UF UNIVERSITY of FLORIDA

UF/IFAS Extension and Florida Sea Grant
mpmcg@ufl.edu

# 4th grade estuary food web activity

About this activity:
There are 21 "cards" representing 21 plants or animals that can be found in estuaries. Each card gives some information about the plant or animal, and also tells what that animal eats. Many of the cards also tell what eats the plant or animal. Eventually, the teacher will use pieces of yarn to connect all of the producers to the appropriate primary consumers, and also make connections between consumers. This will show visually the complexity of a food web. The teacher can then choose to demonstrate how an environmental disaster might affect the food web.

How it works:

1. Give each student one of the cards. Ask them to read the information on the card, then hang the card around their neck so the information faces out. (NOTE: if you have less than 21 students, leave out one or more of the following cards: catfish, stingray, flounder, clams or decomposers)
2. Ask all students who are plants to come forward. Ask them what type of plant they are (you should have algae, marsh grass and phytoplankton). Remind the students that plants are producers—they can make their own food using energy from the sun in a process called photosynthesis.
3. Ask the other students if any of them are an animal that eats algae (you don't have to start with algae, but it's best to do one plant at a time).
4. Double check that the students who raise their hands do eat algae. Then have them step forward and give each of them one end of a piece of string. Give the other end of these pieces of string to the algae. This represents the food web connection (energy flow) between the algae and the consumers (snails, shrimp, worms, manatees, fiddler crabs, blue crabs, catfish).
5. Repeat this for the other producers.
6. One at a time, take each of the primary consumers that you identified in steps 4 & 5. Ask the class if any of them eats (pick one of the consumers). Continue making food web connections with pieces of string. It's OK that it will get quite confusing with strings cris-crossing all over the place.
7. Once you have made all the connections, you can choose to explain that a "disaster" has happened (e.g. someone has dumped used motor oil into the estuary and this has killed all of the zooplankton). The person who is the "zooplankton" will then release all of the strings that they were holding. The teacher should help the students understand the potential impacts of this on the

food web (e.g. phytoplankton could become more abundant, which could be good for the things that eat phytoplankton, but things that eat zooplankton will have to find other food items or die).

8. Once you are finished, please carefully collect up the strings so they can be re-used. Collect the species cards.

| **Species represented** | **What does it eat?** | **What eats it?** |
|---|---|---|
| Algae (seaweed) | Nothing (photosynthesizes) | Blue crab, worms, shrimp, snails, fiddler crabs, catfish |
| Marsh grass | Nothing (photosynthesizes) | Worms, snails |
| Phytoplankton | Nothing (photosynthesizes) | Zooplankton, clams, oysters |
| Clams | Phytoplankton, zooplankton, decomposers | Blue crabs, stingrays, humans |
| Oysters | Phytoplankton, zooplankton, decomposers | Snails, humans, blue crabs |
| Blue crab | Oyster, clams, algae, snails | Red drum, humans, stingray, catfish |
| Zooplankton | Phytoplankton, decomposers | Clams, oysters |
| Manatees | Algae | |
| Worms | Decomposers, dead algae, dead marsh grass | Catfish, shore birds, fiddler crabs, shrimp |
| Shrimp | Algae, worms | Red drum, flounder, shore birds, humans, catfish |
| Snails | Marsh grass, algae, snails, oysters, clams, decomposers | Snails, blue crabs, red drum, humans, stingray |
| Fiddler crabs | Algae, worms, decomposers | Red drum, shore birds, stingrays |
| Shore birds | Shrimp, worms, fish | |
| Stingray | Snails, blue crabs, clams | Shore birds, humans |
| Flounder | Shrimp, fish | Humans, shore birds |
| Catfish | Algae, worms, shrimp, blue crabs | Osprey, humans, shore birds |
| Bottlenose dolphin | Fish (red drum) | humans |
| Red drum | Fiddler crabs, blue crabs, shrimp, snails | Humans, shore birds, osprey, bottlenose dolphin |
| Osprey | Fish (red drum, catfish) | |
| Humans | Red drum, blue crab, stingray, bottlenose dolphin, flounder, clams, oysters, shrimp, snails | |
| Decomposers | Everything! (after things die) | Clams, oysters, zooplankton, snails, fiddler crabs |

Note that this table only reflects species included in this activity. There will likely be additional prey items and predators in reality ☺

Activity created by Maia McGuire, PhD, Florida Sea Grant Associate Director for Extension and Education

# **Algae [**Al-jee**](seaweed)**

There are three groups of seaweed—green algae, brown algae and red algae. Algae do not have true roots, stems or flowers. Many types of algae attach to hard surfaces using holdfasts. Some types of brown algae use gas-filled floats to hold the plants upright. Green algae will often grow very fast when there are too many nutrients (e.g. fertilizer) in the water. Some kinds of green and red algae make a limestone skeleton.

