

Food Web Activity: Investigating an Important Link



Background Information:

(for definitions of **highlighted** terms, see Glossary at the end of this handout)

People depend on healthy ecosystems for food, recreation, and jobs. Restoring the health of ecosystems is a goal of local, state and national agencies such as the U. S. Fish and Wildlife Service (USFWS).

Wildlife biologists who work for these organizations work towards this goal by studying interactions within ecosystems and making a plan for maintaining and/or creating balance within them. When biologists identify an organism that is declining in number, they must study that organism in order to develop a plan to help restore its numbers. One important thing that they study is what an organism eats, or its diet.

In this activity, you will play the role of a fisheries biologist as you investigate the interactions of fish and other organisms in an ecosystem within the Chesapeake Bay region. You will determine which fish species forms an important “link” between **first order** and **higher order consumers** in this ecosystem and then decide what actions (if any) need to be carried out in order to restore their numbers.

Similar to the field guides and other resources that fisheries biologists use, you will use a set of Food Web cards to identify and gather information about the diets of the various species in this ecosystem.

Study Area

Your study area covers the ecosystem of the **estuary** within the lower Chesapeake Bay region. The coastal rivers and estuarine environments of the Chesapeake Bay are home to diverse organisms. Producers and consumers in these environments form an interconnected food web where a change in the number of one species (producer or consumer) can have an impact on other species. Species numbers can be affected by changes in habitat, predation, harvesting, and disease.

As a fisheries biologist, you will investigate an ecosystem within this study area.

Directions:

Part 1:

1. Cut out the food web cards
2. Carefully read each card and make note of each organism’s diet. From this information arrange the cards in a manner that represents the feeding relationships within the ecosystem.

3. Place your cards on a large sheet such as newsprint or poster board. Attach the cards to the large sheet with a very small piece of tape as you may later decide to change your arrangement based upon discussion with your classmates.
4. With a pencil, draw in arrows from each organism to the organism that eats it.
5. Write each group member's name on the large sheet.
6. When your group is done with their food web arrangement, pick another group that has finished their food web. Compare how the other groups' food web arrangement is similar to, or different from, that created by your group. Record your observations in the chart below.

Similarities between Webs	Differences between Webs	Explanation for Differences

7. Participate in a class discussion to identify and record an explanation for any differences between food web arrangements. As a class, come to a consensus concerning the best arrangement of organisms in the web.
8. Rearrange your group's food web to correspond with that decided upon by the whole class. Tape or glue your cards to your large sheet and redraw any arrows if necessary. Fill in the proper flow of energy between organisms with a marker.
9. Using your food web, answer the following questions:
 - (a) Which organisms are **producers**?
 - (b) Which organisms are **first order consumers**?
 - (c) Which organisms are **second order consumers**?
 - (d) Which organisms are **third order consumers**?
10. Which organism provides an important link in the food web between the **plankton** organisms and the higher order consumers such as fishes and mammals? Use your food web and other data to justify your answer.

Part 2:

11. Read about the fisheries biologist and the American shad.
12. From the readings and the information you learned from your study of the food web, answer the following questions:
 - (a) What are the three reasons that American shad numbers declined?
 - (b) Which two fishes have also been affected by the decline of American shad?
 - (c) List the two ways that scientists recommend removing the blockages to fish migration in rivers caused by dams to help restore American shad.
13. Using the answers from question #12, decide which of these actions holds the best promise of restoring this organism in the near shore environment. Then create a poster (8-1/2" X 11") that shows the benefits of this action. Summarize the importance of the relationship between people and nature or between producers and consumers. Be creative and informative.
14. Optional: How can increasing the numbers of this organism impact the food supply for humans?

Glossary of Terms:

Consumer: an organism that eats producers or other lower order consumers.

First or Second Order Consumer: a first order consumer eats producers. An organism which feeds on a first order consumer is called a second order consumer.

Estuary: a body of water formed where freshwater from rivers and streams flows into the ocean, mixing with the seawater.

Food chain: consists of a series of animals that eat plants and other animals.

Food Web: a network of interrelated food chains in a given area. An example of a food chain is: producer, first order consumer, second order consumer, third order consumer.

Plankton: animal and plant life that is usually microscopic and floats or drifts in salt or fresh water. Plankton include single-celled algae and tiny crustaceans such as copepods.

Producer: usually a plant or plant-like organism such as a diatom, that produces its' own food.

Follow Up Activities:

- Visit the Blackwater National Wildlife Refuge (<http://www.friendsofblackwater.org/>) or the Norfolk Botanical Gardens Eagle Cam (www.norfolkbotanicalgarden.org/e-community/eagle-cam) and observe bald eagles in their natural habitat. The “eagle cam” provides fascinating real-time images of eagles and their prey. You will be able to actually observe the eagles as they bring live shad to their offspring.
- Go fishing! While fishing in the coastal plain, see if you can identify species of fish described in your food web.
- Plant a shad bush (*Amelanchier* spp.) in your yard or neighborhood. This bush blooms when shad return to lay their eggs in rivers.