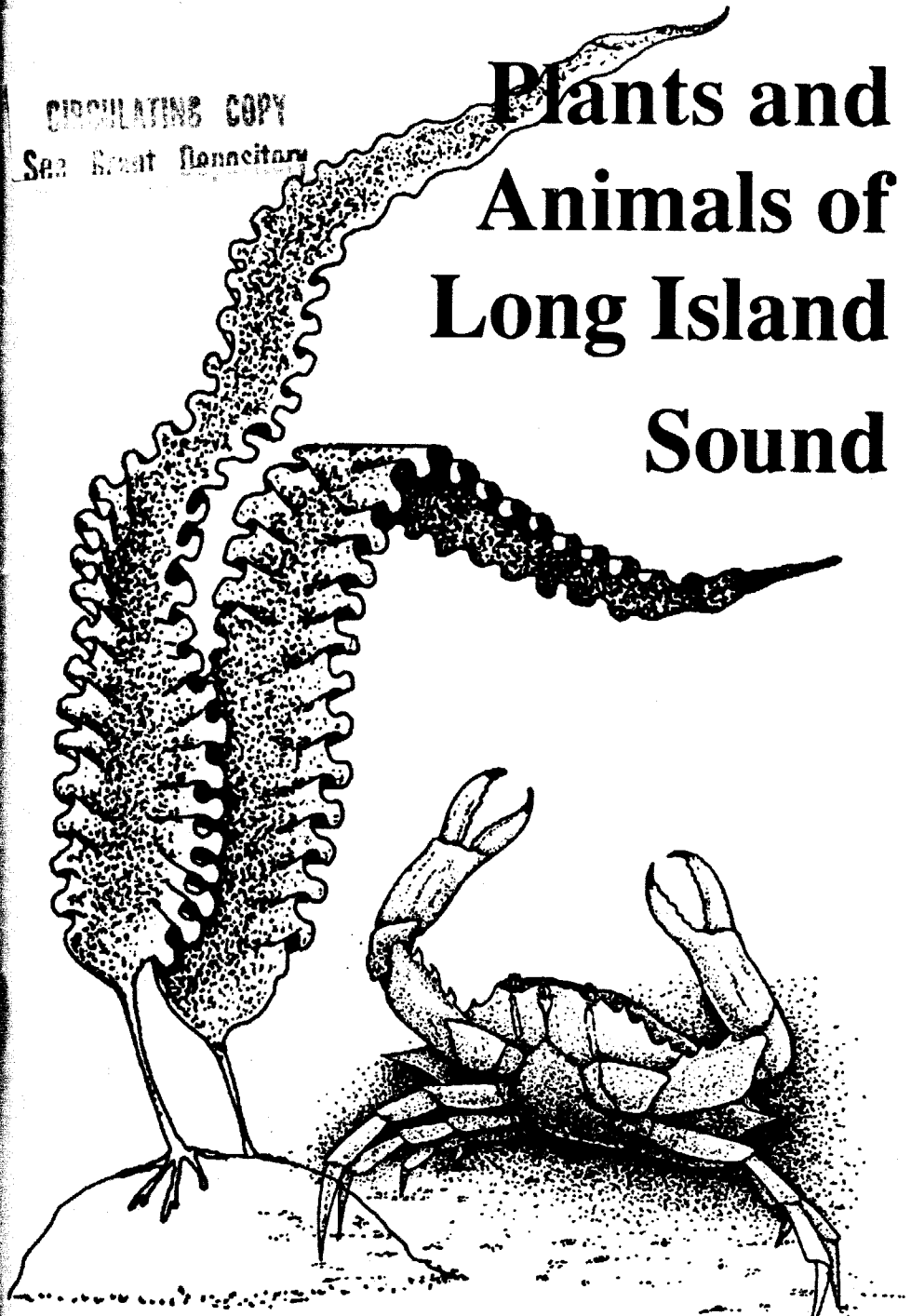


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# Plants and Animals of Long Island Sound



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# **Plants and Animals of Long Island Sound**

**by Lisa Wahle**

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# ***Plants and Animals of Long Island Sound***

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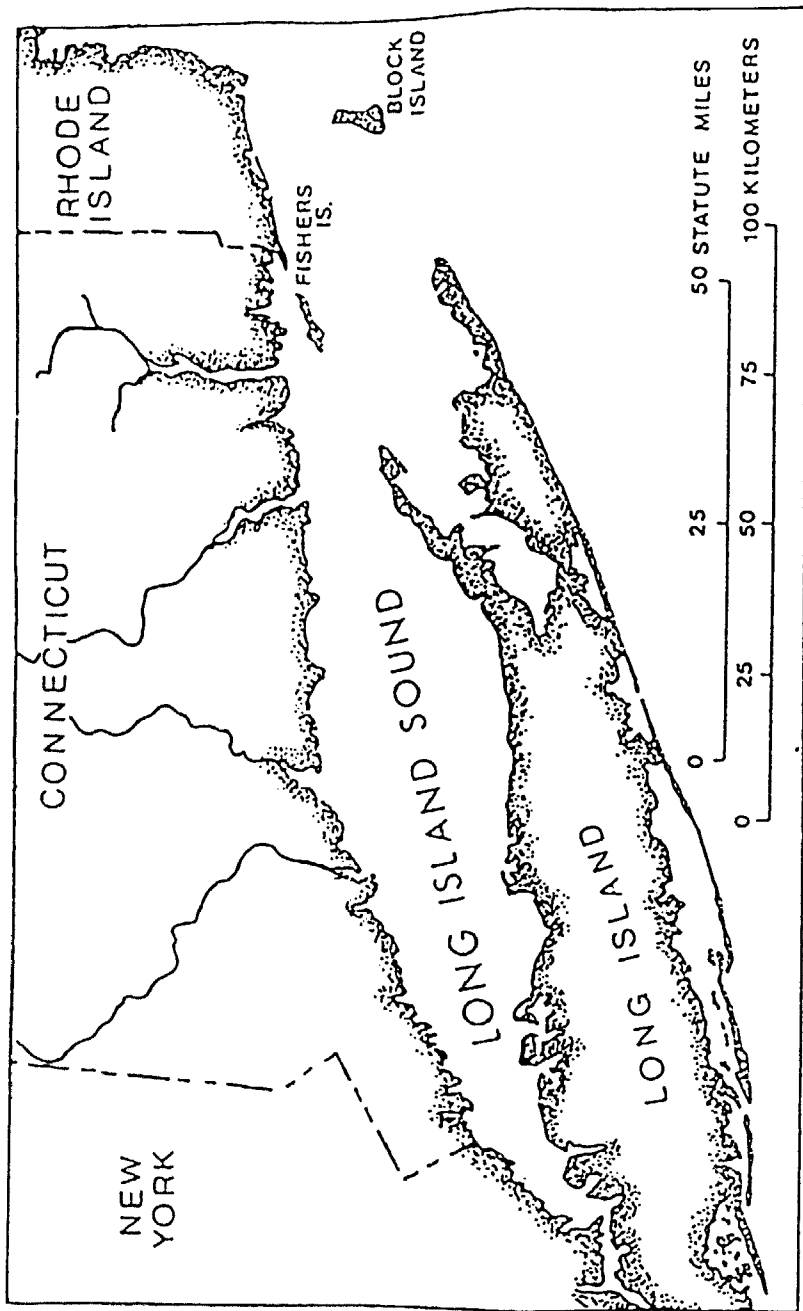


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The Connecticut Sea Grant College Program is a partnership between the National Sea Grant College Program of the National Oceanic and Atmospheric Administration and the University of Connecticut. It is one of 30 university-based programs along the East, West, and Gulf coasts and the shores of the Great Lakes.

## **The Long Island Sound Study**

The Long Island Sound Study is a six-year research and management project that began in 1985 as part of the National Estuary Program, a recent addition to the federal Clean Water Act created to protect estuaries of national importance. The LISS is a cooperative effort involving research institutions, regulatory agencies, marine user groups and other concerned organizations and individuals. The purpose of the Study is to produce a management plan for the Sound that will be administered by the three major LISS partners, the Environmental Protection Agency and the states of New York and Connecticut. To get involved with the Study, or for more information, contact: the New York Sea Grant Extension Program, 125 Nassau Hall, SUNY, Stony Brook, NY 11794, Tel. (516)632-8737; or the Connecticut Sea Grant Marine Advisory Program, 43 Mame Street, Hamden, CT 06514, Tel. (203)789-7865.



*Long Island Sound, "the Urban Sea," is an estuary of immense size and complexity.*

# Foreword

Often called the "Urban Sea", Long Island Sound is an estuary of immense size and complexity, stretching from densely populated New York City on the western end to the eastern tip of Long Island. Its northern shore comprises the entire southern boundary of the state of Connecticut, and Westchester County, New York, while its southern shore is the northern border of Long Island.