**What do I eat?** Nothing—I make my own food by using the sun's energy to photosynthesize [Fo-to-sin-thuh-size].

Sea lettuce algae

# Marsh grass

Marsh grasses can survive being flooded by brackish water part or all of the time. The shorter, bright green marsh grass is called smooth cord grass. The taller, darker green to brown color grass is black needle rush. Some animals (e.g. snails called marsh periwinkles [pear-ee-wink-uls]) eat the living grass. When the marsh grass dies, it is broken down by decomposers to form mud and nutrients.

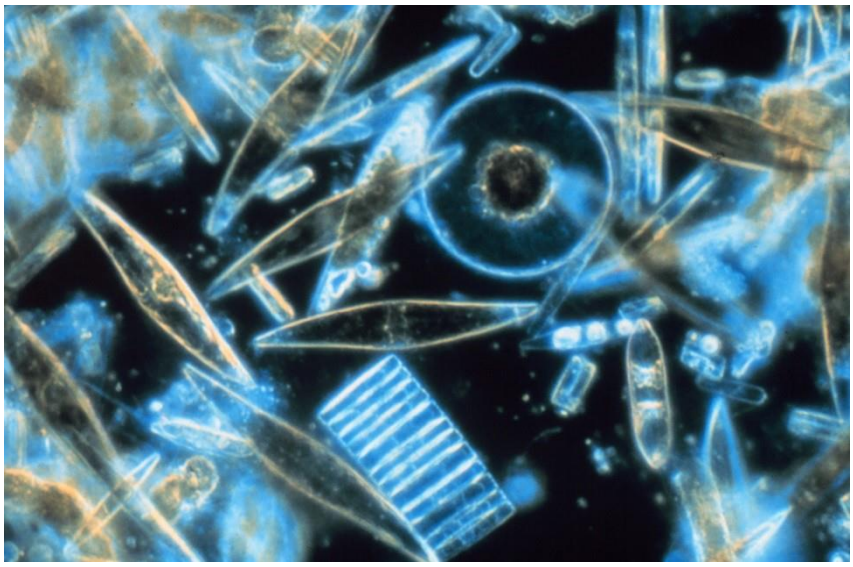
**What do I eat?** Nothing—I make my own food by using the sun's energy to photosynthesize [Fo-to-sin-thuh-size].

Smooth cord grass and black needle rush.

# **Phytoplankton [**Fie-toe-plank-tun**]**

Phytoplankton are tiny plants that are found in water. They are usually too small for us to see without using a microscope. The word plankton comes from the Greek word "planktos" which means "drifting." So phytoplankton could be called plant drifters.

**What do I eat?** Nothing—I make my own food by using the sun's energy to photosynthesize [Fo-to-sin-thuh-size].



Phytoplankton photographed through a microscope.

# Snails

Marsh periwinkles [pear-ee-wink-uls] are very common snails in the salt marsh. During high tide, they crawl up cordgrass stalks. Here they look like bent leaves. This makes it hard for predators to see them. When the tide goes out, the snails crawl back down the grass to the mud. Here they eat dead plants. Other types of snails in the saltmarsh include crown conchs and horse conchs. These snails are carnivores.

**What do I eat?** Marsh grass, algae, other snails, clams, oysters, decomposers
**Who eats me?** Blue crabs, red drum, humans, stingrays

Marsh periwinkle snails

# Shrimp

Glass shrimp and white shrimp are common in the estuary. They are clear and almost colorless. They are scavengers, which means they eat whatever they can find. The white shrimp has very long antennae. It is one of the types of shrimp that people like to eat.

