



WETLAND FOOD WEBS

Summary

What is the web of life? Why is it important to have diversity in an ecosystem? Through different role-playing games, students understand the relationship and importance of all forms of wetland life.

Objectives

Students will:

- know the difference between food webs and food chains
- understand the interrelationship and importance of all forms of wetland life

California Content Standards Addressed

Grade Six - *Science content 5.a*: "Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs."

Grade Six - *Science content 5.b*: "Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment."

Grade Seven - *Science investigation and experimentation 7.d*: "Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge."

Outline

There are five pieces to this lesson:

- 1) Webbing game (35 minutes)
- 2) Discussion of food webs and food chains (5 minutes)
- 3) Food chain activity (25 minutes)
- 4) Journal prompt (10 minutes)
- 5) Closing circle (5 minutes)

The Basics:

Grade Level:

6 - 8

Subject areas:

Life sciences

Duration

80 minutes

Materials:

For the webbing activity

For the teacher:

1. one set webbing activity cards (teacher's kit)
2. ball of string

For the food chain activity

1. Food Chain Game instruction pages
2. popped popcorn, sandwich baggies, masking tape, and pre-made construction paper cards for students to wear

For the journal prompt:

Teacher prep:

1. Assorted wetland wildlife cards on the tables.

For each student:

1. clipboard, pencil or colored pencils, and Journal Prompt 6 (Appendix B)

Background Material

Excerpted from "Interesting facts about food chains" by Jacobo Bulaevsky.

In an ecosystem, plants capture the sun's energy and use it to convert inorganic compounds into energy-rich organic compounds. This process of using the sun's energy to convert minerals (such as magnesium or nitrogen) in the soil into green leaves, or carrots, or strawberries, is called photosynthesis.

Photosynthesis is only the beginning of a chain of energy conversions. There are many types of animals that will eat the products of the photosynthesis process. Examples are deer eating shrub leaves, rabbits eating carrots, or worms eating grass. When these animals eat these plant products, food energy and organic compounds are transferred from the plants to the animals. These animals are in turn eaten by other animals, again transferring energy and organic compounds from one animal to another. Examples would be lions eating deer, foxes eating rabbits, or birds eating worms.

This chain of energy transferring from one species to another can continue several more times, but it eventually ends. It ends with the dead animals that are broken down and used as food or nutrition by bacteria and fungi. As these organisms, referred to as decomposers, feed from the dead animals, they break down the complex organic compounds into simple nutrients. Decomposers play a very important role in this world because they take care of breaking down (cleaning) many dead material. There are more than 100,000 different types of decomposer organisms! These simpler nutrients are returned to the soil and can be used again by the plants. The energy transformation chain starts all over again.

Food web and food chain vocabulary:

Producers. Organisms, such as plants, that produce their own food are called **autotrophs**. The autotrophs, as mentioned before, convert inorganic compounds into organic compounds. They are called producers because all of the species of the ecosystem depend on them.

Consumers. All the organisms that can not make their own food (and need producers) are called **heterotrophs**. In an ecosystem heterotrophs are called consumers because they depend on others. They obtain food by eating other organisms. There are different levels of consumers. Those that feed directly from producers, i.e. organisms that eat plant or plant products are called primary consumers.

Organisms that feed on primary consumers are called **secondary consumers**. Those who feed on secondary consumers are **tertiary consumers**.

Consumers are also classified depending on what they eat:

Herbivores are those that eat only plants or plant products. Examples are grasshoppers, mice, rabbits, deer, beavers, moose, cows, sheep, goats, and groundhogs.

Carnivores, on the other hand, are those that eat only other animals. Examples of carnivores are foxes, frogs, snakes, hawks, and spiders.

Omnivores are the last type and eat both plants (acting as primary consumers) and meat (acting as secondary or tertiary consumers). Examples of omnivores are:

Bears --They eat insects, fish, moose, elk, deer, sheep as well as honey, grass, and sedges.

Turtles -- They eat snails, crayfish, crickets, earthworms, but also lettuce, small plants, and algae.

Monkeys -- They eat frogs and lizards as well as fruits, flowers, and leaves.

Squirrels -- They eat insects, moths, bird eggs and nestling birds and also seeds, fruits, acorns, and nuts.

Trophic Level. The last word that is worth mentioning in this section is trophic level, which corresponds to the different levels or steps in the food chain. In other words, the producers, the consumers, and the decomposers are the main trophic levels.

Food Webs. The concept of food chains may seem simple, but in reality it is more complex. Think about it. How many different animals eat grass? How many different foods does the hawk eat? One doesn't find simple independent food chains in an ecosystem, but many interdependent and complex food chains that look more like a web and are therefore called food webs.

