvae with gills, and metamorphose into air-breathing adults. The skin of reptiles is covered with scales. Marine species found along the bayshore include turtles.

Species List

Diamondback Terrapin (*Malaclemys terrapin*)
Loggerhead turtle (*Caretta caretta*)
Green Sea turtle (*Chelonia mydas*)

BIRDS (PHYLUM CHORDATA, CLASS AVES)

Birds can be found in abundance along beaches and dunes. Great Blackbacked Gulls, Herring Gulls, and Ring-billed Gulls can be found all year. Laughing Gulls are common in the summer, and the small, tern-like Bonaparte's Gulls can be seen in the winter. Gulls have a varied diet and eat almost anything, feeding at the water surface or on land. Terns are also found along the beaches, feeding mainly on small fish and often diving for their food. Common

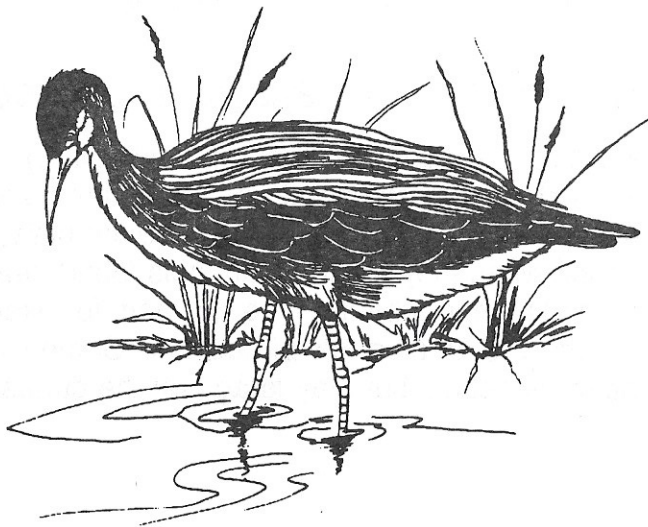


Osprey

Terns, Foster's Terns, and Least Terns live along the bayshore. During migration, Caspian Terns and Royal Terns are frequently seen. The Piping Plover and Least Tern both nest on the dunes here, and both are endangered species. Dunlins and Sanderlings can be found along the high tide line, patrolling for food in the surf zone. A variety of ducks can be found in the bay, and songbirds can be found along the beaches. A variety of songbirds inhabit the shrubs or wooded areas of the dunes as well. In the winter, this area provides shelter for migratory species like the Yellow-rumped Warbler and the Savannah Sparrow, which feed on the fruits of the bayberry and poison ivy. Birds of prey will migrate along the shore, and during the winter, Redtailed and Rough-legged Hawks hunt for small mammals along the dunes.

Species List

- Herring Gull (*Larus argentatus*)
- Laughing Gull (*Larus atricilla*)
- Ring-billed Gull (*Larus delawarensis*)
- Great Black-backed Gull (*Larus marinus*)
- Bonaparte's Gull (*Larus philadelphia*)
- Common Tern (*Sterna hirundo*)
- Forster's Tern (*Sterna forsteri*)
- Caspian Tern (*Sterna caspia*)
- Least Tern (*Sterna albifrons*)
- Piping Plover (*Charadrius*
melodus)
- Black Scoter (*Melanitta nigra*)
- Surf Scoter (*Melanitta*
perspicillata)
- White-winged Scoter (*Melanitta*
deglandi)
- Common Goldeneye (*Bucephala*
clangula)
- Bufflehead (*Bucephala albeola*)
- Greater Scaup (*Aythya marila*)
- Oldsquaw (*Clangula hyemalis*)
- Red-breasted Merganser
(*Mergus serrator*)



Green Heron

Red-throated Loon (*Gavia stellata*)
Common Loon (*Gavia immer*)
Horned Grebe (*Podiceps auritus*)
Sanderling (*Calidris alba*)
Dunlin (*Calidris alpina*)
Semipalmated Sandpiper (*Calidris pusilla*)
Northern Gannet (*Morus bassanus*)
Savannah Sparrow (*Passerculus sandwichensis*)
Song Sparrow (*Melospiza melodia*)
Seaside Sparrow (*Ammospiza maritima*)
Yellow-rumped Warbler (*Dendroica coronata*)
Palm Warbler (*Dendroica palmarum*)
Yellowthroat (*Geothlypis trichas*)
White-eyed Vireo (*Vireo griseus*)
Northern Mockingbird (*Mimus polyglottos*)
Gray Catbird (*Dumetella carolinensis*)
Brown Thrasher (*Toxostoma rufum*)
American Robin (*Turdus migratorius*)
Fish Crow (*Corvus ossifragus*)
Horned Lark (*Eremophila alpestris*)
Snow Bunting (*Plectrophenax nivalis*)
Red-tailed Hawk (*Buteo jamaicensis*)
Rough-legged Hawk (*Buteo lagopus*)

MAMMALS (PHYLUM CHORDATA, CLASS MAMMALIA)

Mammals are animals that: 1) have hair, 2) nurse their young, and 3) maintain a constant body temperature. Most mammals bear their young alive, with the exception of primitive mammals like the platypus, which lays eggs but nurses its young when they hatch. Mammals found near dunes and marshes are also found in other habitats. The raccoon, for example, is widely distributed throughout the U.S. in a variety of habitats. Some listed species make their homes near the beach, but may forage on the dunes or beach.

Species List

Raccoon (*Procyon lotor*)
Muskrat (*Ondatra zibethicus*)
Gray squirrel (*Sciurus carolinensis*)
White-Footed Mouse (*Peromyscus leucopus*)
Meadow Vole (*Microtus pennsylvanicus*)
Pine Vole (*Pitymys pinetorum*)
Norway Rat (*Rattus norvegicus*)
House Mouse (*Mus musculus*)
Eastern Cottontail (*Sylvilagus palustris*)
Opossum (*Didelphis marsupialis*)

MAN'S IMPACT ON THE REACH AND DUNES

Man has tried to protect the beaches from erosion by building jetties, seawalls and sand dunes. By changing the shape of the shoreline in this way, we interfere with the natural evolution of the beach environment. Pollution is another way that man affects the natural beach. Littering (including broken bottles, plastic, and metal containers) poses a health risk, not only to wildlife, but to people as well. Chemical pollutants in the water are harmful to plant and animal communities inhabiting the bay waters, and also can harm man, who depends on marine organisms for food. Foot and vehicular traffic and development compromise the protection that has been built by natural succession over the years. It is important that we recognize our role in the protection of the landforms that guard our coastline. Environmental laws help with controlling man's adverse impact on these fragile habitats, but what is needed the most is for every individual to do his part to protect this unique area.

TIDAL MARSHES

MUCH MORE THAN A SWAMP

In general terms, natural wetlands are areas where intermittent saturation or shallow water conditions are principal factors in determining the character of the soil. In other words, they are lands which, due to geological or ecological factors, have a natural supply of water (either from tidal flows, flooding rivers, connections with groundwater, or because they are perched on aquifers or potholes). they are covered by or soaked with water for at least a part, and often all, of