



Science Unit: *Aquatic Ecosystems*

Lesson 5: *Pond Food Chains and Webs*

School year: 2006/2007

Developed for: Collingwood Neighbourhood Elementary School, Vancouver School District

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Grade level: Presented to grades K and 3; appropriate for grades K-7 with appropriate modifications.

Duration of lesson: 1 hour and 20 minutes

Notes: This lesson was adapted from *Weird Webs and Who Am I?*
www.cpawscalgary.org/education/free-resources/lessons.html#5min

Objectives

1. Learn about pond and wetland ecosystems.
2. Learn about food chains and food webs in a pond.
3. Learn about the diversity of pond flora and fauna.
4. Gain experience of the interconnections between pond animals and plants.

Background Information

All living things require energy and nutrients to live and grow. Some organisms get these from non-living things (the sun and nutrients from the air, water and/or soil) and are called producers. The most common producers are green plants, whether terrestrial or aquatic. Consumers are organisms that eat other organisms or dead organic matter. Consumers can be herbivores (plant eaters), carnivores (animal eaters), omnivores (eaters of both plants and animals) or detritivores (eaters of dead plant/animal matter). The pathway of nutrients and energy flowing from producers to herbivores to carnivores to top predators is called a food chain. There are many food chains in a single ecosystem, and all these food chains together make a food web. All living things are connected via the food web.

In a pond, like most ecosystems, all animals depend directly or indirectly on plants for their food. These plants may include phytoplankton (microscopic aquatic plants), algae, duckweed, water lilies, or cattails, to name a few. In addition to being a food source, some pond plants can also provide shelter and suitable nesting grounds. A typical pond food chain could begin with producers such as algae or phytoplankton, followed by herbivores such as zooplankton (microscopic aquatic animals) or snails or tadpoles, which feed on the algae or phytoplankton. In turn, these animals could be eaten by carnivores, such as fish, frogs, or preying insects. At the top of the food chain there would be herons, otters, or raccoons which would feed on the carnivores. These animals are known as the top predators in an ecosystem.



Vocabulary

Pond: a small body of freshwater, shallow enough for sunlight to reach the bottom and for rooted plants to grow.

Aquatic Invertebrate: Animals such as insects, crustaceans, and worms that spend part or all of their life cycles in water.

Invertebrate: animals without a backbone.

Phytoplankton: microscopic single-celled plants that live in fresh or marine water.

Zooplankton: tiny animals that graze on phytoplankton.

Food web: a network of many food chains in an ecosystem which are connected to each other.

Food chain: a chain which shows the transfer of energy from plants to animals that eat them, and then to the predators which eat those animals.

Producer: an organism which makes its own food/energy from non-living materials eg. Plants, algae.

Consumer: an animal which obtains its food from other organisms (plants, animals).

Herbivore: a plant-eating animal.

Carnivore: a meat-eating animal.

Omnivore: an animal which eats plants and animals.

Detritivore: an organism that eats dead plants and animals (eg. Some snails, fungi, worms).

Primary consumer: an animal which eats plants.

Secondary consumer: an animal which eats plant-eating animals.

Top predator: an animal at the top of a food chain, which hunts and kills other animals for food. (eg. coyotes, bears, herons, killer whales, wolves).

Algae: plants with no true roots, stems or leaves, living in water or moist environments.

Materials

- Index cards with different pond organisms (including the sun, pond plants, herbivores, carnivores, omnivores, detritivores and top predators) drawn or cut-out and labeled, with neck string attached.
- Ball of string or yarn (100m at least)

Introductory Discussion

Review what plants and animals live in or around ponds. What do these animals eat? Where do the pond plants get their food? Introduce the concept of a food chain. Ask the students what they will have for recess or lunch? Will they eat things from plants or animals? Or both? Draw a basic food chain illustrating this. Then return to the animals in the pond. Ask the students to think of a food chain in the pond. Sketch several pond food chains.

Briefly describe the activities that will be done during the lesson.



Science Activity/Experiment

1. Students must close their eyes and the teacher hangs a pond organism index card on their back. After they open their eyes they must ask questions to each other with yes/no answers. The object of the game is to determine what pond organism you are. The teacher may be the sun card, as it is essential to all other life forms.

Start with asking questions such as:

Am I a producer? Herbivore? Carnivore? Top Predator? (for younger students: Am I a plant? am I an animal? Do I eat plants? Do I eat other animals?)

Do I live in the water? Around the pond? On land? At the bottom of the pond, in the mud? In the air?

Am I smaller/larger than a pencil? Shoebox?

Do I have gills, scales, fur, feathers, a shell?

Do I breathe underwater? Do I need to come out of the water for air?

Am I an insect? Amphibian? Fish? Mammal? Bird?

Let the students ask each other these questions, for younger students, adults can help direct their questions.

2. Once everyone has guessed correctly about who they are, they can flip their index cards to the front. Students can then get into ecological groups: producers, herbivores, carnivores, omnivores, decomposers, top predators.
3. Have everyone mix themselves up and then sit in a large circle, showing their cards, with the teacher (sun) in the center of the circle. Explain to students that they are going to make a food web. The sun (teacher) must begin because the sun is the source of life for all things. He/She has a ball of string, holds on to the end and then passes it to a plant saying, "I am the sun and I give the algae energy, the plant needs me!" Tell the students they can pass the ball of string (holding on to one end) to another organism in the circle, **only if it needs you, or you need it to survive.** For example, the duck could give the ball of string to the cattails (which it needs to survive for nesting) or the coyote (which needs it to survive). During each pass, the student must tell the others who they are and why and who they are passing the string to. All organisms in the circle must be connected so no person is left out. It is useful before starting to rehearse a few times so that each person can point to another person (organism) that he/she needs or is needed. Some organisms/elements may be included more than once (eg. the sun, plants).