Procedure

1) Webbing game (35 minutes) Depending on the size of your group and your needs, there are three ways to play this game, the grasslands version or the wetlands version, or the full version. Each version has mandatory cards:

Grasslands game mandatory cards:

Sun, soil, California oat grass, California blackberry, wild rose, or other flower producing fruit, grasshopper, song sparrow, coyote, deer mouse, American kestrel, red-tailed hawk, mosquito, barn swallow, turkey vulture, decomposers, and people.

Wetlands game mandatory cards:

Sun, water, duckweed, algae, tree frog, spider, mallard, fish, great blue heron, raccoon, mosquito, decomposers, and people.

Full version mandatory cards:

Combine the grasslands and wetlands version cards.

- Tell students that they are going to play a game. Pass out one webbing game to each student and instruct him/her to wear the cards around their necks.
- Students stand in a circle. Each is given a name card identifying him/her as part of a wetland habitat.
- The teacher takes a ball of string and hands it to the student who has drawn the 'sun' card. The sun asks, "Who depends on me"? One student who answers is handed the string (the 'sun' still keeps hold of the end of the string). The teacher repeats the question over and over, and the string is unfurled in one continuous strand. Eventually all the players are connected or reconnected in a giant food web.
- Discuss how each connection relies on previous and subsequent connections.
- Now ask one student to sit down but to keep holding the string. (Perhaps a fish has been affected by pollution or the ducks have flown off after being disturbed.) When other students feel the string pull, they also sit down. Discuss what happens to the web of life once the connections have been broken.

2) Discussion of food webs and food chains (5 minutes)

- Tell students that they have just created a wetland food web. Ask why they think it is called a web.

- Tell students that every food web has at least 3 plants or animals. First, there is the plant that MAKES the food: the producer. Then there is the animal that EATS the food: the consumer. Finally, there is the RECYCLING organism: the decomposer.
- Tell students that one part of a food web is called a food chain. Give an example of a food chain based on your food web game. Ask students to give an example of their own from the food web game.
- Segue into the food chain game by talking about a food chain consisting of seeds - grasshopper - tree frog - hawk.

3) Wetland Food-Chain Game (25 minutes)

- Ask students if they are ready to go hunting?
- Invite students outside to play a game about wetland food chains.
- Please follow instructions on [Food Chain Game](#) instruction pages.

4) Journal Prompt (10 minutes)

- Give each student his or her science notebook, clipboard, and pencil or colored pencils.

Extensions

1. There is an interactive computer game at www.gould.edu.au/foodwebs/kids_web.htm where students can build food webs based on other ecosystems: an Australian grasslands, an African grasslands, an Antarctic food web, and a marine ecosystem. This is a great way to model the variety of food webs that exist.
2. Outdoor ESHA Watsonville Wetland Food Web.
You'll need, for each student, a clipboard, one copy of the [Food Web Scavenger Hunt](#), a pencil, colored pencils, a pair of binoculars, and a hand lens (to look for decomposers). Teachers and docents can carry bird and plant field guides to help students. Take students into the ESHA and ask them observe the plant and animal life and then draw their own Watsonville Wetlands food web using the [Wetland Food Web](#) worksheet.

Bibliography and Resources

Bulaevsky, Jacobo. Interesting facts about food chains. September 14, 2007. Available from www.arcytech.org/java/population/facts_foodchain.html.

Schwartz, Linda. 1990. Earth Book for Kids. The Learning Works, Inc.

Food-Chain Game

This game from OBIS (*Outdoor Biology Instructional Strategies*) provides a fun, fast-moving outdoor game designed to teach about food chains and the balance of nature. The goal for each player is to survive as an "animal" by getting enough to eat while avoiding being eaten.

To play this game, you will need 4–5 liters of popcorn, chart paper, marking pens, plastic sandwich bags, masking tape, and 5-inch (12.5-cm) square construction-paper cards in red and green. Have enough of each color for about two-thirds of your students. The sandwich bags will become "stomach bags." Place a strip of masking tape across each sandwich bag so that the bottom edge of the tape is 1/2 inch (1.25 cm) from the bottom.

