



## NYSDEC Environmental Education

# Long Island Beach Life

For Students in Grades 3 through 6

*A 45-minute program designed to teach about marine science, focusing on the organisms and physical science of Long Island's beaches, estuaries and marine ecosystems.*

### **Goal**

Students will be introduced to some of the larger concepts of marine biology. Students will learn about local species of plants and animals found in Long Island's coastal waters.

#### **NYS Intermediate Level Science Core Curriculum**

##### **Standard 1: *Scientific Inquiry***

*Key Idea 1:* The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

##### **Standard 4: *The Living Environment***

*Key Idea 5:* Organisms maintain a dynamic equilibrium that sustains life.

*Key Idea 6:* Plants and animals depend on each other and their physical environment.

*Key Idea 7:* Human decisions and activities have had a profound impact on the physical and living environment.

##### **Process Skills:**

*Living Environment Skills 7:* Interpret and/or illustrate the energy flow in a food chain, energy pyramid, or food web.

### **Procedure**

Use several techniques to illustrate the physical marine science of the waters and beaches around Long Island. Utilizing images, taxidermy mounts, shells and other props, encourage the students to ask questions and discuss the materials presented. The two activities included in this packet can be played as a part of the presentation or as extensions after the lesson.

## ***Materials***

Bring a collection of assorted artifacts that may include: baleen, shells, taxidermy fish, sea turtle shell, horseshoe crab shell, taxidermy birds, shark teeth, and/or other appropriate materials.

For activities, a playing area is needed. A large area such as a playground or auditorium is best, although demonstrations can be adapted to the classroom.

## ***Vocabulary List***

***Baleen***

***Barrier Beach***

***Bay***

***Beach Zone***

***Bivalve***

***Camouflage***

***Coral Reef***

***Crustacean***

***Defenses***

***Detritus***

***Ecosystem***

***Exoskeleton***

***Filter feeding***

***Food chain***

***Food web***

***Intertidal zone***

***Littoral zone***

***Marine habitat***

***Migration***

***Mollusk***

***Ocean***

***Plankton***

***Pollution***

***Predator***

***Prey***

***Saline***

***Tide***

***Univalve***

## ***Conclusions***

Encourage the students to ask questions or to share ocean experiences with the class (time permitting). Do a short review of some of the discoveries made and answer questions students have about the marine environment.

# Topics of Discussion

## What is Salt Water?

The water in the ocean is different from the water we drink. Salt is present in the ocean. Salt is poisonous to many kinds of organisms. Most land plants die when exposed to salt water, and most animals cannot drink salt water.

There are some animals that can tolerate salt water AND fresh water. Some kinds of fish can move in and out of fresh and salt water, and many species spend part of their life in fresh water, and part of their life in salt water.

## What Lives in the Ocean?

Some of the largest and smallest animals on Earth live in the ocean. **Plankton** is what we call the microscopic floating plants and animals in the ocean. Almost all marine food chains start with plankton. Illustrate food chains.

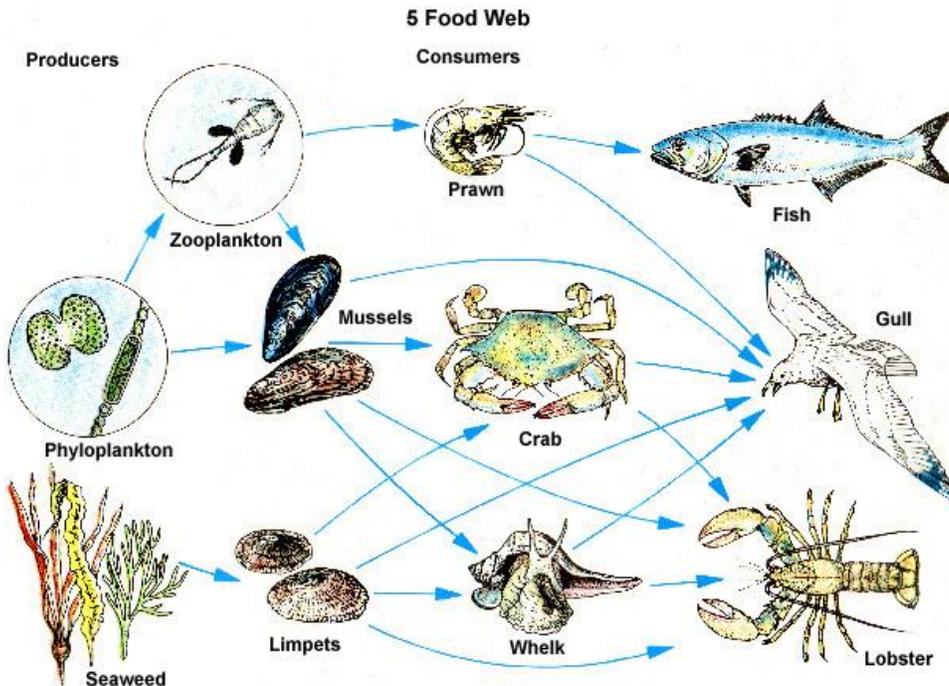
Below is an example of a marine food chain.

plankton → amphipods → small fish → large fish → seals

One of the things to consider in marine habitats is that many animals interact in the ocean. An important part of the marine ecosystem is the dead material that falls to the bottom. This dead material is called **detritus** and is fed on by many creatures.

Below is an example of a detritus based food chain.

detritus → snails → crabs → large fish → osprey



Rather than view the food system as a chain, it may be more helpful to view it as a web.

Where would humans fit into this food web?