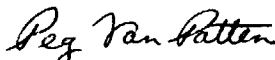
Long Island Sound is 110 miles long from end to end, and 21 miles wide at its widest point, near the Connecticut River. It is a mixture of fresh and salt water that offers some habitats with unusual characteristics seldom found elsewhere. It covers 1,300 square miles, with two high and two low tides per day.

People are very much a part of the Sound. More than 14.6 million people live within its watershed, which reaches into five states and part of Canada. Five million people live within 15 miles of its coast. The Sound is heavily used by humans for a variety of purposes: marine industry, commercial and sport fishing, boating, swimming and other types of recreation, transportation, military maneuvers, and waste disposal. These users sometimes compete with each other and with the myriad plants and animals that live in the Sound and along its shores.

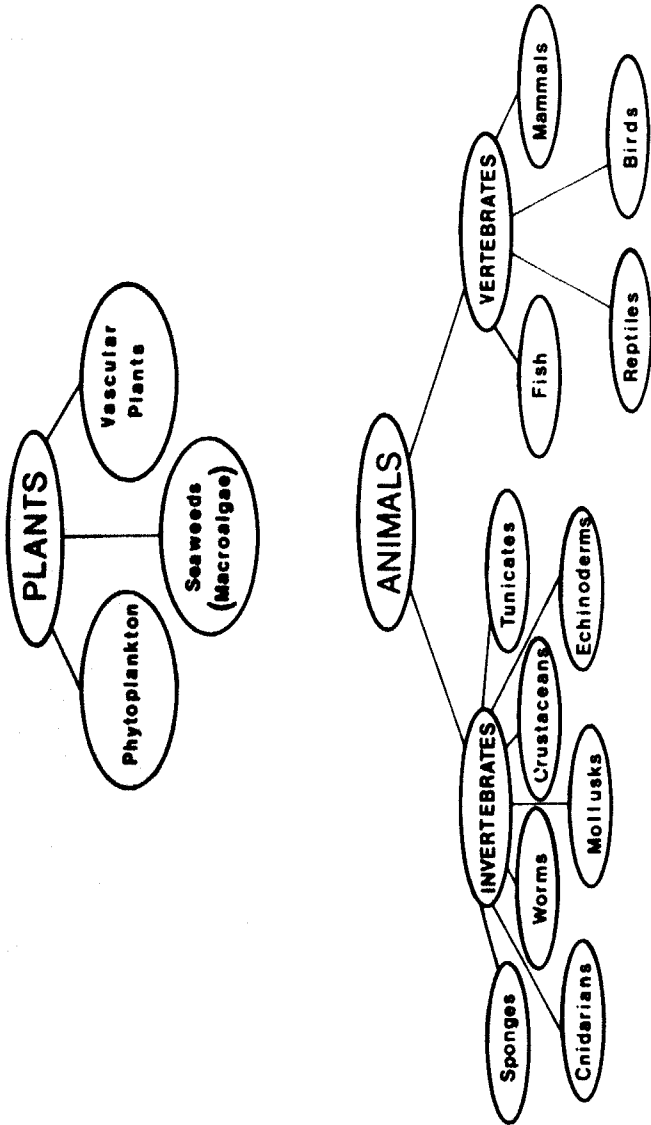
The accelerated development of an already densely populated coastline has increased stress on the Long Island Sound estuary, and both the health and abundance of the Sound's plants and animals have declined in recent years. But the situation is not hopeless. By merely being vigilant about what we put into it and considering the effects of human activities on ecosystems, concerned citizens can do much to preserve the integrity of this vast water body.

Lisa Wahle wrote this publication as part of the Long Island Sound Study's public education effort, to make citizens of all ages aware of the beauty and diversity of the creatures with whom we share the Sound, and their relationship to it--and to us. Scanning these pages makes the reader realize how much we stand to lose if we don't learn to conserve and manage our Long Island Sound resources wisely, for the benefit of both its human and non-human users.

This booklet benefits tremendously from the attractive line drawings of artist Susan Stone, to whom we are grateful. We would also like to thank Chester Arnold, Ralph Lewis, Penny Howell and Sally Richards for reviewing the text.



Peg Van Patten  
Sea Grant Communicator  
November 28, 1990



*Plant and animal groups found in Long Island Sound.*

## **PLANTS AND ANIMALS:**

### **LIVING MARINE RESOURCES OF LONG ISLAND SOUND**

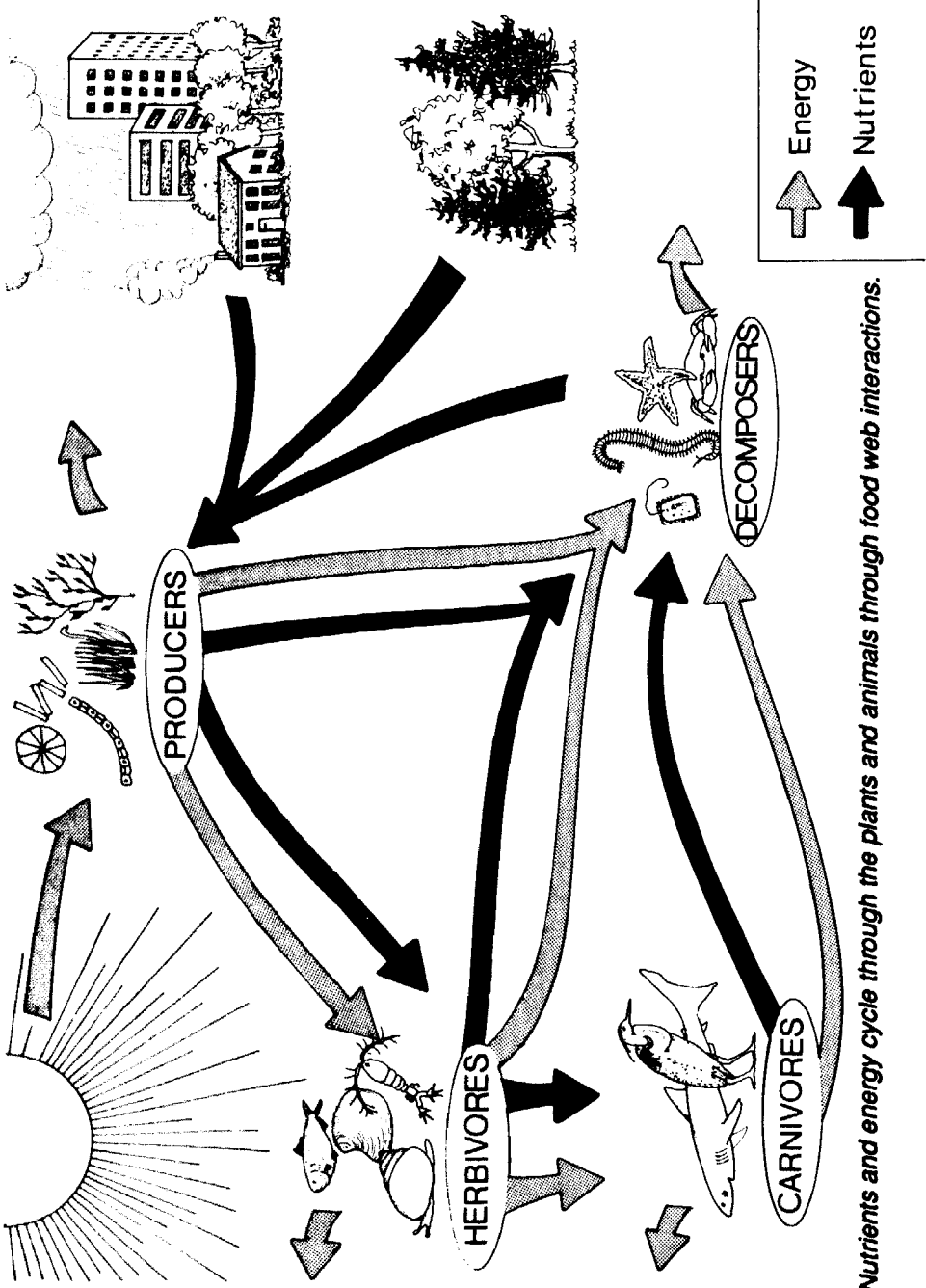
From microscopic bacteria and phytoplankton to striped bass and harbor seals, Long Island Sound is alive. The Sound is a major spawning ground for many species of finfish and shellfish and an essential food and rest stop for hundreds of species of migratory birds. Although the abundance and variety of organisms have decreased in recent years, as the coastline became more densely populated by humans, the Sound still supports a multitude of creatures great and small year-round. Many more live there for a part of their life cycle. Together, these plants and animals are valuable living marine resources. While not all species are commercially important, they are all interesting and all of great ecological importance to the balance of life in the Sound.