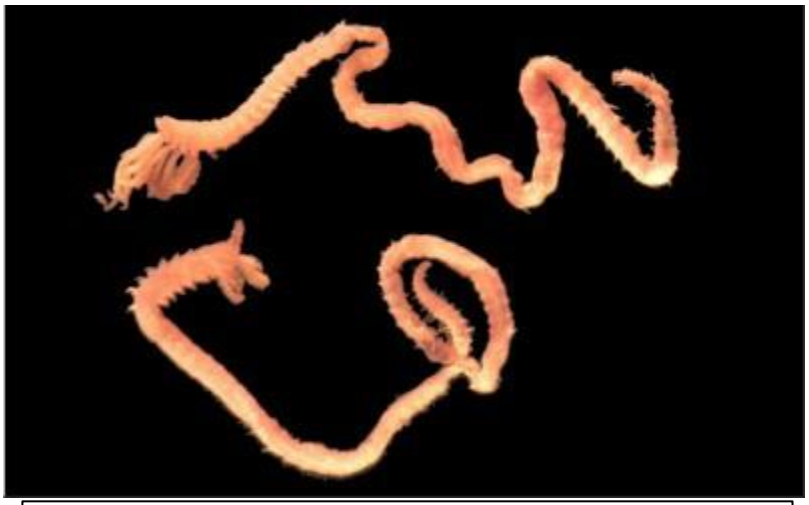
**What do I eat?** Whatever I can find—algae, small dead fish, worms, etc.
**Who eats me?** Red drum, flounder, shore birds, catfish, humans

Glass shrimp (top) and white shrimp (bottom) Can you see the white shrimp's long antenna?

# Worms

Many different kinds of worms live in the mud in the estuary. Some of these worms live in tubes or burrows that they build. Others just crawl around near the surface of the mud. Most of the worms that live in the estuary are called polychaetes [polly-keet-s]. This means that they have many body sections that have little hairs or bristles on them. Most of these worms are quite tiny.

**What do I eat?** Decomposers, dead algae, dead marsh grass
**What eats me?** Catfish, shore birds, fiddler crabs, shrimp



Can you see the body sections and the bristles on these worms?

# Manatees

Manatees are endangered. They can live in fresh water and salt water. A long time ago, people used to hunt them. Now their main threat is being hit by boats. Many manatees have scars from boat propellers. Manatees are herbivores. They have to eat about 100 pounds of food a day! Manatees cannot survive in cold water. In the winter, they swim to warmer waters in south Florida or some springs.

**What do I eat?** Algae and other types of plants.
**Who eats me?** Manatees have no real predators.

A manatee at Blue Spring State Park.

# **Zooplankton [**Zoh-plank-tun**]**

Zooplankton are animals that are found in water and that cannot swim against a current. They are sometimes too small for us to see without using a microscope. The word plankton comes from the Greek word "planktos" which means "drifting."  So zooplankton could be called animal drifters. Some marine animals have babies that are part of the plankton. Other types of zooplankton live in the plankton all the time.