Choose a site approximately 50 feet (15 m) square. (You can change this to make the game easier or more challenging.) Ask students if they know what eats mice and what mice eat. They may respond

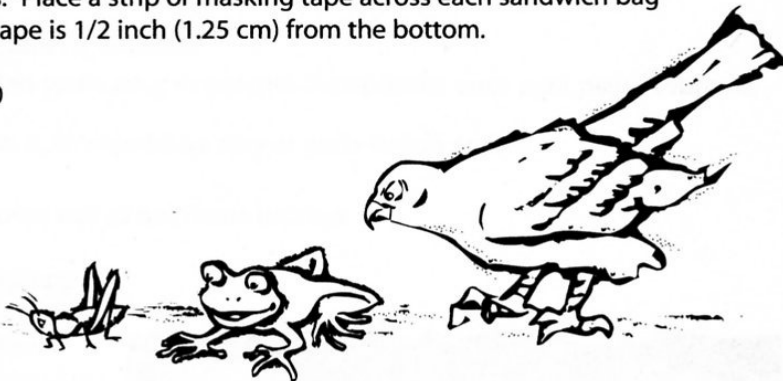
with *Mice eat seeds, and snakes*

eat mice. Then ask them what might

eat snakes. For the benefit of this game, use the

answer *hawks.* Diagram the relationship students describe, and introduce it as a food chain.

Ask students if they can think of other food chains, including one with humans.



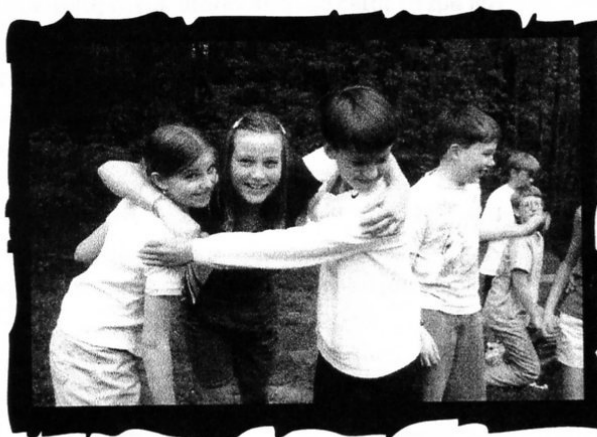
How to Play

1. Describe the play area boundaries. Then spread popcorn over the area. Tell students you are distributing the plants that grasshoppers eat.
2. Give plastic bags to one-third of your students. These students will be grasshoppers. When you say *go*, "grasshoppers" place "food" (popcorn) in their "stomachs" (bags).
3. Give bags and green cards to a second one-third of the group, and red cards to the last third. When the game starts, "frogs" (green cards) try to capture (tag) grasshoppers, and "hawks" (red cards) pursue frogs. When a frog captures a grasshopper, the grasshopper's stomach is transferred to the frog. When a hawk captures a frog, he or she takes the frog's stomach. Hawks do not eat grasshoppers in this game. Frogs and hawks must visibly carry their green and red cards, or you can attach them to students' clothing with clothespins or tape.
4. The first game usually lasts only a few seconds with one of two things happening: Grasshoppers are gobbled up before they have a chance to forage, or frogs are gobbled up, and grasshoppers continue to eat popcorn and get fat.

Following the game, lead a discussion with students. How many of each kind of animal survived? For a grasshopper to survive, popcorn must fill the stomach bag to the bottom of the tape. For a frog to survive, popcorn must fill the stomach bag to the top of the tape. Hawks must have the equivalent of one frog with sufficient food to survive. If at least one of each kind of animal survives, you have an ongoing food chain. Return the popcorn to the activity area after each game. Each round of play equals a day in the life of this food chain.

Ask students to suggest rule variations that may result in more of a balance after each playing cycle, or a day in the life of these creatures. Usually one rule is changed for each replay so students can see if it works. Students can use chart paper to record rule changes and population changes before and after each round. Tell them to remember that they are trying to end each day with at least one of each animal alive and kicking. After each game, analyze the results. How many grasshoppers got a full stomach? How many frogs? hawks?

With enough playing time and enough times at trying new starting numbers for each animal, students come to realize that an area needs many, many more things at the bottom of the food chain than at the top. Generally, based on an energy chain pyramid, you would need ten frogs for each hawk, 100 grasshoppers for each frog, and 1,000 units of grasshopper food (popcorn) for each grasshopper to survive. Please note that these numbers are only broad rules of thumb.



Some variables you could add to this game include:

- Change the number of grasshoppers and/or frogs and/or hawks.
- Let each grasshopper come back as another grasshopper once after being captured and transferring "stomach" contents.
- Provide a "safety zone" for frogs and/or grasshoppers where they can be safe.
- Schedule timed releases. Let grasshoppers go first to forage unbothered. One minute later, release the frogs, and later, the hawks.
- Spread out more popcorn.