## ***Tide and Time***

If you are a snail or a crab living near a beach, life can be very different from hour to hour. As the moon orbits the Earth, it makes the water of the oceans move. This creates the tides. The water at low tide is further down the beach than it is at high tide. If an animal lives between the tides, in the ***intertidal zone***, it will be exposed to the air at low tide, and under water during high tide. There are many animals and plants that have adapted to living between the tides in the intertidal zone. Remember that the animals have adapted to live there year-round, from the hot sun of the summer to the frozen icy spray of the winter.

## ***How Do Clams Eat?***

There are many animals in the ocean that do not move. Shell animals like oysters, mussels, and clams stay in one spot. They feed on tiny plankton drifting along by drawing salt water into their bodies, removing the plankton with a filter, and expelling the water. It works like a filter in a pool or a vacuum cleaner, and this feeding strategy is called ***filter feeding***.

The ocean's largest animals are also filter feeders. Baleen whales draw in large amounts of sea water, filter out krill, squid and small fish, and expel the water. The special teeth they use for this is called ***baleen***. Other whales have teeth and eat larger animals- like fish, penguins, seals and squid.

## ***Dangers of the Sea***

What eats little fish? There are many animals that do. Humans, sharks, tuna, bass, seagulls, jellyfish, crabs, eels, squid, and many others need little fish to survive. Fish have many different defenses to avoid being eaten. Some fish have camouflage, others are fast, some hide in holes or rocks, and many types of fish gather together in schools for protection.

Guide the students in the 'Migration Game' to illustrate how fish face dangerous obstacles in the ocean.

## ***Schools of Fish***

Why do fish swim in schools? Not all fish do, but many form into groups that can sometimes number into the millions. The fish move together to feed, sleep and migrate. Schooling is a way of avoiding being eaten.

Guide the students into the 'School of Fish Game' to illustrate the function of fish schools.

## ***Migration Game***

- Set up an open area, approximately ten feet wide and twenty feet long. Playing area must be narrow enough to make it difficult for fish to evade hazards. Most of the students will represent fish, some will represent hazards. Students representing fish should line up on one of the ends of the playing area. Each round can represent a migration- from resting areas to feeding areas, from deep water to shallow water.
- Assign some students as hazards, approximately one hazard for every five fish. These students will represent some of the challenges that fish face in trying to survive from day to day. They will receive a card that represents the challenge to wear around their neck. These students should be assigned a spot in the playing area. They will be permitted to move their arms to tag students, but not to move their feet. (An extension would give each hazard specific ways of moving to represent the challenge to the fish).
- When you say go, fish should move from one end of the playing area to the other, trying to avoid the hazards. **Hazards cannot move their feet, only bend and move their arms to reach fish.** If tagged, a fish leaves the playing area this round.
- Repeat the exercise, keeping track of how many fish survive, and get caught by the hazards. Ask the students to analyze some of the hazards and strategies used to avoid them, and what happened each round.

HAZARDS (students encouraged to make appropriate noises)

Predator! Flounder hiding in the sand (crouches near ground, tags one fish at a time)

Predator! Anemones (two students stand back to back with arms outstretched)

Predator! Jellyfish! (student waves arms (tentacles) around to catch prey)

Fishing net! (two or three students link elbows and shift to grab fish)

Pollution! (student tags as many fish as they can)

## *School of Fish Game*

- Form students into a broad circle. This will define the playing area.
- Select one volunteer as a predatory fish. Allow student to pick what predator she represents, suggesting that she picks a local species (striped bass, bluefish, flounder, blackfish, weakfish).
- Select one volunteer as a prey fish. Suggest a local species the student can represent (baitfish may be less familiar- silversides, killifish, herring, bunker, mullet).
- Within the circle, the student representing the prey species should move around *at a walking speed*, representing the fish moving through its habitat. Once the fish moves a bit, the predator may attempt to tag the prey (tagging with their hands), which would represent the predator successfully eating the prey.
- Now select two additional prey fish, and have them join the original prey species. They now represent a small school of fish. They should still move at a walking speed, but now the two new fish should follow the first fish closely. This is how schools of fish move together. Once they get the hang of this, allow the predator to lunge and grab *one prey fish* for food. This represents the predator successfully eating the prey.
- Now in both demonstrations, a prey fish was eaten by a predator fish. In the second case, however, two fish survived. If the students have been introduced to fractions or other basic statistics, suggest that the odds of survival were much greater in the second demonstration. If they can give the odds, discuss this as a math problem on the board. What was the rate of survival? Of predation?
- For round three, select 8 prey fish, and 1 predator fish (for fairness, perhaps selecting new volunteers would help class harmony). Ask the students if they can predict the outcome. After the demonstration, ask what is happening to the likelihood of survival to each individual prey fish. What would happen with 20 fish? 100? 10,000?
- Extension: Assign all students in class as a predator or prey species. Allow entire class to participate. Another suggestion- allow a predator to only catch stragglers. If a prey fish is touching another prey fish, the predator cannot take either one.

## Marine Animal Word Search

Can you discover these 23 marine organisms that can be found on Long Island beaches?  
Words can be across, down or diagonal. Circle the words in the puzzle, and cross them off of  
the word bank as you find them.



### Word Bank

Barnacle  
Clam  
Fiddler crab  
Fish  
Fluke  
Gull

Hermit crab  
Horseshoe crab  
Lobster  
Mussel  
Oyster  
Plankton

Sandpiper  
Scallop  
Sea turtle  
Seal  
Seastar  
Seaweed

Shrimp  
Skate  
Snail  
Tern  
Urchin