**What do I eat?** Mostly phytoplankton [Fie-toe-plank-tun]
**What eats me?** Clams, oysters

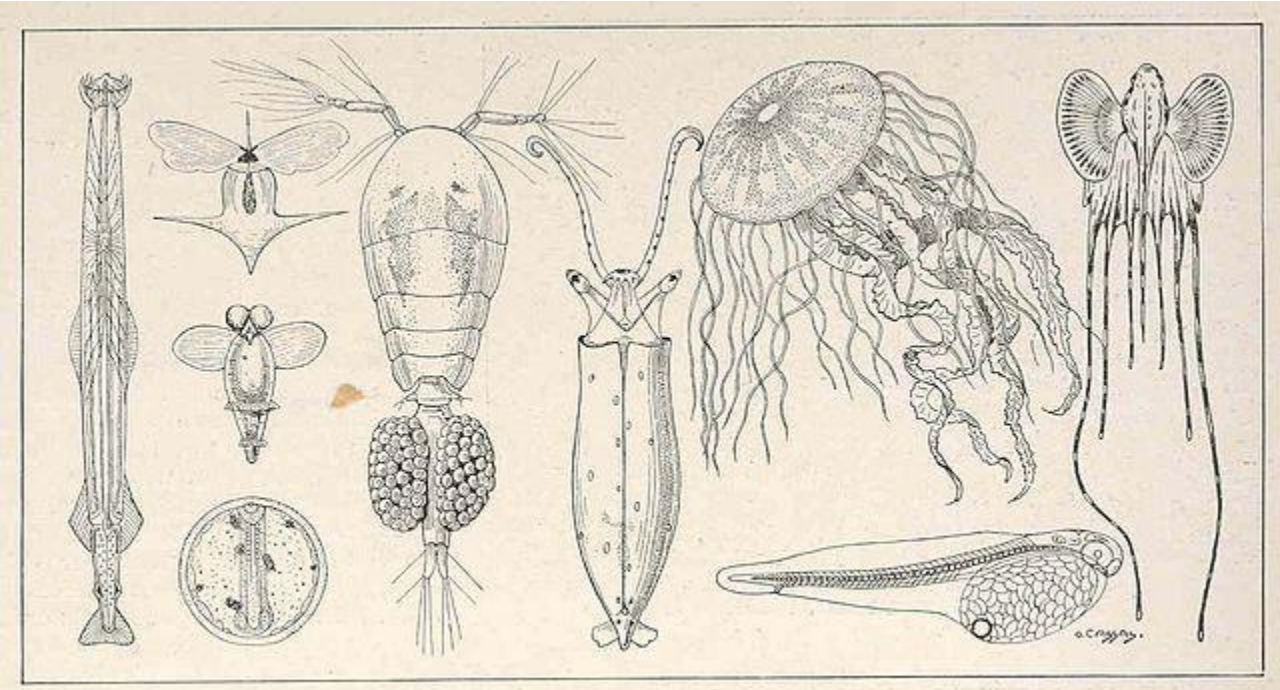


FIG. 120. – Quelques éléments du ZOOPLANKTON, ou plankton composé d'organismes animaux.

# Oysters

Oysters are found attached to hard surfaces in fairly shallow water. They prefer to live in brackish (slightly salty) water. Baby oysters can swim and are found in the plankton. Baby oysters attach to older oyster shells using very strong cement. Oysters stay tightly closed at low tide to prevent the animal from drying out. Oyster shells can have very sharp edges.

**What do I eat?** Phytoplankton, zooplankton, decomposers
**What eats me?** Some snails, humans, blue crabs

# Clams

Clams usually bury themselves in the mud or sand. The inside of the hard clam shell has a section that is purple in color. Native Americans used this purple shell as wampum, which was their money. Clams prefer brackish (slightly salty) and salty water.

**What do I eat?** Phytoplankton, zooplankton, decomposers
**Who eats me?** Blue crabs, stingrays, snails, humans

Hard clam showing the purple that has been used as wampum.

# Blue crab

The scientific name of the blue crab means "Beautiful swimmer." The two back legs are flattened into paddles. This lets the blue crab swim quite well. The blue crab has strong pincers! Baby blue crabs live in the plankton and do not look at all like crabs. As blue crabs get bigger, they have to get rid of their old shell and grow a new one. Blue crabs are very common in salt marshes.

**What do I eat?** Oysters, clams, snails, algae
**What eats me?** Red drum, catfish, humans

# Fiddler crab

Male and female (boy and girl) fiddler crabs look different from each other. The male has one very large claw and one small one. The female has two small claws. The male waves his large claw in the air to attract the female crab. Fiddler crabs live in burrows that they dig in the mud and sand. At high tide, the crabs stay in the burrows. At low tide, they dig out of the burrows and crawl out onto the mud and sand. Fiddler crabs eat detritus [dee-tr-I-tuss]. Detritus is small pieces of plant and animal material. They scoop a ball of sand into their mouths and remove the detritus. They then spit out the clean sand. You can tell when a fiddler crab has been eating by the pile of tiny sandballs!

**What do I eat?** Bits of algae, worms, decomposers
**What eats me?** Red drum, shore birds, stingrays

Male (top) and female (bottom) fiddler crabs.

# Shore birds

Common shore birds in the estuary include great blue herons and egrets. People used to hunt the great egret for its white feathers. The feathers were used to decorate ladies' hats. These birds wade in the water. Their long legs and necks allow them to find small food among the marsh grasses. Shore birds often nest in large groups in trees. These groups of nests are called rookeries.