Plants and animals interact with each other, their environment, and people in the Long Island Sound **ecosystem** in complex and interesting ways. Consider the following scenario. You dine on a lobster this evening whose last supper was the remains of a bluefish which had been filleted and tossed overboard by a sport fisherman. The bluefish may have eaten a number of menhaden (bunker). The menhaden had in turn eaten many tiny algae which had used the energy of sunlight to turn water, carbon dioxide and chemical nutrients, such as nitrates and phosphates, into living tissue.

Energy and nutrients are cycled through living marine resources in the Sound by these types of food web interactions. Organisms obtain energy and nutrients by consuming other organisms or, in the case of plants, by converting sunlight, water and chemicals into living tissue.



Plants and Animals of Long Island Sound



*Nutrients and energy cycle through the plants and animals through food web interactions.*

## LONG ISLAND SOUND'S ENVIRONMENT FOR LIFE

Long Island Sound is a diverse and dynamic system encompassing a variety of **habitats** where plants and animals live and make their livings. The Sound is an **estuary**, a place where fresh and salt water meet and mix. Fresh water from several large and numerous small rivers dilutes sea water coming into the Sound from the Atlantic Ocean; waters in the eastern Sound near the open ocean are more saline (saltier) than those of the western Sound. In turn, each river mouth is itself a mini-estuary where fresh water from upstream mixes with more saline waters of the Sound.

Estuaries are water bodies of constantly varying conditions. Thus, the plants and animals in Long Island Sound must be able to tolerate wide ranges in salinity (salt content). Year-round residents must also withstand tremendous seasonal changes in temperature. Organisms that live in the **intertidal** zone must tolerate being alternately submerged in water and exposed to air, as well as withstanding the baking sun or frigid weather.

Estuarine organisms of the Sound have special adaptations to cope with a constantly changing environment. Animals that move between fresh and salt water, as do certain fish such as salmon and shad, have special mechanisms to balance salt levels inside their bodies in relation to levels in the water. In response to cold temperatures, some animals, such as bluefish, actually migrate out of the area. Others, like fiddler crabs, go into a quiescent state during the winter months. To prevent drying, barnacles and mollusks close up tight when exposed to air.

## HABITATS IN LONG ISLAND SOUND

Long Island Sound provides many diverse habitats (homes) for organisms. Fringing the shore, **salt marshes**

provide nursery grounds for many fishes and are home to abundant prey organisms for crustaceans, fish, birds, reptiles and mammals. Salt marshes also work as traps for contaminants, sediments and nutrients. They later become a source of nutrients which are released slowly into the water through decayed vegetation.

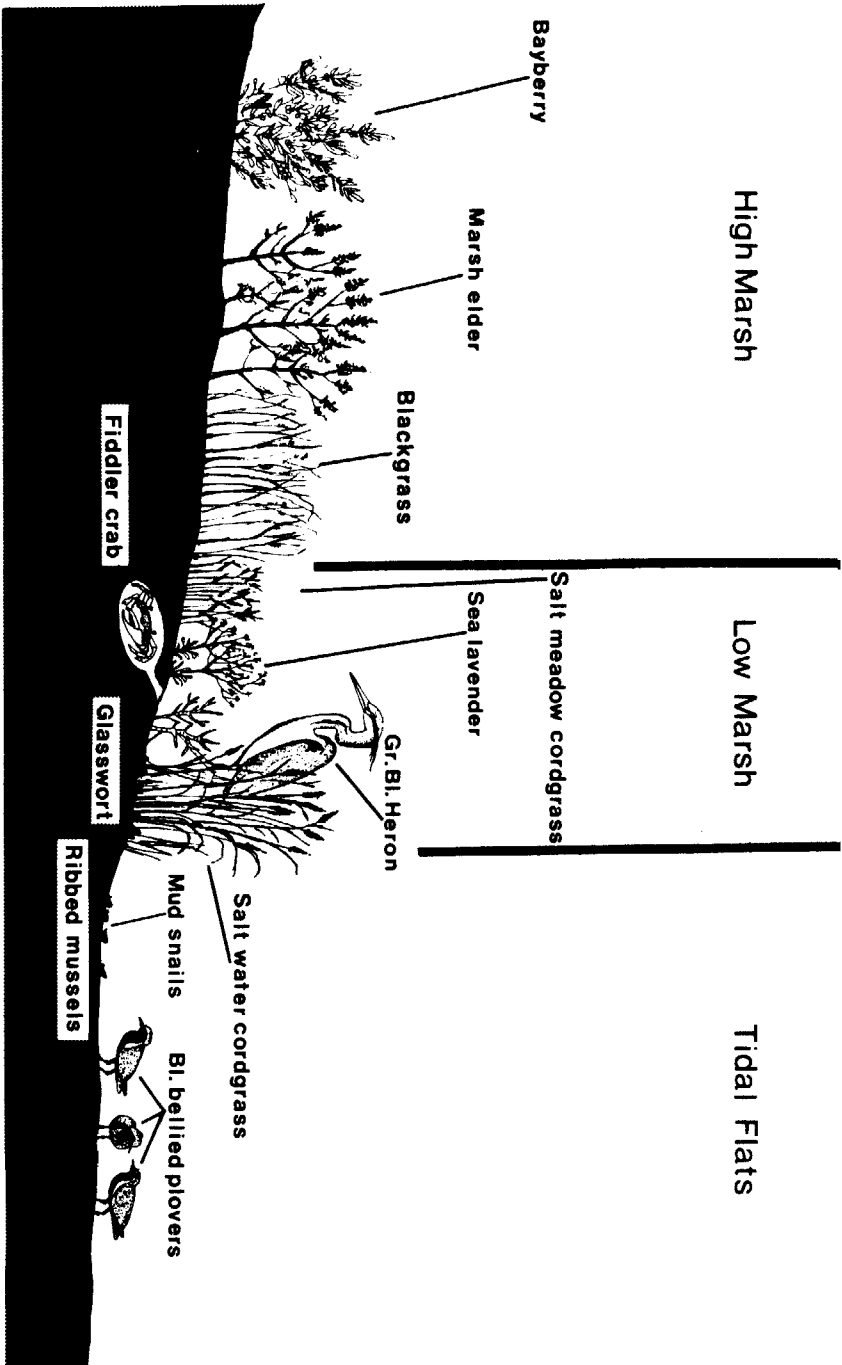
**Tidal flats** are lower energy sandy or muddy areas in the estuary. As with all intertidal areas, they are subject to daily periods of exposure to air followed by complete inundation. Flats support various communities of snails, worms, burrowing clams and the higher organisms that feed on them.

The **rocky intertidal zone** is a much harsher environment with intense wave action. Organisms that live there, such as seaweeds and barnacles, have special adaptations for attachment to rock surfaces.