WETLAND NOTEBOOK
WETLAND FOOD WEBS

JOURNAL ENTRY

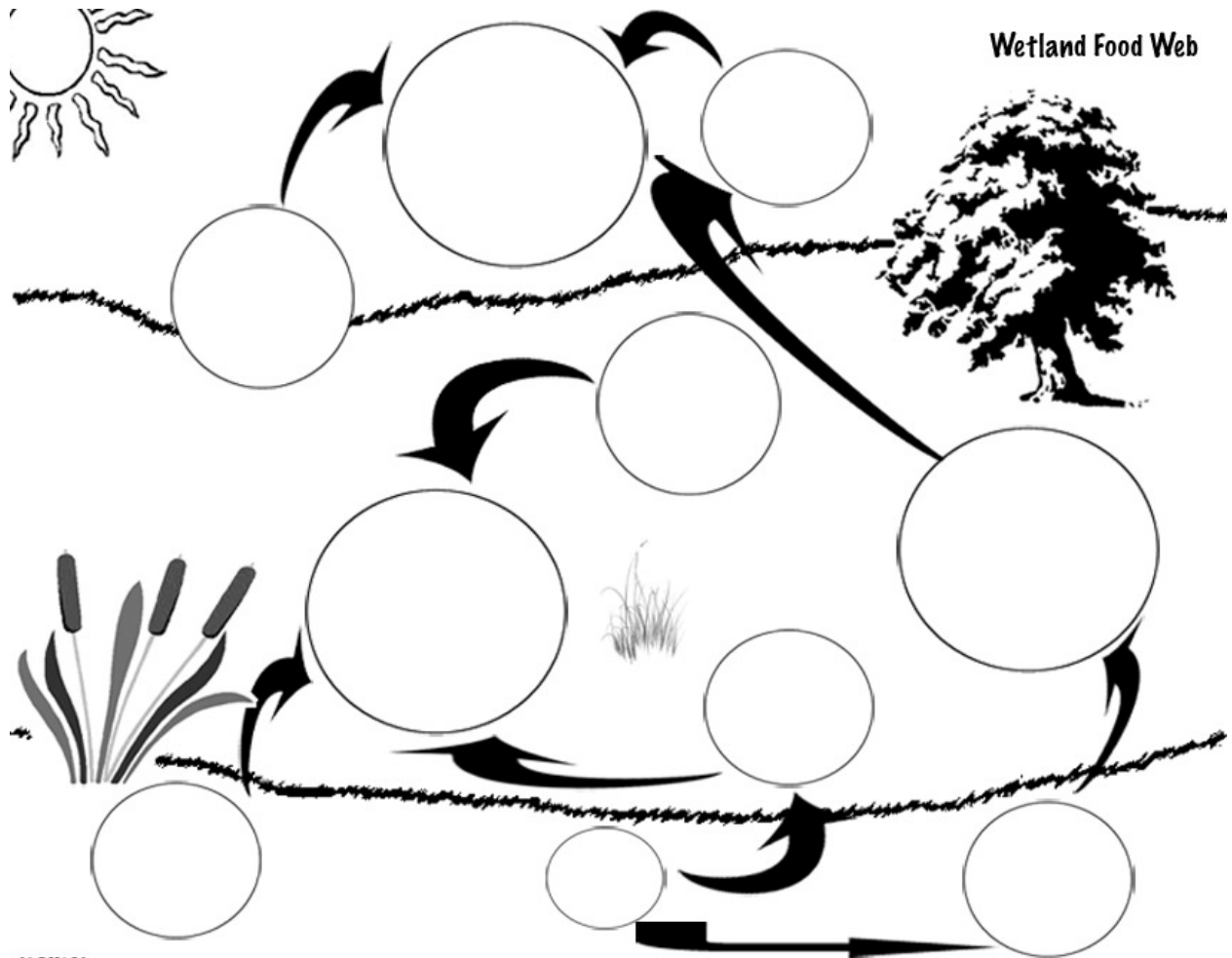
NAME _____ DATE _____

Draw your own wetland food web! Use the wetland wildlife cards on the table for ideas, and try to include some or all of the following things: Sun, Water, Duckweed, Algae, Tree frog, Spider, Mallard, Fish, Great Blue Heron, Raccoon, Mosquito, and Decomposers. Label one producer and one consumer.

WERC Watsonville Wetland Food Web

Sit outside and observe all the living things in the Wetlands - the plants, birds, and insects. Look for tracks or scat that give clues about wetland mammals. Look at the soil with your hand lens to try to find any decomposers.

Fill in the wetland food web based on your observations. Label the producers, consumers, and decomposers and name them if you can.



name: _____