

The *Nature* of Teaching

• UNIT 2 •

Mammal Food Webs

Food webs are useful for describing how living organisms are interconnected within the environment.



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Unit 2 • Overview

Estimated Time

Three 30-minute lessons and a 50-minute lesson

Vocabulary

- Producer
- Consumer
- Carnivore
- Herbivore
- Omnivore
- Trophic level

Unit Objectives

Students will be able to:

- Understand that organisms have different feeding habits.
- List the different trophic levels within a food web.
- Recognize how organisms are inter-connected within the environment.
- Explain how energy flows from one organism to another within a food web.

Targeted Grade-Level Indiana Standards

K–5 Science Standards

1.1.1; 1.4.2; 1.4.3; 1.4.4

2.1.5; 2.4.1; 2.4.3

3.1.2; 3.1.3; 3.1.4; 3.4.1; 3.4.4

4.4.3; 4.4.4

5.4.5

Reference Materials

- *Natural History of Indiana Mammals* (FNR-413) by Robert N. Chapman and Rod N. Williams
- *Be a Tooth Sleuth* poster (FNR-408) by Rod N. Williams and Robert N. Chapman

Required Materials

- Red and green yarn
- Scissors
- Skulls (mink, muskrat, raccoon)
- Skins (gray fox and skunk)
- Owl pellet kit: owl pellets, bone chart, wooden probe, skeleton chart, student activity sheet
- *Owl Food Web* poster from Acorn Naturalists
- *Be a Tooth Sleuth* poster (FNR-408) by Rod N. Williams and Robert N. Chapman
- *Natural History of Indiana Mammals* (FNR-413) by Robert N. Chapman and Rod N. Williams

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Lesson 1:

Be a Tooth Sleuth

This activity provides students with definitions and explanations of mammal feeding habits.

Estimated Time ▶ 30 minutes

Required Materials

- *Be a Tooth Sleuth* poster (FNR-408) by Rod N. Williams and Robert N. Chapman
- Skulls
- Notebook paper
- Pen or pencil



Procedure

1. Display the *Be a Tooth Sleuth* poster in the classroom.
2. Explain to the students that their *mission* is to determine what a mammal eats by looking only at teeth. Their *mission objective* is to determine which mammals are carnivores, omnivores, and herbivores. Explain what the students need to know to solve this mystery by pointing out and defining the four types of teeth on the colored skull diagram and the three types of feeding habits used by mammals. Explain that most mammals have premolars and molars, but these teeth have different shapes that can help identify food habit. Plants are hard to digest, so the cheek teeth of herbivores are flat with grinding surfaces that contain numerous folds. Meat is easy to digest, so the cheek teeth of carnivores have high, sharp ridges to shear food into pieces that are big enough to swallow. Omnivores typically have both grinding and shearing surfaces on their cheek teeth, since they eat both plants and animals.
3. Divide the class into groups and provide each group with a *Be a Tooth Sleuth* poster. Ask students to complete the mission by reading the *clues* for each species and classifying it as a carnivore, omnivore, or herbivore. Have the students write their answers on blank sheets of paper. Have students grade their own papers as the teacher reads through the clues and reveals the answers (which are given on the bottom of the poster).
4. After the groups have completed the poster exercise, provide each group with a skull. Have the students write on their papers the types of teeth found in the skull and the food habit of the mammal.
5. Explain to the class that this activity will help them understand that different animals can have the same type of teeth, but the shape of those teeth can result in different feeding habits.

Lesson 2:

Poster Exploration of Food Webs

Estimated Time ▶ 30 minutes

Required Materials

Owl Food Web poster from Acorn Naturalists

This activity will help students understand the various trophic levels within a food web.

Procedure

1. Introduce the terms “producer” and “consumer” by asking students what they had for dinner. Write the responses down, making sure to list the individual ingredients for each food (e.g., hamburgers: beef, tomato, lettuce, pickle, bread).
2. Ask the students which ingredients came from plants and which did not come from plants. Categorize the ingredients into producers (tomato, lettuce, pickle, and bread) and consumers (beef).
3. Introduce the formal definitions for producers (organisms that make their own food via photosynthesis) and consumers (organisms that eat producers or other consumers for food). You can further explain the various levels of consumers. Primary consumers are organisms that feed upon plants. Secondary consumers feed upon primary consumers. Tertiary consumers feed upon both primary and secondary consumers, and so forth. It is also important to mention that the sun and “detritivores” (decomposers) are needed for food webs to function (provide energy needed for producers to exist).
4. Display the Owl Food Web poster in the classroom.
5. Have the students list organisms on the poster that are producers (all plants), primary consumers (insects and rodents), secondary consumers (mole, shrew, amphibian, bird), tertiary consumers (mink), and quaternary consumer (barn owl).
6. Explain that energy flows up the food web from producers to consumers as one organism eats another to survive.