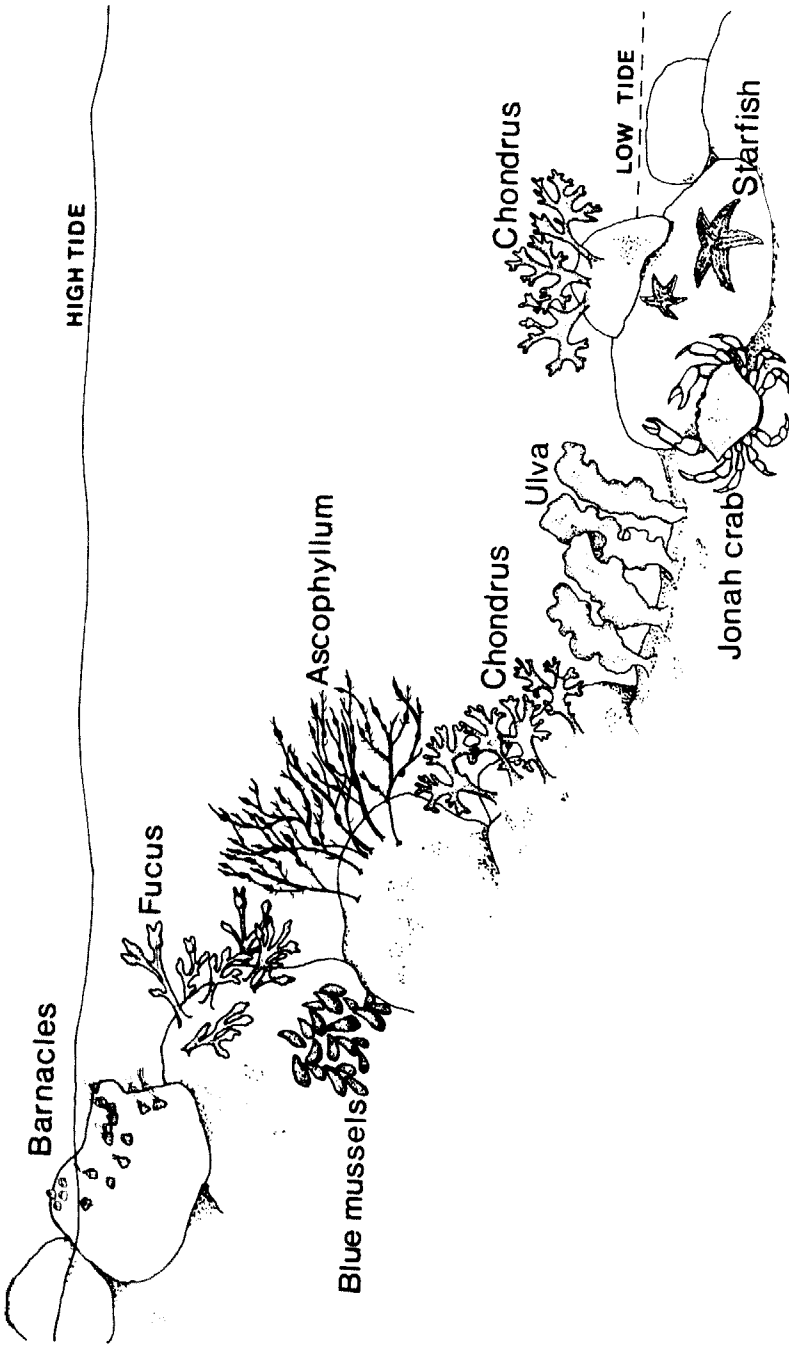
Another high energy shoreline habitat is the **sandy beach**. Although the beach may seem barren at first glance, numerous tiny animals live beneath and between the grains of sand, escaping the scorching heat of the sun. This constantly shifting environment is also home to tiny mole crabs, dune grass and several species of shore birds.

The **subtidal zone** is constantly submerged and supports both **benthic** (sea floor) and **pelagic** (open water) communities. Benthic substrates vary in the Sound from rocky reefs to fine organic silts. Rocky reef communities have many attached organisms, such as anemones and seaweeds, which provide food and shelter for mobile organisms, such as fish and crabs. On mud and sand substrates, benthic communities are largely composed of **Invertebrates** (animals without backbones), microscopic organisms and some finfish.

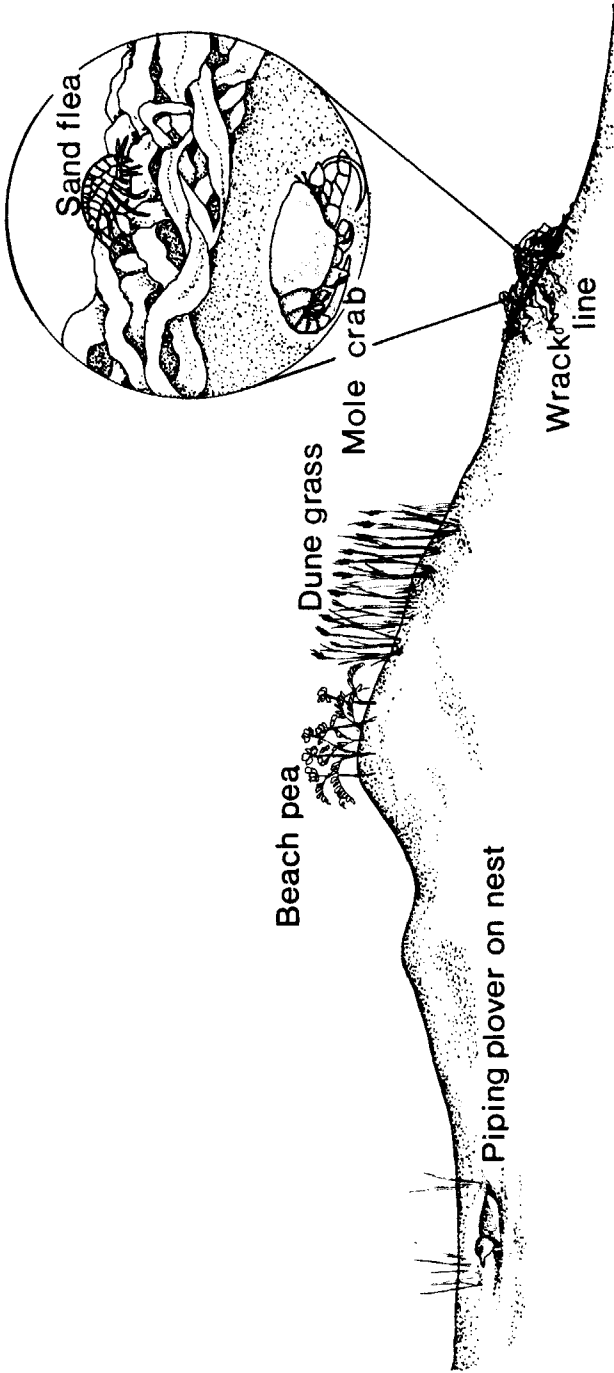
Organisms that live on or in the sea floor are collectively known as **benthos**. Benthos are further categorized by where they live: on (epibenthos) or in (infauna and in flora) the sediments. Benthic organisms range in size from microscopic bacteria to large lobsters and flounder.



*The Salt Marsh/Tidal Flat Complex: nursery ground, food source, and/or home to myriad fish, birds, crustaceans, mollusks, reptiles, and mammals.*

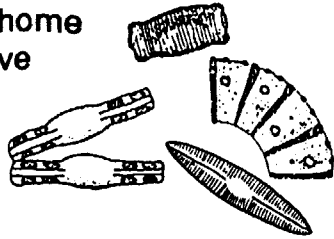


*The Rocky Intertidal Zone, a habitat that undergoes alternate submergence and desiccation.*



*Sandy Beach: Although seemingly barren at first glance, this constantly shifting environment supports many species of plants and animals.*

In open pelagic waters a large number of finfish species are found, along with other interesting organisms such as the jellyfish, a relative of the anemone, and the squid, a relative of snails and clams. The upper waters of the pelagic zone are also home to the many plankton species that drive the nutrient and energy cycles in Long Island Sound.



*Diatoms*

## WHAT KINDS OF ORGANISMS LIVE IN LONG ISLAND SOUND?

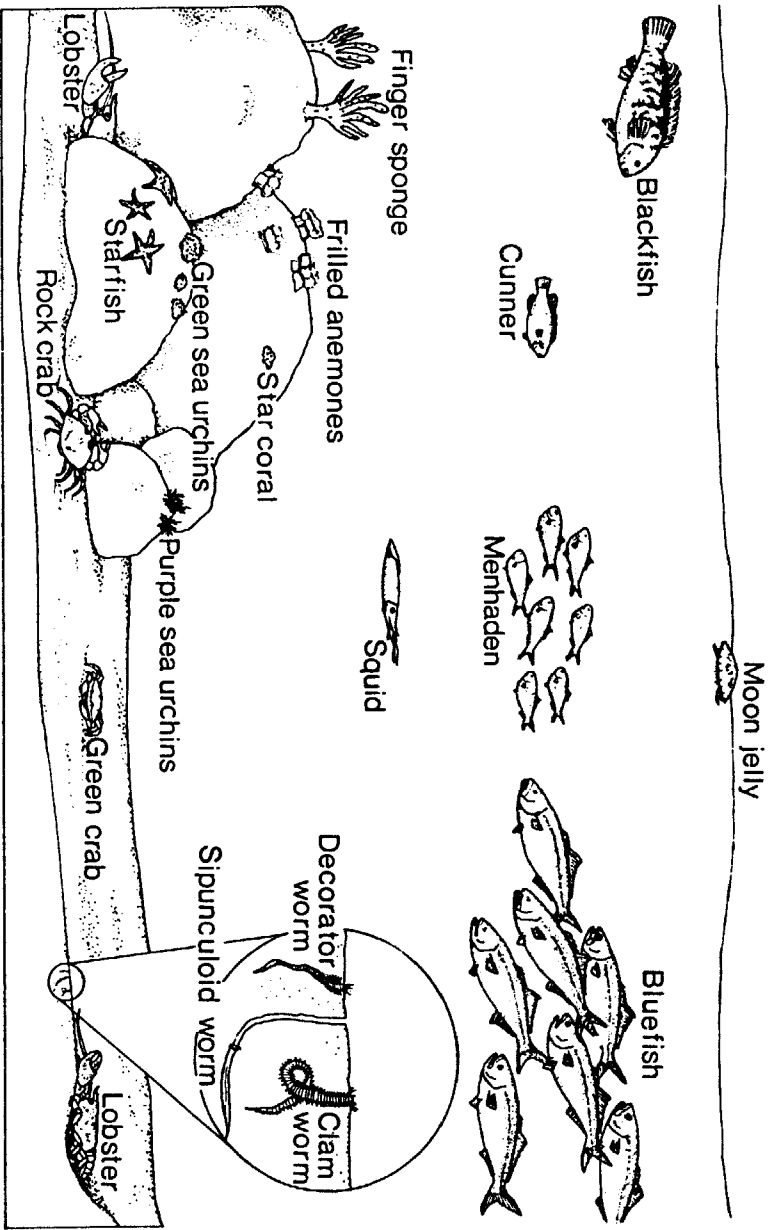
### *PLANTS*

Plants are critical to the survival of all that live in Long Island Sound because they alone can use water, carbon dioxide, chemical nutrients and the energy of sunlight to make living tissue and to release oxygen. In fact, it is this process of **photosynthesis** that permits life on earth.