**What do I eat?** Shrimp, small fish, worms
**What eats me?** Shore birds may be hunted by bobcats and domestic cats

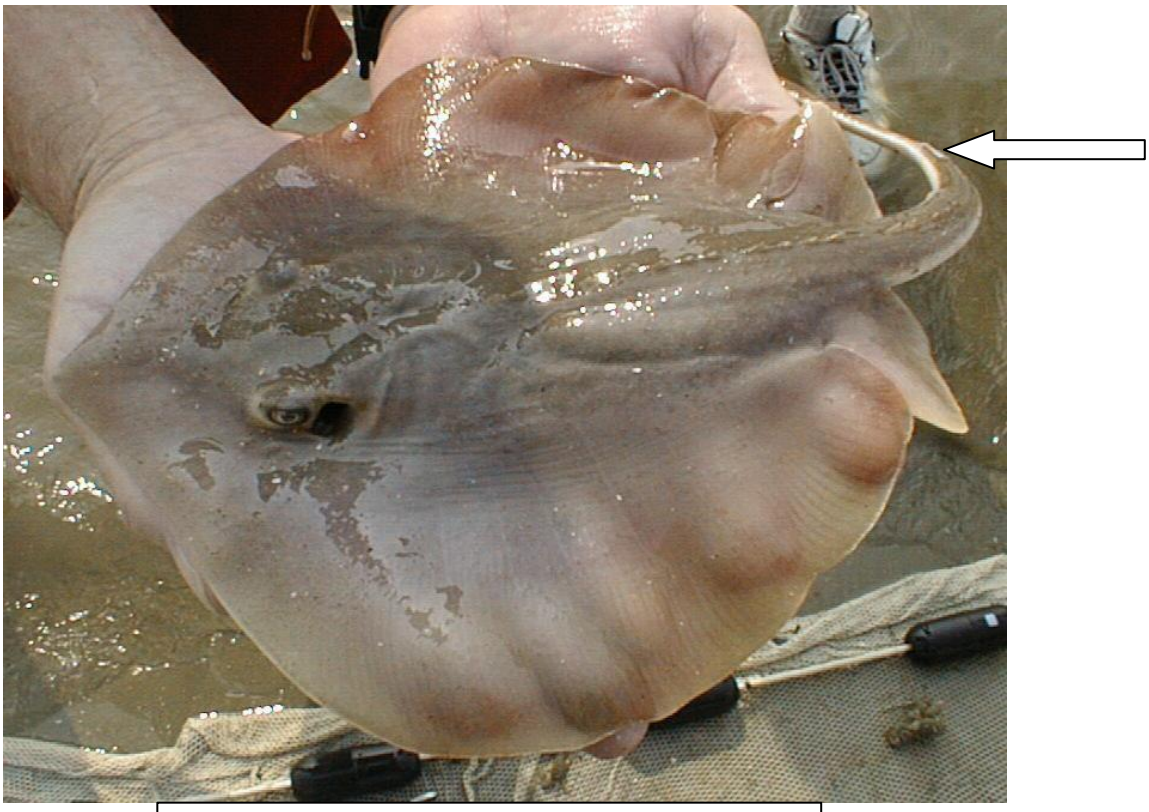
A great egret.

# Stingray

Stingrays are a type of fish. Unlike most fish, they do not have bones. Instead, their skeleton is made of cartilage. This is the same stuff that is in our nose and ears. Stingrays have a sharp barb near the base of their tails. They can make this barb stick up. There is a sack of poison at the base of the barb. If someone steps on a stingray's tail, they can get the barb stuck in their foot. This is very painful! The poison can make the wound keep hurting for a long time. Stingrays bury themselves in the sand or mud. People should shuffle their feet when walking in the sand or mud. This will make the stingrays move and will prevent someone from stepping on the stingray's tail.