Lesson 3:

Student Investigations of Food Webs

This activity will introduce students to the creation and interpretation of food webs.

Estimated Time ▶ 30 minutes

Required Materials

- Red and green yarn
- Scissors
- Raccoon skull
- Mink skull
- Muskrat skull
- Gray fox skin
- Skunk skin
- Classroom potted plant (or hand drawing of plant)
- *Natural History of Indiana Mammals* (FNR-413) by Robert N. Chapman and Rod N. Williams
White-footed mouse, bobcat, eastern cottontail, eastern chipmunk sheets

Procedure

1. Display the *Owl Food Web* poster in the classroom.
2. Have students take turns cutting several strings of yarn (both green and red) into eight-foot lengths. You'll need about 25 red strings and four green strings. Ask for 10 volunteers to serve as members of a classroom food web.
3. Ask your 10 student volunteers to each hold a skin, skull, or natural history sheet representing an animal contributing to the food web. Have them form a circle in the center of the classroom and space themselves at least 6–8 feet from one another.
4. Begin the activity by asking which animals are producers (only the student holding the plant). Next ask which animals are primary consumers (eastern chipmunk, white-footed mouse, eastern cottontail, and muskrat) and have each of those students stretch a green string of yarn from themselves to the student representing a producer. Finally, ask the students which animals are secondary consumers (bobcat, raccoon, gray fox, skunk, and mink) and have each of those students stretch a red string of yarn to the prey they eat. For example, the mink will have a red string stretching to a muskrat, eastern chipmunk, eastern cottontail, and white-footed mouse.
5. Upon completion, the students should have created a complex, interwoven food web linking producers to consumers.
6. Ask students to predict the impact of removing all of the plants from a certain environment (by installing a parking lot through the forest and eliminating the plants primary consumers eat). Have the student representing the plant drop all of the strings that s/he is holding. Ask the students what impact this will have on the remaining organisms within the food web (all of the primary consumers will starve). Next, have all of the students that are representing primary consumers drop their strings, since they will not have anything to eat. Again, ask the students what will happen to the top predators within this now-defunct ecosystem.
7. Explain that this activity shows how plants and animals are interconnected. By removing a few species from the environment, the whole food web can be negatively affected.

Lesson 4:

Energy Flow and Food Webs

This activity will introduce students to the concept that energy flows from one organism to another.



Estimated Time ► 50 minutes

Required Materials

- Carolina Biological Supply Owl Pellet Kit
- Owl pellets
- Wooden probes
- Bone chart
- Rat skeleton chart
- Student activity sheet
- Teacher information manual (if needed)
- Glue (optional)
- Construction paper (optional)
- *Owl Food Web* poster from Acorn Naturalists

Procedure

1. Display the *Owl Food Web* poster in the classroom.
2. Explain that the pellets students are preparing to dissect are from a quaternary consumer as depicted on the poster.
3. Read owl pellet information from the Student Activity Sheet. Reinforce to the students that the owl pellets are sterile. *Note:* owl pellets consist mostly of indigestible fur, so students with hair allergies should not participate any further.
4. You might do a teacher demonstration of owl pellet dissection (optional).
5. Follow the protocol for student dissections as described in the Student Activity Sheet provided in your kit. Make sure students wash their hands after handling owl pellets.

6. Using only the skulls found among classroom dissections, tally the different types of animals eaten. Create bar graphs and discuss why some species are eaten in larger numbers than others (higher densities, easier to find and consume, more expansive habitat, etc.).

Additional Optional Activities (advanced):

7. Have each student reconstruct a skeleton from the bones found within an owl pellet. Students can place their bones on construction paper and glue them into place. Students may trade bones with other students to complete their skeletons. Any bones that may be missing can be drawn in using a pen or pencil. Use the Rat Skeleton Chart as a guide for bone placement or drawing.
8. Students can then be evaluated on their completed skeletons.
9. To order additional owl pellets, visit the Carolina Biological Supply Web site: www.carolina.com