There are three broad categories of plants in the Long Island Sound ecosystem: **phytoplankton**, **macroalgae** (seaweeds), and **vascular** (true) **plants**. **Phytoplankton** are tiny usually free-floating single-celled algae, the most common type being **diatoms**. They may also occur as colonial algae of many cells. Phytoplankton are important food for many **herbivores** (plant eaters), as well as producers of oxygen for other life forms in the Sound.

An overabundance of phytoplankton or an excess of certain kinds can have serious ecological consequences, however. For instance, certain red phytoplankton, dinoflagellates, can cause "red tides" which may be toxic to marine life. Dinoflagellate toxins can, on rare occasions, accumulate in filter feeders such as clams, posing a health threat to human consumers.

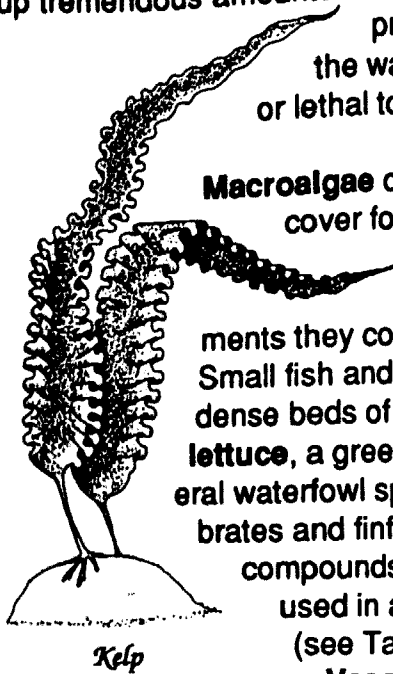
An excess of non-toxic algae is implicated in the hypoxic



*The Subtidal Zone supports both pelagic and benthic communities.*



(low oxygen) events of 1987, 1988, and 1989. In such cases, large numbers of dead and dying algae actually use up tremendous amounts of oxygen through the decaying process causing oxygen levels in the water to drop to levels dangerous or lethal to other organisms.



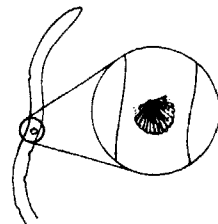
*Kelp*

**Macroalgae** or seaweeds provide food and cover for a variety of biota. There are three types of macroalgae distinguished by the type of pigments they contain: red, brown and green. Small fish and invertebrates find shelter in dense beds of the brown alga **kelp**. **Sea lettuce**, a green alga, is a food source for several waterfowl species as well as some invertebrates and finfish. Seaweeds contain special compounds called **phycocolloids** that are used in a variety of manmade products (see Table # 1 on page 27 ).

**Vascular plants:** There are few species of vascular or true plants in the open waters of Long Island Sound. **Eelgrass** grows in shallow waters where its thin blades provide refuge for small finfish and shellfish. Eelgrass beds are critical to the survival of bay scallops, which attach to the blades during their first weeks of life. Brant, close relatives of Canada geese, dine heavily on eelgrass and sea lettuce.

Vascular plants are more common in the fringing habitats of the Long Island Sound ecosystem.

In salt marshes, these plants have special tolerances to salinity. The most important species that grow there are **saltwater cordgrass** along the seaward marsh edge, and **saltmeadow grass** of the high marsh.



*Eelgrass blade  
with juvenile scallop attached*

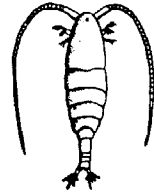
Several other grasses and broad-leaved plants, such as **sea lavender**, **bayberry**, and **marsh elder**, also form the salt marsh plant community.

Interestingly, most salt marsh vegetation is as important to the Long Island Sound ecosystem dead as it is alive. Dead leaves and stems provide food for fiddler crabs, worms, snails and the immature stages of finfish and shellfish. Bacteria break down the vegetation further to release chemical nutrients into the water.

A few species of vascular plants inhabit the sandy shores of Long Island Sound. **Dune grasses** help stabilize shifting sands. **Jimson weed**, **beach pea** and **dusty miller** are also found on beach dunes.

## ANIMALS

The animals of Long Island Sound are numerous and varied. Some are residents year-round while others occur here only on a seasonal basis. All animals rely on ingesting plants or other animals to obtain energy and nutrients.



*Copepod*



*Amphipod*

**Zooplankton** are small, often microscopic, animals that feed on bacteria, phytoplankton, and other zooplankton. Unlike phytoplankton, they are usually capable of some locomotion. Copepods, amphipods, and other shrimp-like creatures spend their entire lives as zoo-plankton, while larval (immature ) forms of barnacles, crabs, worms, mollusks, and most finfish are temporary members of the zooplankton community. All zooplankton are extremely important prey for other organisms.

## Invertebrates

Most **invertebrates** (animals without backbones) in Long Island Sound are benthic creatures. They are divided into

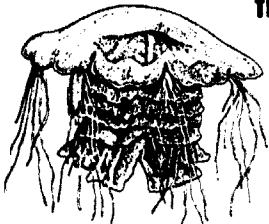
several major groups: sponges, cnidarians, worms, mollusks, crustaceans, echinoderms, and tunicates.

**Sponges** are the most primitive group of multicellular animals. They feed by passing water through their bodies and filtering out food particles. Sponges attach to hard surfaces where they can provide cover for juvenile lobsters and crabs, and food for certain sea stars. Some sponges, known as boring sponges, drill into the shells of oysters and other mollusks, making them less attractive for the marketplace.

It is interesting to note that the group of organisms that includes **jellyfish** also includes **sea anemones**. These animals, collectively known as **cnidarians** (ni-dare'-ee-ans), often have a two stage life cycle: one free swimming and one sessile (attached). In the case of jellyfish, the free swimming adult form is dominant while the sessile form is reduced to a short larval stage. The free swimming stage is absent in sea anemones. Anemones in Long Island Sound can be found attached to rock surfaces, pilings and even shellfish. Other species burrow in offshore muds.

Closely related to sea anemones are the colonial **hydroids**, often mistaken for seaweed on rocks and pilings. Within the branching hydroid colony are individuals specialized for feeding and others specialized for reproduction. It may be a surprise to some that the Sound supports another well-known cnidarian, **coral**. The star corals of Long Island Sound grow abundantly on rocky reefs.

All cnidarians are equipped with stinging cells for defense and for stunning prey. In the case of the **lion's mane jellyfish**, this can be an unpleasant surprise to an unwary swimmer.



*Lion's mane jellyfish*

Most people are probably unaware of the tremendous number of **worms** that occupy the sediments of Long Island Sound. One square meter of sediment ten centimeters deep can contain thousands of

worms. Most of these are so small that they are easily missed. Benthic worms belong to two major groups, **polychaetes** (many-bristled) and **oligochaetes** (few-bristled). Their main function is in working the sediments, bringing nutrients to the sediment surface and allowing oxygen



*Polychaete worm*

to reach lower levels. Worms feed on decaying matter, algae and bacteria. They are themselves prey for larger animals. Large marine **sand**

**worms** are sold as fishing bait.

Marine biologists can draw conclusions about the general "health" or condition of an area by the number and types of worms present. In this way, worms and other benthic creatures serve as "indicator species" of their environments.

