# Food Webs

## Contributors

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## Intended Audience

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<tbody>
<tr>
<td>K-4</td>
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<tr>
<td>5-8</td>
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<tr>
<td>9-12</td>
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## Classroom Setting

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Requires special equipment</td>
<td>X</td>
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<tr>
<td>Uses hands-on manipulatives</td>
<td>X</td>
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<tr>
<td>Requires mathematical skills</td>
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<tr>
<td>Can be performed individually</td>
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<tr>
<td>Requires group work</td>
<td>X</td>
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<tr>
<td>Requires more than one (45 min class) period</td>
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<tr>
<td>Appropriate for special needs student</td>
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Introduction

Description

Students go outside and observe and collect specimen from a pond ecosystem. Students then use their observations to answer questions.

Abstract

This activity aims to introduce students to the organisms found in aquatic ecosystems in their local area. Students will also be introduced to food webs and how food webs change between sites or regions.

Core Themes Addressed

<table>
<thead>
<tr>
<th>Core Themes Addressed</th>
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<tbody>
<tr>
<td>Microbial Cell Biology</td>
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<tr>
<td>Microbial Genetics</td>
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<tr>
<td>Microorganisms and Humans</td>
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<td>Microorganisms and the Environment</td>
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<tr>
<td>Microbial Evolution and Diversity</td>
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<tr>
<td>Other –Ecology</td>
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Keywords

Pond, organism identification, trophic pyramid

Learning Objectives

At completion of this activity, students will be able to:

1. Collect and identify organisms found in their school pond
2. Create a food web out of pond organisms
3. Relate the pond food web to other aquatic ecosystems

National Science Education Standards Addressed

STANDARD C: Life science

- The cell
- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms
Food Webs

Student Prior Knowledge

Students need a basic background on community ecology and trophic structure.

Teacher Background Information

Teachers should be comfortable creating wet slides, and using microscopes.

Trophic pyramids are created with primary producers on level one, herbivores (primary consumers) on level two, followed by secondary consumers, then tertiary consumers.

A food web is a diagram of the links among species in an ecosystem.

- The base of a food web is occupied by primary producers and decomposers.
- Primary, secondary, and tertiary consumers occupy the higher levels.
- Food webs are complicated by the fact that many species feed at various levels.

Class Time

This activity will require a minimum of one 90 minute class period

1. Prepare students to go out to pond (10 minutes)
2. Walk class to pond (depends on distance from classroom)
3. Students walk around the pond and observe the plants and animals (10 minutes)
4. Students collect sediment (mud) from the bottom of the pond (5 minutes)
5. Students collect water samples for phytoplankton identification (5 minutes)
6. Students use microscopes to identify phytoplankton (15 minutes)
7. Students complete handout (15 minutes)

Teacher Preparation Time

This lesson will require approximately 30 minutes of preparation time.

1. Setup microscopes (15 minutes)
2. Set out materials (10 minutes)
3. Make copies (5 minutes)
Safety Precautions

Students should be warned ahead of time to wear outdoor appropriate clothing (a change of clothing may also be recommended). Waders can also be used by students to keep them from getting wet.

Materials and Equipment (Groups of 2-4)

1. Pond
2. Microscope (1 per group)
3. Slides (1 per group)
4. Cover slips (1 per group)
5. Dip-net 1 per group)
6. 500 mL bottle with cap (1 per group)
7. Waders (1 per group)
8. Bucket (1 per group)

Methods

1. Students are walked to the pond and instructed to make observations and collections of water and mud.
2. Students are then taken back to the lab to create wet mounts of phytoplankton and sift through their mud for bugs.
3. Students are then asked to fill out their handout with observations from the activity.

Tips/Suggestions

1. Depending on class size, class period length, and available equipment each group can be assigned one job outside and samples can be shared with the entire class.
   a. Water collection
   b. Mud collection
   c. Animal identification
   d. Plant identification

Answers to Student Handouts
1) Walk around the pond and observe the plants and animals. Describe any large animals that use the pond. 
   **Examples: ducks, turtles, fish**
   
   Describe the vegetation around the pond. 
   **Examples: cattails, bald cypress, weeds**
   
   Describe the vegetation inside the pond. 
   **Examples: cattails, bald cypress, lily pads, duckweed**

2) We want to sample the pond sediment for invertebrates (bugs). Scoop up mud from the pond bottom with the dip-net and put it in your bucket. Separate any organisms you see and bring them back to the lab for further inspection. Describe what you found. 
   **Example: Dragonfly larva, mayfly larva, stonefly larva, copepods, cladocera, nematodes, water boatman**

3) Sample phytoplankton by collecting 500 milliliters of water with a bottle. Close the cap and shake it. Then pour 50 milliliters into a tube. We will preserve the sample by adding 1 ml of Lugol’s solution. In the lab put one drop of your plankton sample on a microscope slide and then put on the cover slip. View the slide under a microscope at 200x magnification. Draw the plankton you see below.
4) Fill in the Trophic Pyramid with the plants and animals you identified from the pond.

5) Create a Food Web with the plants and animals you found at the pond.
6) Judging from the types of organisms you found, do you think that the school ponds are healthy ecosystems? Explain your reasoning.

The pond has a diversity and abundance of organisms. There are organisms from all the trophic levels so it seems to be functioning well. The pond looks healthy although it is located in the middle of a parking lot so there is probably runoff pollution getting into it.
Introduction

Ecosystems are environments made up of both biotic and abiotic factors. In this activity you will be exploring a pond ecosystem, focusing on the biotic factors and how they interact.

Student Background Knowledge

Trophic pyramids are created with primary producers on level one, herbivores (primary consumers) on level two, followed by secondary consumers, then tertiary consumers.

A food web is a diagram of the links among species in an ecosystem.

- The base of a food web is occupied by primary producers and decomposers.
- Primary, secondary, and tertiary consumers occupy the higher levels.
- Food webs are complicated by the fact that many species feed at various levels.

Vocabulary

**Abiotic:** Nonliving components of the environment

**Biotic:** Living components of the environment

**Ecosystem:** The interaction of populations, communities, and abiotic factors. Ecosystem defines a unique interaction (wetland, grassland, marine)

**Food Web:** A diagram depicting how energy moves through organisms in an ecosystem

**Phytoplankton:** Photosynthetic single celled plants of the water

**Trophic Pyramid:** A diagram depicting the levels functional role of organisms in an ecosystem

Safety Considerations

There is a chance you may get wet. Please wear appropriate clothing and be on your best behavior while near the pond.
1) Walk around the pond and observe the plants and animals. 
   Describe any large animals that use the pond.

   Describe the vegetation around the pond.

   Describe the vegetation inside the pond.

2) We want to sample the pond sediment for invertebrates (bugs).
   Scoop up mud from the pond bottom with the dip-net and put it in your bucket.
   Separate any organisms you see and bring them back to the lab for further inspection.
   Describe what you found.

3) Sample phytoplankton by collecting 500 milliliters of water with a bottle. Close the cap and shake it. Then pour 50 milliliters into a tube. We will preserve the sample by adding 1 ml of Lugol’s solution.
   In the lab put one drop of your plankton sample on a microscope slide and then put on the cover slip. View the slide under a microscope at 200x magnification.
   Draw the plankton you see below.
Student Worksheet

Food Webs

Name:_____________
Block:__________________

1) Fill in the Trophic Pyramid with the plants and animals you identified from the pond.

[Diagram of a Trophic Pyramid]

2) Create a Food Web with the plants and animals you found at the pond.

3) Judging from the types of organisms you found, do you think that the school ponds are healthy ecosystems? Explain your reasoning.