**What do I eat?** Snails, blue crabs, clams

**Who eats me?** Shore birds, humans

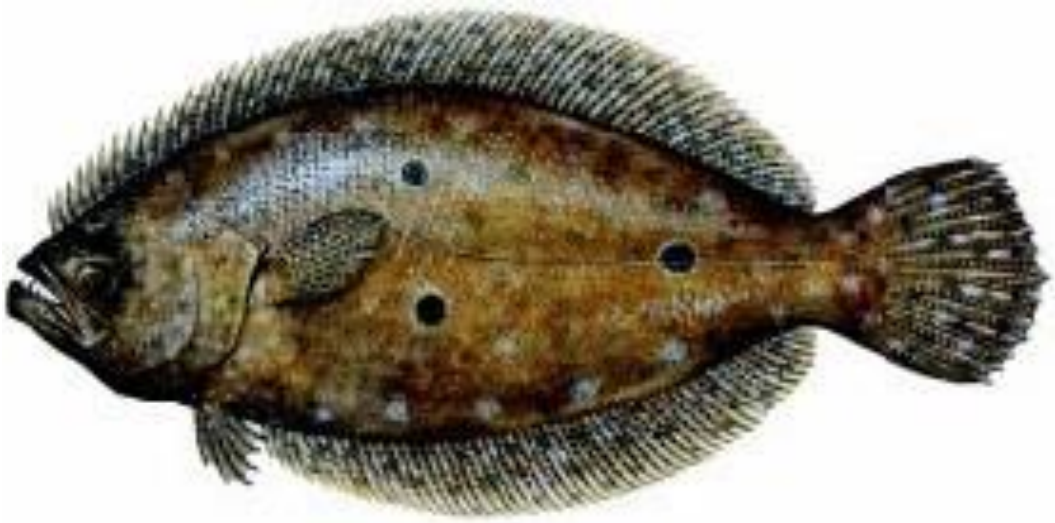


Can you see the barb on the stingray's tail?

# Flounder

The flounder is a type of flatfish. When it is a baby, the flounder looks like any other fish. As it grows larger, the flounder settles on the bottom of the ocean. It lies on one side, and the eye on that side moves around to the other side. Some flounders are left-eyed and some are right-eyed. Left-eyed flounders have both eyes on the left side of their head. Young flounders often live in estuaries for the first years of their lives.

**What do I eat?** Shrimp, fish
**What eats me?** Humans, shore birds



# Catfish

There are two types of catfish that live in estuaries. These are the hardhead and sailfin catfish. Like other catfish, they have spines in some of their fins. People who catch a catfish when fishing have to handle it very carefully! Catfish do not have scales. They have whiskers called barbels [bar-buhls] under their chins. They use these barbels to find food in the mud.

**What do I eat?** Algae, worms, shrimp, blue crabs

**What eats me?** Osprey, humans, shore birds


Can you see the barbels under the catfish's chin?

# Bottlenose Dolphin

Bottlenose dolphins can live in the ocean and the estuary. Sometimes people call them porpoises, but they are actually dolphins. Bottlenose dolphins are marine mammals. They breathe through a single blowhole on the top of their heads. This is basically their nostril. Dolphins have good vision, but they use echolocation [eh-koh-loh-kay-shun] to find their food. They send out a sound wave through their melon (forehead). When the sound hits an object (like a fish), it bounces back. The sound passes through the dolphin's lower jaw to its ear. Dolphins will sometimes work together to herd fish into a small area so they can catch them.

**What do I eat?** Fish
**What eats me?** Humans eat dolphins in some parts of the world.

# Red drum (redfish)

The red drum is one of Florida's most popular sport fish. It is also called redfish, channel bass, spottail bass or red bass. The red drum is easily identified by the eyespot on the tail. Their common name describes both their reddish color and the "drumming" sound that the fish can make. Red drum spend about their first 3-6 years in estuaries. Many people like to catch and eat red drum.

**What do I eat?** Crabs, shrimp, small fish, snails
**What eats me?** Humans, shore birds, osprey, bottlenose dolphin

# Osprey

Ospreys are sometimes called "fish hawks." They search for fish by flying and hovering over the water, watching the surface below. When it sees its prey, an Osprey dives steeply with its claws stretched out. It splashes into the water and tries to grab its prey with its claws. If it succeeds, it flies off with the fish clutched in its feet. It will rotate the fish so that the head points forward. Ospreys build large nests on top of trees, poles or other tall objects.

**What do I eat?** Fish
**What eats me?** Ospreys have few natural predators.

# Humans

Humans use the estuary for many reasons. Some people like to fish, others canoe or kayak. Some people like to watch for birds or other wildlife. Sometimes the things that we do are harmful to the estuary. When we put chemicals or drop trash on the ground, those things can wash into the estuary.

**What do I eat?** Red drum, blue crab, stingray, bottlenose dolphin, flounder, clams, oysters, shrimp, snails

**What eats me?** Humans are at the top of the food chain

# Decomposers

Bacteria and fungi [fun-guy] play a very important role in food webs. They are decomposers [dee-com-poze-uhrs]. This means that they take dead plant and animal matter and break it apart. They turn the plant and animal tissue back into nutrients. These nutrients can then be used by other plants and animals in the environment.

**What do I eat?** Everything!
**What eats me?** Clams, oysters, some zooplankton, snails, fiddler crabs

Mold is a fungus that decomposes food items.