**Mollusks** form a large group with more than 50 species in Long Island Sound. Two distinct classifications of mollusks are based on their shells. Mollusks having two hinged shells (valves) are called **bivalves** (e.g. clams), and those with one continuous shell are known as **univalves** or **gastropods** (e.g. snails). Some mollusks, such as the **sea slug** or **nudibranch**, have no shells at all or they may have a greatly altered shell, like the "pen" of a **squid**.

Species of mollusks vary greatly depending on habitat type. **Blue mussels**, **slipper shells** and **periwinkles** are familiar mollusks found on rocky areas. Muddy-sandy substrates support populations of **hard-shell clams** (**quahogs**) and nearshore **soft-shell clams** (**steamers**). Young **bay scallops** require eelgrass blades for attachment and survival, and young



*Nudibranch*

**oysters** require a clean hard substrate for attachment. Because of the tremendous commercial importance of the oyster industry, this substrate is often provided manually by the spreading of **cultch** (clean oyster shells).



*Hard-shell clams*

Some mollusks are found almost exclusively in salt marshes such as the **ribbed mussel** and **salt marsh snail**.

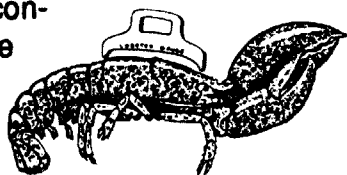
Most mollusks feed on algae or decaying matter either by scraping the substrate surface (e.g. snails) or by filtering food particles out of the water (e.g. bivalves). However, some snail species are predators. **Oyster drills** and **moon snails** drill holes in the shells of their bivalve prey. Large **whelks** actually pull the shells of bivalves apart.



*Oyster drill*

**Crustaceans** are related to insects and spiders in that they possess a hard exoskeleton (exterior skeleton) with many distinct segments and jointed legs and mouth parts. The group includes **crabs**, **lobsters**, **shrimp** and several small shrimplike animals that inhabit the sediments and open water. The latter shrimplike creatures include **copepods**, **amphipods**, **isopods**, and **mysid shrimp**, all of which feed on plankton and are, themselves, important food for larger animals.

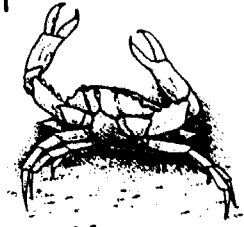
**Lobsters** are by far the most commercially important species of crustacean in Long Island Sound. They utilize a variety of substrates from rock crevasses to mud burrows, and they primarily consume other animals. After hatching from eggs, larval lobsters become part of the zooplankton community in the water column. After eight molts (shedding of the exoskeleton) during growth, lobsters settle to the bottom where growth and molting continues at an increasingly slower rate throughout their lives. A legal size lobster in western Long Island Sound is approximately 5 to 7 years old, and has undergone 25



*Lobster with gauge*

molts. A large lobster weighing 5 pounds can be over 14 years old. Data from commercial catches show that the greatest density of lobsters is in the western Sound.

**Crabs** of Long Island Sound come in many colors and shapes, and from different locations. **Blue crabs**, considered a delicacy, are voracious predators on small shellfish and finfish. One pair of legs is specially adapted for swimming. The quick pincer movements that serve the crab in hunting can also inflict pain in the incautious crabber.



*Blue crab*

**Cancer (red) crabs** include rock and Jonah crabs. Most **Jonah crabs** in Long Island Sound are associated with rocky reef habitats, while **rock crabs** are found commonly on all substrates. Both red crab species are edible though not at this time commercially important.

**Green crabs** are probably the most common crabs in the Sound, inhabiting rocky areas, mudflats and marshes. This European invader of the last century feeds voraciously on bivalves and is sold for blackfish bait.

**Fiddler crabs** are found almost exclusively in salt marshes where their burrows line the banks of tidal creeks and mosquito ditches. The forbidding enlarged front claw of the male is used only to lure a female into his burrow. Fiddler crabs feed on algae and decaying matter on the marsh sediments.

Other common crabs in the Sound are **spider crabs** with small roundish bodies and long radiating legs, **lady crabs** that swim through the water at night and burrow during the day, **burrowing mole crabs** of the surf line on sandy beaches, and **hermit crabs** which inhabit abandoned snail shells.

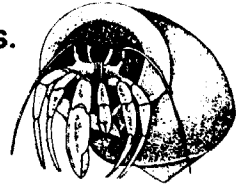


*Spider crab*

**Horseshoe crabs** are not true crabs, but distant relatives more closely related to spiders. They are commonly

found plowing through the soft sediments of shallow waters foraging on benthic creatures.

**Shrimp** of Long Island Sound are not of the baked-stuffed variety that most of us enjoy. They are mostly tiny species found inshore and offshore, and are extremely important prey organisms.



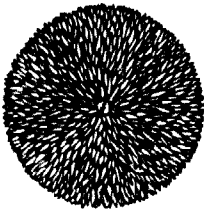
*Hermit crab*

**Barnacles** are also crustaceans but have evolved a sedentary life style in which they simply wave food particles into their mouths when the tide comes in.

The following groups of invertebrates are not commercially important, but they are extremely interesting and are of great ecological importance to the balance of life in the Sound.

**Echinoderms** are animals whose bodies are divided into five symmetrical parts. They include **sea stars (starfish)**, **sea urchins** and **sand dollars**. Echinoderms can be plant eaters, predators, scavengers or all three.

Certain predatory **starfish** are considered a scourge by clam and oyster fishermen who mistakenly used to cut the starfish into pieces and toss them back in the water thinking them dead. Unfortunately for the shell fishermen and fortunately for the starfish, each piece can potentially regenerate a whole new animal. While most starfish consume clams and oysters, other species dine exclusively on sponges, and still others on decaying matter.



*Sea urchin*

**Sea urchins** have a specially developed scraping apparatus that allows them to obtain algae and detritus from substrate surfaces. In the Sound, two species occur on rocky substrates, the purple and the green sea urchins.

**Sand dollars** are rare in the Sound, occurring occasionally in far eastern regions.

**Tunicates**, commonly known as sea squirts, are found attached to rocks, shells, piers, seaweeds or almost any submerged object. Sea squirts can be either solitary or colonial. Their bodies are covered by thick envelopes, tunics, that can be gelatinous or leathery. Certain species introduced to the Sound from foreign vessels have become nuisance fouling organisms on moorings, lines and other boating gear.

## **Vertebrates**

The most evolutionarily advanced animals of Long Island Sound, including humans, are the vertebrates (animals with backbones). They include **finfish, reptiles, birds and mammals**. As with invertebrates, some vertebrates feed on algae and plants, and some eat other animals. Many make their way to our own dining tables.

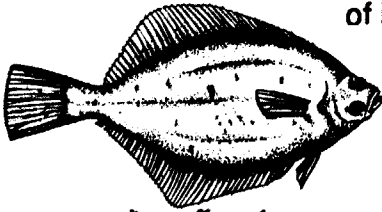
**Finfish:** The most commercially important vertebrates of the Sound are the **finfish**. Long Island Sound's recreational and commercial fishing industries are worth hundreds of millions of dollars annually. Aside from their monetary and food value, finfish are quite fascinating animals.

Finfish in Long Island Sound may be year-round residents, regular visitors that migrate in and out of the Sound at predictable times, or occasional visitors from the open ocean. Populations of many fish species vary dramatically from season to season. There are too many fish species occurring in Long Island Sound to discuss all of them here. The following fish species are not in taxonomical order, but are discussed in terms of their seasonal occurrence in the Sound.

**Winter flounder** are year-round residents of the Sound, migrating only between offshore and inshore waters on a seasonal basis. In summer they move to cool deep water, returning to the shallows to spawn when water temperatures



fall. When a winter flounder is very young, its left eye migrates to the right side of its head. The fish spends the rest of its life swimming along the bottom on its side, right side and two eyes up. These flat bottom-dwelling fish feed primarily on benthic worms. Winter flounder have a chameleon-like ability to change their color to blend with

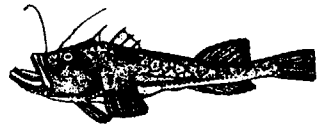


*Winter flounder*

surrounding sediments. This adaptation serves them well against most predators except man, whose trawls and hooks are not fooled by their camouflage.

Another year-round bottom resident, found mostly in the eastern Sound, is the bizarre **goose** or **monkfish**. The enormous mouth of this animal is capable of grasping large fish, crustaceans and even, on rare occasions, unlucky waterfowl.

**Blackfish** are also year-round residents. When water temperatures are warm, they feed on mollusks and barnacles in nearshore rocky areas. During the cold months they move into rocky crevasses in deeper waters, and begin an inactive or "quiescent" phase.