After every organism has been connected and you have an elaborate-looking web, ask students to pull the string gently until it is taut. What pattern have the students made with the string? (A web.) This pattern shows the interconnections between only some of the organisms living in the forest. Often, all the interrelationships between organisms in an ecosystem are called a web of life. Tell students that in a real pond or other ecosystem, the web would be much more complex.

- 4.* (For older students) Tell students that an invasive plant, called purple loosestrife has been introduced to their pond and is choking out the native pond plants such as cattails and bulrushes. The cattail/bulrushes person(s) can let go of his/her string. After the string is released ask if anyone felt a change in the tension of their string? Who was directly affected by the loss of these pond plants? Ask these students to let go of their string now. Now what remaining students were affected (or could feel the slackening of the string)? And so on. Students will realize that any change in the ecosystem is felt throughout the web.



Closure Discussion

Make a circle and ask students to talk about their observations and experiences. Review vocabulary and let students give examples of simple food chains. What new things did they learn about plants and animals that live a pond or wetland? Have students work on response sheet to create a pond food chain. (For younger students, it might be easier for them to understand the concept of food chains if you begin with the top predator first. It is also helpful to start the discussion by focusing on a food chain that includes themselves.)

References

Who Am I? Weird Webs www.cpawscalgary.org/education/free-resources/lessons.html#5min

Greenaway, Theresa. 2001. Food Chains: Cycles in Nature. Raintree Steck-Vaughn Publishers.

Wallace, Holly. 2001. Food Chains and Webs. Heinemann Library. Chicago. Pp.18-19.

Lauber, Patricia. 1995. Who Eats What? Food Chains and Food Webs. Let's-Read-and-Find-Out-Science. Harper Collins. New York.

Ganeri, Anita. 2004. Food Chains. Heinemann Library (Nature Patterns Series). Chicago.

Kalman, Bobbie. 2005. Food Chains and You. Crabtree Publishing Company. New York.

Nadeau, Isaac. 2002. Food Chains in a Tide Pool Habitat. PowerKids Press. New York.

Hickman, Pamela. 1993. Wetlands. Federation of Ontario Naturalists. Kids Can Press. Toronto.

Extensions

Watch a food chain/web video such as Marsh and Swamp. 1986. 12 min. VSB Media Services (#495163) or The Magic School Bus Gets Eaten. 30 min. VSB Media Services (#495197)

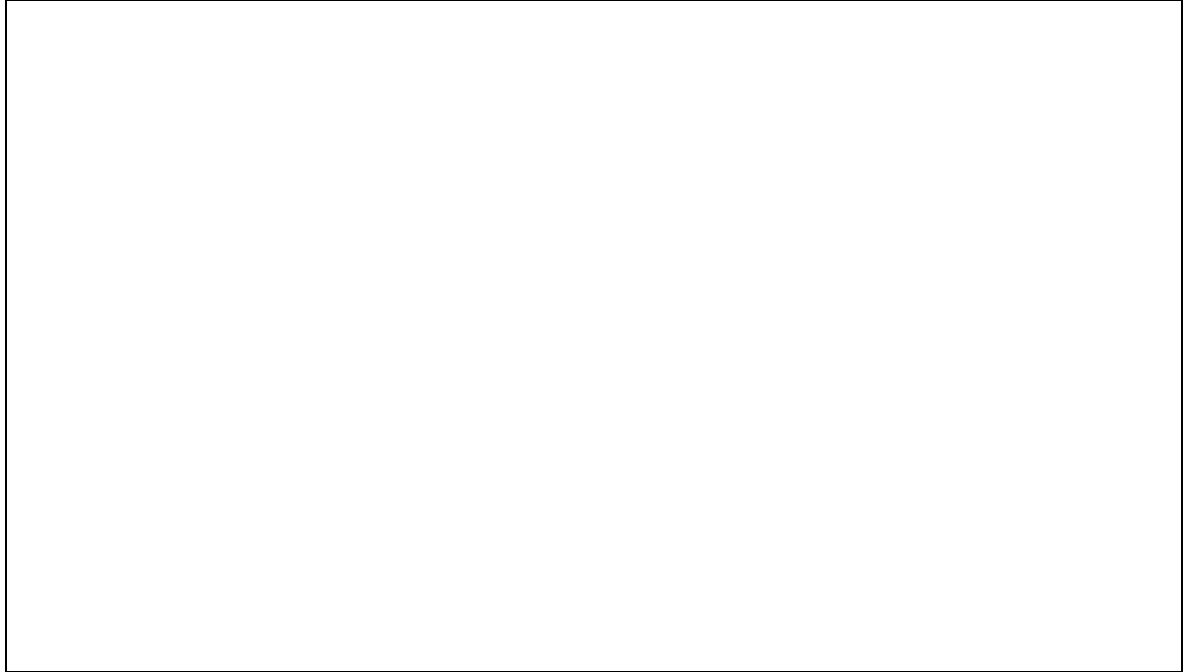
Read a food chain book such as "Who Eats What?"

Make a giant mural/poster of the pond, ocean or human food web.

Food Chains

Name of Scientist _____

Draw a pond food chain and label.



Draw a food chain with you as the top predator.

