BAILEY-MATTHEWS NATIONAL SHELL MUSEUM

Food Web War!

Bailey-Matthews National Shell Museum is dedicated to shells and the animals that make them: the mollusks. Mollusca is the second largest phylum of invertebrates, just behind Arthropoda (insects, crustaceans, etc.). There are more than 80,000 described species of mollusks, including snails, slugs, squids, octopuses, clams and mussels. This phylum plays an important role in the food web, which describes the connections among species within an ecosystem.

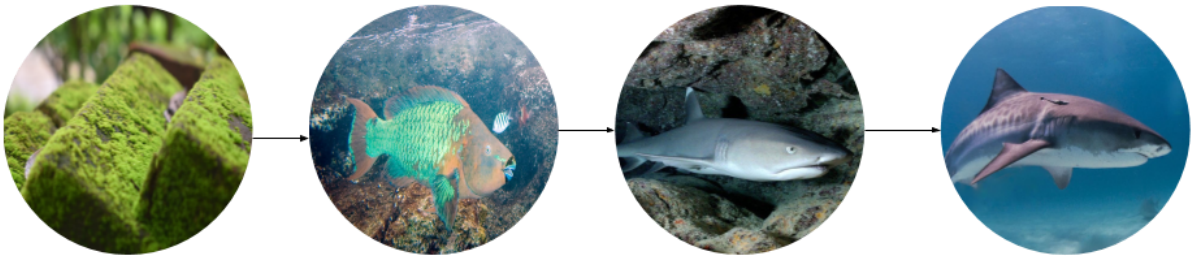
Here is a fun and simple activity you can do at home to help introduce your children/students to food chains and food webs. If you like the card game “War,” this will be a fun activity for you!

Preparation:
Read over all the given materials.
Print and cut out five copies of the producer and consumer cards. (pg. 5) Extra copies may be needed for more than two players.

Introductory material:
All animals found in an ecosystem are connected through food chains. For example, a fish feeds on algae and a shark feeds on the fish. The shark, fish and algae are all part of a food chain.

As we build the food chains we can start to identify the different trophic levels, which describe how energy moves through the food chains.

Figure 1



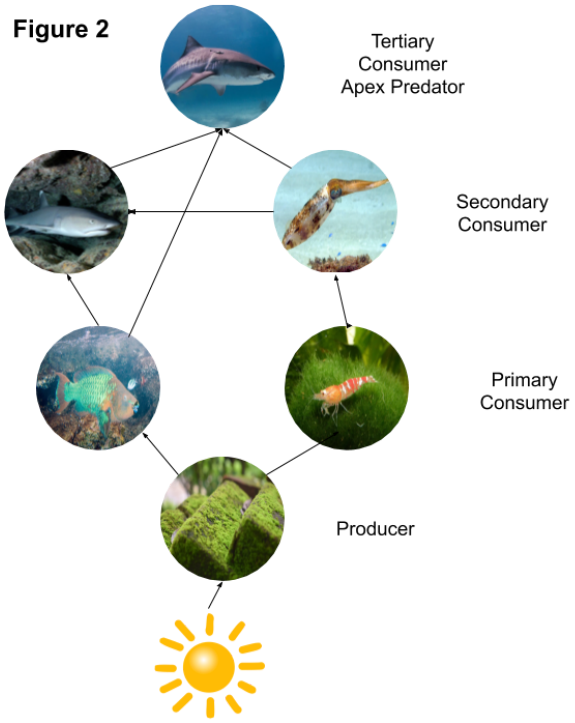
Use Figure 1 for the next three paragraphs. The first trophic level are the producers, which will use sunlight to produce their own energy through a process called photosynthesis. Algae and plants are producers.

After producers, we have consumers, animals that must feed since they are unable to produce their own food. There are three levels of consumers.

The first level is the primary consumers—these are the herbivores, the animals that feed on the producers. The fish in our example is a primary consumer as it feeds directly on a producer. Next is the secondary consumers, which feed on the primary consumer. The shark is the secondary consumer. The top level is the tertiary consumer, which feeds on the secondary consumers. In our example, a larger shark eats a small shark. These tertiary consumers can also be considered apex predators, as they are at the top of the food chain.

Since more than one animal will feed on the fish or the algae, they can be included in many different food chains. When we put together these different food chains, we create a food web (Figure 2).

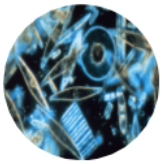
Figure 2



This chart introduces the producers and consumers that will be used in our food web game!