*Monkfish*

Other year-round residents include the **killifish** and **sticklebacks** of inshore waters, **Atlantic silversides**, **sea ravens**, **sculpins**, **cunner**, **sand lance**, **whiting**, **tomcod**, **windowpane flounder**, and **skates**. Little skates and windowpane flounder are among the most abundant fish found in Long Island Sound.

Most fish species in Long Island Sound occur seasonally or undergo seasonal changes in abundance. Adult **bluefish** begin to arrive in the spring, appearing in greatest numbers in July and August after spawning offshore. They remain until the fall, providing tremendous fishing opportunities for anglers. Voracious schools of blues have been known to

chase prey species such as bunker far up into shallow coves causing mass fish kills. The bunker become so frenzied and concentrated that they use up all available oxygen in the water and suffocate.

Young bluefish, called "snappers", appear in the Sound in late summer and early fall. Snapper blues and adult bluefish combined constitute the majority of fish caught by recreational fishermen and a significant portion of commercial hook and line landings in Long Island Sound.

Other finfish that occur during summer in abundance are **scup, mackerel, some herrings, dogfish** and the **sandbar sharks** that frequent Long Island's north shore.

Long Island Sound has several species of finfish whose migration routes take them from ocean salt water to the fresh water of streams where they spawn. The most notable of

these **anadromous** species are Atlantic salmon and American shad.



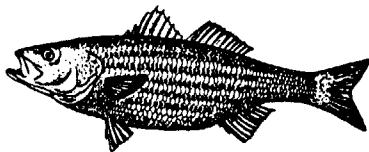
*Atlantic salmon*

**Atlantic salmon** spend their first few years in fresh water before migrating to sea. They return two years later to their birthplace to spawn. The construction of impassable dams on rivers, industrial pollution and over-fishing caused the local extinction of this species by the mid-1800s.

Attempts to restore Atlantic salmon to the Connecticut River began as early as 1893 with the construction of a fish ladder at the Holyoke Dam. Although restoration efforts continue, salmon have yet to achieve their former estimated population level.

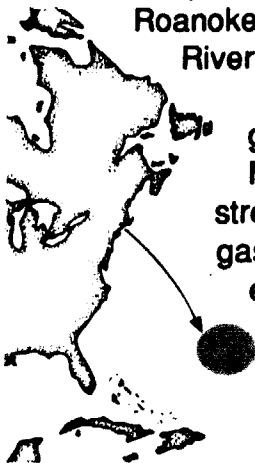
**American shad** are large herring that return to spawn in the streams where they were born after 4-5 years at sea. Pollution and dams have reduced their spawning effort in the Sound to one major run in the Connecticut River, where they

arrive in April. After spawning, adults move out of the rivers and Sound. Young shad follow in October and November.



*Striped bass*

The predatory **striped bass** is another anadromous fish found in Long Island Sound, though not known to spawn in its tributaries. They arrive in the Sound in early spring, feed in shallow nearshore waters during the summer and depart by fall. A small population of striped bass may overwinter in the Sound, while most of these fish migrate south. Spawning occurs primarily in tributaries of Chesapeake Bay, the Roanoke River of North Carolina and the Hudson River of New York.



*American eel  
migration route*

**American eels** have the opposite migration pattern from salmon and shad. Mature adults migrate out of fresh water streams and travel far to spawn in the Sargasso Sea south of Bermuda. Young eels eventually migrate back to the streams that their parents once occupied. The mechanism by which they are able to navigate is still unknown.

**Reptiles:** Most reptiles that occur inland can also occur along the coast in brackish waters. The only reptile that occurs exclusively on the coast is the **diamondback terrapin**, a turtle of salt marshes. Terrapins eat crustaceans, mollusks, dead fish and some plant material. They were nearly hunted to extinction locally in the early 1900s for their tasty meat, but populations have since recovered in many areas.

Four true marine turtles, the **loggerhead**, **Kemp's ridley**, **leatherback**, and **green**, are regular summer visitors to Long Island Sound, although few of us ever see them.

Most sightings occur when these animals pop up in fishermen's pound nets along the north shore of Long Island. If these cold-blooded creatures linger in the Sound for too long in the fall, they may become "cold-stunned" and wash up on shore.



*Diamondback  
Terrapin*

Except for spawning on more southern shores, a healthy sea turtle spends its entire life at sea. Kemp's ridleys travel 2000 miles from their only spawning grounds in Mexico to reach Long Island Sound.

Different kinds of sea turtles eat different things. For example, loggerheads and Kemp's ridleys eat mollusks and crustaceans. Leatherbacks feed exclusively on jellyfish, while green turtles are vegetarians.



*Gulls*

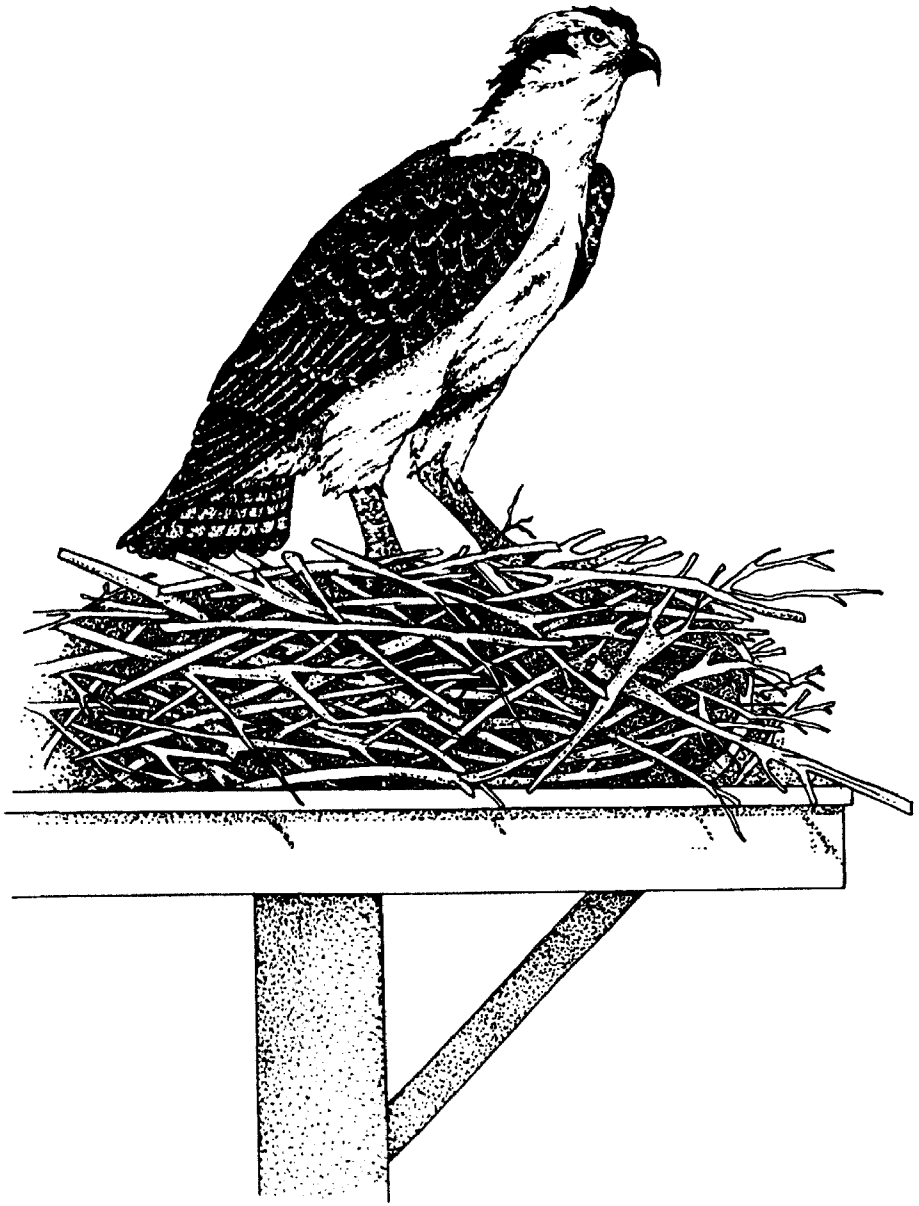
**Birds:** No trip to the beach would be complete without the raucus call of **gulls** overhead or next to your beach towel (trying to pilfer your french fries). While gulls may be the most obvious coastal bird, numerous other species are found along the shore, taking advantage of the Sound's abundant fish, shellfish, and plant life.

Bird populations in and near Long Island Sound vary seasonally. In winter, birders delight at large concentrations of waterfowl and other water birds. **Mergansers, buffleheads, goldeneyes, scaup, scoter, canvasbacks, mallards, black ducks, brant and Canada geese** are among the types of waterfowl commonly seen along the coast in winter. **Loons and grebes** are distant relatives of waterfowl that



*Mergansers*

also winter along the shores of the Sound. Probably our most spectacular winter resident is the **American bald eagle** along the Connecticut and Housatonic Rivers.



