

Teacher's Guide

“Pond Study I”

**Grade Level:**

3rd, 4th, 5th

GPS Reference:

S3L1 b, c; S3L2 a, b
S4L1 a, b, c, d;
S5L1 a

Summary:

Students take samples of organisms, mostly aquatic macroinvertebrates, found along the edge of a pond and identify and view them under a microscope to make inferences about the condition of the water and habitat.

Objective:

Students will understand the diversity and relationships of organisms found in a pond habitat, as well as the impacts of pollution and water quality on the pond community.

Essential Questions

- 🕒 What types of animals would you find in and around a pond?
- 🕒 What types of invertebrates would you find in and around a pond?
- 🕒 What types of insects start their life in the water and live out of the water as adults?
- 🕒 How are these insects and other invertebrates important to the pond food chains and food web?
- 🕒 What are some types of pollution that may affect the health of these organisms?

Vocabulary

- 🕒 *Naiad* - the immature stage of aquatic insects, such as dragonflies and mayflies, which exhibit incomplete metamorphosis
- 🕒 *Larva* - the immature stage of insects exhibiting complete metamorphosis
- 🕒 *Macroinvertebrate* - an organism which lacks a backbone and can be seen without the aid of a microscope
- 🕒 *Bioindicator* - a species whose presence may be used to monitor the condition of a habitat

Pre-Visit Activities

- 🕒 **Read** a book from the suggested reading list
- 🕒 **Webs and Chains** Have students make several food chains using only organisms the students can think of that live in and around a pond. Link these food chains with each other to make a food web.
- 🕒 **Are You Me?** (Adapted from Project WILD Aquatic) Using picture cards (last pages), students match pairs of juvenile and adult aquatic animals. Color and cut out pictures, one per card. Students mingle amongst the class to search for their match. How are the adults and juveniles different than each other; the same? Which of these animals are vertebrates? Which are invertebrates? During Pond Study, we will be collecting mostly invertebrates, so students should note the animals in this activity that we will find in the pond.

Post visit activities

- 🌀 **Clay Critters** Using modeling clay, students can create model macroinvertebrates in their larval / naiad form and transform into adult. Guide students in making a macroinvertebrate, a dragonfly for example. Be sure students model adaptations, such as gills, and discuss these adaptations. Take a photo of students' model. Then have students slowly transform their model into the adult form of their animal. What body parts remain the same / similar? What body parts change? How are these changes adaptations?
- 🌀 **Webs and Chains Remix** Have students make several food chains of organisms living in and around the pond *now incorporating some of the organisms the students found during their field study*. Link these food chains with each other to make a food web and discuss how and why these aquatic macroinvertebrates are important to the success of a healthy pond habitat.
- 🌀 **Bioindicators** Review the species you found during your pond study. What inferences can you make about the quality of the water in the pond? What other ways can scientists determine water quality? Amphibians are vertebrates that are also studied as indicators of habitat health. Have students research other bioindicators and how they have been used in environmental research.

Suggesting Reading

Dragons in the Pond by Robert H. Armstrong, John Hudson & Marge Hermans

Explore Rivers and Ponds by Carla Mooney

Eyewitness Pond and River by Steve Parker

One Small Square: Pond by Donald M. Silver

Song of the Water Boatman and other Pond Poems by Joyce Kilmer

Insect Life Cycles by Molly Aloian and Bobbie Kalman

Mosquitoes by Cari Meister

Flies (From Flower Flies to Mosquitoes) by Sara Swan Miller

Suggested Websites

<http://www.dec.ny.gov/animals/35772.html>

<http://www.42explore.com/pond.htm>

<http://www.epa.gov/owow/keep/NPS/kids/masterbugtheater.html>

<http://www.nature.com/scitable/knowledge/library/bioindicators-using-organisms-to-measure-environmental-impacts-16821310>

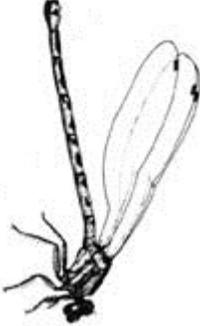
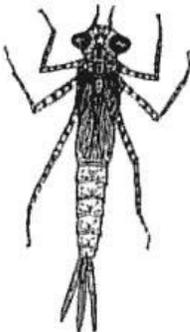
http://gaprojectwet.org/gawet_index.asp

<http://extension.usu.edu/waterquality/htm/educator-resources/lessonplans/macro/>

Annual Water / Art Contest: River of Words http://gaprojectwet.org/gawet_row2.asp

Are You Me? (Adapted from Project WILD Aquatic Curriculum)

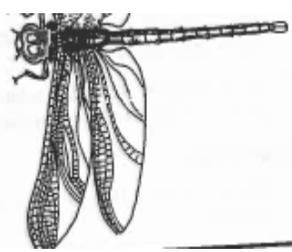
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<p>Butterfly Adult</p> 	<p>Butterfly Larva</p> 	<p>Frog Adult</p> 	<p>Tadpole</p> 
<p>Adult Beaver</p> 	<p>Kit</p> 	<p>Osprey Chicks</p> 	<p>Osprey</p> 
<p>Duck</p> 	<p>Ducklings</p> 	<p>Damselfly Adult</p> 	<p>Damselfly Larva</p> 

Dragonfly Nymph



Dragonfly Adult



Caddisfly Larva



Caddisfly Adult



Stonefly Nymph



Stonefly Adult



Mayfly Adult



Mayfly Nymph



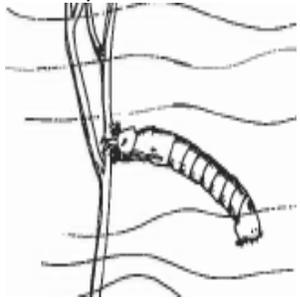
Crane fly Adult



Crane fly Nymph



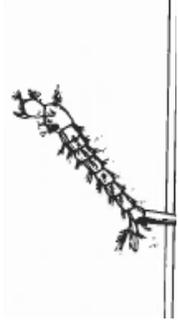
Black Fly Larva



Black Fly Adult



Mosquito Larva



Mosquito Adult



Whirling Beetle



Whirling Larva



Further Investigations!



What animals live around a pond? Where do these animals live in the pond? Use the animals below and draw them in the pond habitat where they would live. You can draw other animals too!

FISH DRAGONFLY ADULT WORM FROG

DRAGONFLY NYMPH TADPOLE AQUATIC SNAIL DUCK

BEAVER SNAKE TURTLE DAMSELFLY LARVA