Producers & Consumers

Algae- Producer
Uses sunlight to photosynthesize



Phytoplankton- Producer
Uses sunlight to photosynthesize

Florida Fighting Conch- Herbivore
Feeds on algae

Oyster- Omnivores
Plankton- phytoplankton and zooplankton

Shrimp- Omnivores
Plankton, algae, small fish, and detritus (dead organic matter)

Crabs- Omnivores
eats algae, molluscs,worms, other crustaceans

Squid- Carnivores
fish, crustaceans (like shrimp), crabs and even other squids

Sperm Whale- Carnivore
Giant squid, octopus, fish, shrimp, crab and even small bottom-living sharks

Instructions

Ask:

Using the information from the chart above, ask your student/children to create a food web (starting with the sun) to use as a cheat sheet for the first couple of rounds of the game. (See pg. 4 for answers.) You can give an example of an animal, and ask who eats it, or what it eats, drawing arrows from the prey to the predator.

Have them Identify:

- herbivores, omnivores, carnivores,
- trophic levels: producers, primary, secondary and tertiary consumers
- apex predator

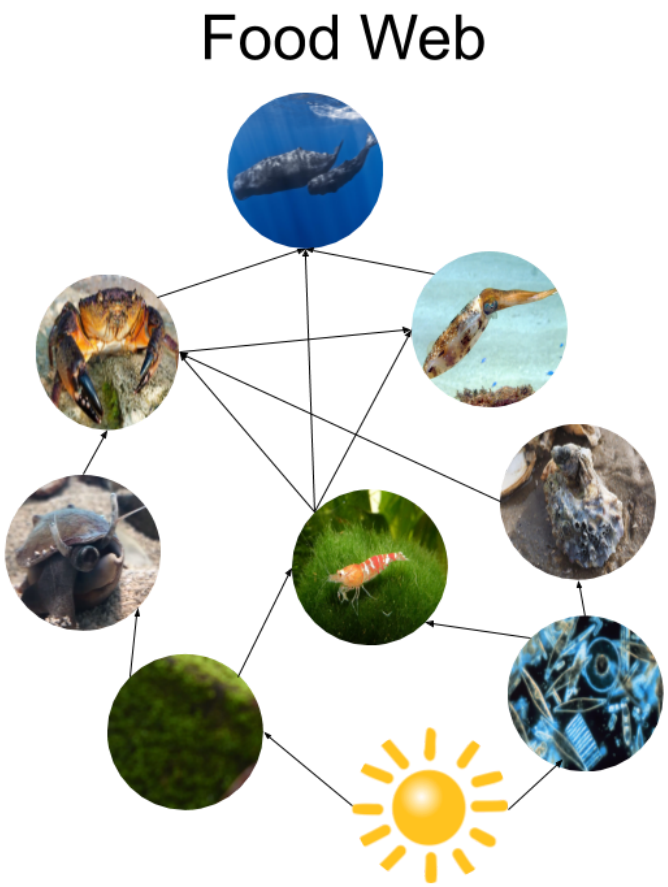
Rules:

- Deal an equal amount of cards to each player.
- Each player places their stack of cards face down in front of them.
- Each player turns up a card at the same time. The winner of the round is the animal that feeds on the other animal.
    - If neither animal feeds on the other, the round is a draw.
    - If playing with more than two players, the highest consumer wins the round.
    - This works the same way as the card game “War.”
- Player with the most cards wins the game.

While playing the game ask your students questions such as:

- What trophic level does the winning organism belong in?
- Is the winning organism an herbivore, omnivore, or carnivore?
- Was there an apex predator played in this round?

Answers Chart:



Animal Diets:

Algae- Producer
Uses sunlight to photosynthesize

Phytoplankton- Producer
Uses sunlight to photosynthesize

Florida Fighting Conch- Herbivore
Primary Consumer

Oysters- Omnivores
Primary Consumer

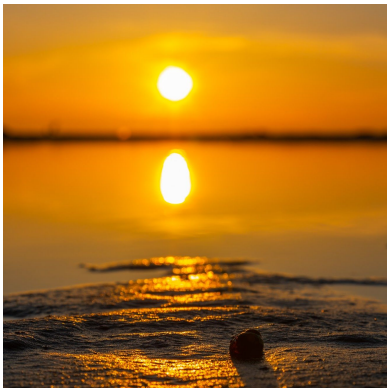
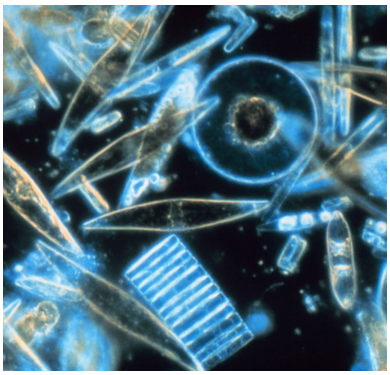
Shrimp- Omnivores
Primary or Secondary Consumer