*The osprey sits on a man-made nesting platform..*



*Brant*

Spring brings the annual migration of a wide variety (sometimes frustrating to the novice birder) of plovers, sandpipers, waterfowl, and songbirds on their way to northern

breeding areas. The marshes, mudflats, beaches and rocky areas of the Sound's shore serve as important stopover areas for many bird species along their migration routes.

One of the most thrilling harbingers of spring is the high-pitched call of the fish-hunting **osprey** returning to nest. Osprey also represent a restoration success story. The banning of DDT, which had caused osprey reproductive failure, and the construction of nesting platforms have brought the Sound's osprey population back to levels not seen for decades.

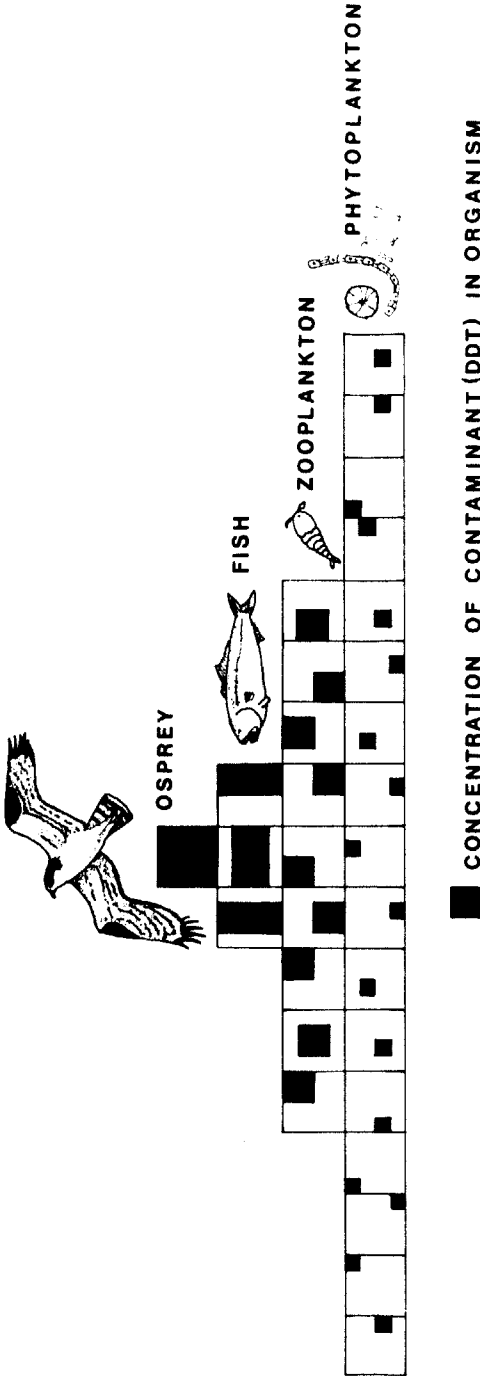
During summer, some offshore islands are frantic with the comings and goings of birds tending their nests and young. Colonies of **cormorants, gulls, terns, herons, ibis** and **egrets** can be found on islands along the Connecticut coast. On a few wind-swept beaches, protected from human disturbance and stray house pets, the threatened **piping plover** and **least tern** make their nests.

Fall, once again, brings masses of migrating birds. **Hawk** watching at this time is optimal as thousands of birds of prey migrate along the coast to southern wintering grounds. Great flocks of waterfowl begin to arrive, and shorebirds move through again this time heading south.

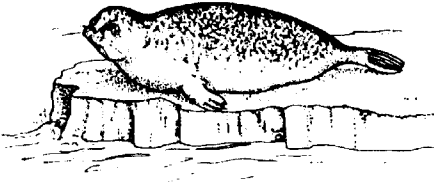


*Bald Eagle*

Birds of the Sound rely upon its abundant resources—fish, invertebrates and plantlife. Scaup and scoters feed primarily on mollusks, while mergansers, cormorants, loons, herons, ospreys and terns feed mostly on finfish. Canada geese, brant and mute swans are grazers feeding on eelgrass and seaweeds.



Certain contaminants, such as DDT, are not water soluble. Instead of being flushed out with body wastes, DDT accumulates in fatty tissue. When one organism eats several smaller others, DDT from the prey concentrates in the predator.



*Harbor seal*

**Mammals:**

**Harbor and gray seals** are the only marine mammals that occur in Long Island Sound with any predictability.

They can be spotted throughout the winter on offshore rocky islands, where their numbers have increased dramatically in recent years. **Whales and dolphins** are rare visitors, though harbor porpoises once occurred regularly.

A variety of terrestrial mammals can be found along the coast. **Muskrats** of the marshes may be the most representative mammal of the coastal region. **Raccoons, red fox, and weasels** also use these habitats as hunting grounds. **Meadow voles** tunnel through marsh grasses feeding on plant matter, insects and other invertebrates. These small mammals in turn provide food for predatory birds and mammals.

The amphibians, reptiles, birds and mammals of Long Island Sound make up a spectacular complex of coastal wildlife. Some waterfowl are hunted, and some mammals are trapped for fur. Considerable investments are made in equipment for hours of wildlife observation and photographing. But coastal wildlife species probably serve humans best through their ecological roles and as biological indicators of the health of the environment.

The types and numbers of living marine resources reflect human activities and their effects on the environment. The story of DDT and subsequent osprey population declines is one



*Red fox chasing vole*





*People are part of the LIS ecosystem, too.*

example. Another example is a tremendous increase in gulls during the past two decades, associated with a proliferation of sanitary landfills where these birds find abundant food resources.

Because living marine resources in Long Island Sound are all interrelated at some level, it is reasonable to assume that a

change in the status of one will somehow affect the well-being of others ... including ourselves.

People are part of the Long Island Sound ecosystem, affecting and being affected by all that lives there. As ultimate users and beneficiaries of the Sound's living marine resources, people have the responsibility to protect and promote the health of the ecosystem.

Table 1.

## **DIRECT VALUES OF LIVING MARINE RESOURCES**

### **ALGAE**

- Diatom skeletons form diatomaceous earth used in swimming pool filters and as an abrasive.
- The brown seaweed kelp is eaten in many countries and is also the source of alginate used in photo emulsions, and as a smoothing agent in salad dressing and syrups.
- The red seaweed *Chondrus* provides carrageenan which makes ice cream smooth. Other species are the source of thickeners for pudding, gelatin, and fruit fillings.

### **VASCULAR PLANTS**

- Salt meadow cordgrass was historically harvested as salt hay for livestock.
- Bayberries are collected for candle and potpourri scents.
- Eelgrass beds provide nursery areas for bay scallops.

### **MOLLUSKS**

- Steamers, hard clams, oysters, scallops, mussels, conch and squid are all highly valued foods representing multi-million dollar industries.

### **CRUSTACEANS**

- The lobster fishery in the Sound is worth at least \$6.4 million per year.
- Blue crabs are recreationally caught and eaten.
- Green crabs are often sold as blackfish bait.

### **FINFISH**

- Recreational fish species of Long Island Sound include bluefish, striped bass, blackfish, weakfish, flounders, fluke, mackerel and scup. The value of recreational fishing in the Sound is estimated at \$80-100 million annually, based on fishing trip expenditures. The commercial fishery includes flounder, shad, eels, butterfish, menhaden, scup, and weakfish, and landings are worth at least \$18 million per year.

### **REPTILES**

- Diamondback terrapins were nearly hunted to extinction in the early 1900's for their meat.
- Other reptiles prey on biting insects.

## *Plants and Animals of Long Island Sound*

### **BIRDS**

- Long Island Sound provides excellent opportunities to view concentrations of winter waterfowl, migrating hawks, nesting osprey and colonies of terns, herons, and egrets.
- Waterfowl hunting along the coast is also a highly valued traditional sport.

### **MAMMALS**

- Nature watchers are delighted at viewing harbor seals hauled out on rocky islands in winter, or observing mammal signs along tidal creeks.
- Muskrats and raccoons are trapped for fur in riverine and coastal salt marshes.

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**Field Guides:**

- Audubon Field Guide Series:** Atlantic and Gulf Coasts  
Wetlands  
North American Birds  
North American Seashore Creatures
- Peterson Field Guide Series:** Shells of the Atlantic and Gulf Coasts  
Atlantic Seashore  
Eastern Birds  
North American Mammals
- Sierra Club Naturalist's Guide:** The North Atlantic Coast

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