Crabs- Omnivores
Primary or Secondary Consumer

Squid- carnivores
Secondary Consumer

Sperm Whale- Carnivore
Apex Predator
Tertiary Consumer

Producer and Consumer Cards

 **Sun**	 **Algae**	 **Florida Fighting Conch**
 **Crab**	 **Squid**	 **Sperm Whale**
 **Shimp**	 **Phytoplankton**	 **Oyster**

Conservation Messaging:
Once your child has an understanding of food chains and food webs, present them with the idea of what might happen if one species is removed from the food web.

Since all living things in an ecosystem are connected, if one species is removed, this can put more pressure on the rest of the food web. After enough time, if more food sources are lost from an ecosystem, this can cause collapse of the food web. The mollusks in the food web we explored today, the oysters, squids and florida fighting conch, and not only an important food source, but also all play an important ecological role in their natural habitat.

Oysters are not only a food source for crabs but also stingray and even humans. Oysters play such an important role in their ecosystem that they are often considered a keystone species—a species that can have a large effect if removed. Oysters provide habitats for animals as well as a hard surface for barnacles, mussels, and anemones to live on. They also offer protection to various animals looking to lay their eggs. Besides creating an ideal habitat for many different animals in various stages of their life, oysters play an important role of keeping the water clean. An adult oyster can filter up to 50 gallons of water per day.

Squid are also an important food source for many different animals—from other squid to humans. They are very active predators with large appetites, feeding on large amounts of prey. Their diets can vary depending on where they are found, which helps to maintain a healthy ecosystem.

Florida fighting conchs are preyed upon by many different animals, but as herbivores, the role they play in their ecosystem is sometimes overlooked. Herbivores in any ecosystem can help maintain diversity by keeping vegetation in check, allowing a wider variety of plants, and in some habitats, corals, to grow.

Ask your children/students what threats food webs are facing.

- Overfishing
- Global climate change
- Habitat destruction/loss
- Pollution

Have them add humans to their food web. Ask them: if the food web in the oceans collapsed, would it affect our food web?

Ask your children/students what we might be able to do to ensure our food webs don't collapse.

- Choosing sustainable food
- Reducing our carbon footprints
- Protecting our habitats
- Reducing our waste

Additional Resources:

Bailey Matthews National Shell Museum Shell Guide
www.shellmuseum.org/shell-guide

Food Chain | Biology FuseSchool
www.youtube.com/watch?v=bvqN9H3QtTQ

Seafood Watch Guide
www.montereybayaquarium.org/act-for-the-ocean/sustainable-seafood

Book:
Williams, Lilly. *If Sharks Disappeared.* Roaring Brook Press, 2017

Vocabulary

Food Chain: A chain of links in a food web starting from producer organisms and ending at apex predator species. Each level of a food chain represents a different trophic level.

Food Web: A graphical representation of overlapping food chains that build off each other and show what eats what in an ecological community.

Trophic Levels: The sequential stages in a food chain, occupied by producers at the bottom and in turn by primary, secondary, and tertiary consumers**.**

Producer: An organism that makes its own food by gathering energy from chemicals or sunlight and converting it into sugar with the help of water. Plants are a common example of a producer.

Herbivore: An animal that feeds on plants.

Omnivore: An animal that feeds on plants and animals.

Carnivore: An animal that feeds on animals.

Predator: An animal that preys on other organisms for food. Many predators hunt and eventually kill their prey.

Apex Predator: A predator at the top of a food chain, with no natural predators. Apex predators are usually defined in terms of trophic dynamics, meaning that they occupy the highest trophic levels.

Plankton: Small plants and animals that drift along in the ocean currents. There are two types of plankton: tiny plants called phytoplankton, and weak-swimming animals called zooplankton.

Mollusks: Large phylum of invertebrates that includes gastropods (snails and slugs), bivalves (clams, mussels, scallops, and oysters), cephalopods (squid and octopuses), and five other classes. They have a soft, unsegmented body and most have an external calcareous shell.

Ecosystem: A community of living organisms in conjunction with the nonliving components of their environment.

Keystone Species: A species on which other species in an ecosystem largely depend, such that if it were removed, the ecosystem would change drastically.