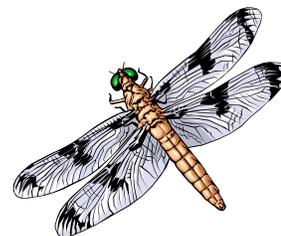


Pond Insect Investigation



In a Nutshell



Students will use dip nets, microscopes, and aquatic insect keys to capture and identify a variety of insects that make up the pond community. Students will discover many of the insects they find flying around the pond, actually begin their lives in the water.

Grades 2 & 3
Seasons Late Spring, Early Summer
Location Bass Ponds Trailhead, Long Meadow Lake Unit

Learning Objectives

After participating in this activity, students will be able to:

- Identify the following combination of physical characteristics unique to insects: 6 legs, 3 body parts, 1 or 2 pairs of wings (as adults), and compound eyes.
- Distinguish between insect and non-insect members of the pond community.
- Give at least one example of an insect that looks very different in the larval and the adult stages.
- Explain why protecting pond habitat is a critical part of managing healthy food webs on the Minnesota Valley National Wildlife Refuge.

Literature Connections

Eliza and the Dragonfly by Susie Rinehart

Song of the Water Boatman by Joyce Sidman (NP)

Diving Beetles by Sandra Markle (780L)

Water Insects by Sylvia Johnson

Golden Guide to Pond Life by George Reid

Do Bees Sneeze? by James Wangberg

Minnesota Valley National Wildlife Refuge

3815 American Blvd E Bloomington, MN 55425 15865 Rapids Lake Rd Carver, MN 55315



Minnesota Valley National Wildlife Refuge

Look Closer: Bugs by DK Publishing

1000 Facts on Bugs by Barbara Taylor

How Do Flies Walk Upside Down? by Melvin and Gilda Berger

The Magic of Morphing by Mary Hoff, *MN Conservation Volunteer Magazine*

Damsels and Dragons by Janice Welsh, *MN Conservation Volunteer Magazine*

Pre-Activities

Students will transform one of their classmates into an aquatic insect, one costume component at a time. Students will be introduced to the larval and adult stages of common pond insects in the Project WILD Aquatic match-up game *Are You Me?*

On-Site Activities

Students will use aquatic insect collection kits to catch, observe and identify a variety of pond insects in larval and adult stages. Students will discover the lifecycles of many pond insects include time in the water as well as time in the air.

Classroom Connection

Build a “virtual” insect collection for your classroom. Invite students to bring in magazine or internet pictures, or their own drawings or photographs of the insects they caught during their refuge field trip.

Teacher Resources

Wonderful Wacky Water Critters by the Wisconsin DNR, Extension Publication GWQ023

Guide to Aquatic Insects and Crustaceans by the Izaak Walton League

The Magic of Morphing by Mary Hoff, *MN Conservation Volunteer Magazine*, Teacher's Guide

http://www.dnr.state.mn.us/young_naturalists/teachersguides

Damsels and Dragons by Janice Welsh, *MN Conservation Volunteer Magazine*, Teacher's Guide

http://www.dnr.state.mn.us/young_naturalists/teachersguides

Pet Bugs: A kid's guide to catching & keeping touchable insects by Sally Kneidel

More Pet Bugs: A kid's guide to catching & keeping insects & other small creatures by Sally Kneidel

Minnesota Valley National Wildlife Refuge

3815 American Blvd E Bloomington, MN 55425

15865 Rapids Lake Rd Carver, MN 55315



Pond Insect Survey

Pre-Activity

Materials

- Insect costume kit: headband antennae, wings, compound eye “glasses”, head (helmet), thorax (body shield), abdomen (stuffed to be worn around the waist), and six legs (2 arm “socks”, 4 stuffed “legs” to attach to the thorax with safety pins)
Aquatic adaptations: breathing tube (snorkel), air bubble (small inflated balloon), 2 long wooden spoons (set of paddle-like legs)
- Kaleidoscopes to represent compound eyes.
- Posters: *Tree of Life*
- Deer vertebrae
- Pond Insect collection in riker mounts or vials
- Laminated set of *Are You Me Cards?* (master attached here)

Animal Groups

Explain to students how animal groups are organized by physical characteristics, using the *Tree of Life* poster. To explain the difference between Vertebrates and Invertebrates (non-vertebrates), use the deer vertebrae to show students the first animal group. Continue looking at each group until reaching the insect branch of the tree. Insects are part of the invertebrate group.

Insect Dress-Up

Begin this activity by asking students to think about what it takes to be an insect? Select a student volunteer who is not easily embarrassed or shy to come to the front of the group. Ask students to think about what body parts are needed to make a “bug” a real insect? Add costume pieces that represent each characteristic one piece at a time. When the student has been transformed into an insect explain that some creatures, often referred to as “bugs”, are not insects at all! Examples of other invertebrates often mistakenly grouped with insects are spiders, centipedes, millipedes, daddy longlegs, sow or pill bugs. Show students where these other invertebrates are located on the *Tree of Life* poster.

Next, add the aquatic adaptations one piece at a time. The snorkel represents the breathing tube of a **Water Scorpion** or **Giant Water Bug**. The breathing tube allows these insects to hunt motionless, hanging headfirst under floating vegetation, until prey travels close enough to grab.



Giant Water Bug



Water Scorpion



Backswimmer



Water Boatman

Other water insects, like the **Back swimmer**, carry an air bubble (like a little balloon) that allows them to swim underwater for longer periods of time.

Water insects, like the **Water Boatman**, are equipped with a set of paddle-like legs shaped like the oars of a boat (the long wooden spoons). This design helps water insects to be fast and efficient swimmers.

Are You ME?

Many of the insect species flying above the pond began their life cycles in the pond water. For this reason, many larvae or juveniles do not look anything like their adult parents.

Pass out the Project Wild Aquatic *Are You Me?* Cards (a master is attached). These cards illustrate the larval and adult forms of common pond insects. Ask students to find the classmate holding their match. If students appear to have trouble, encourage them to compare the insect names on the cards. When all students have found a match, ask each pair to introduce their pond insect to the entire class. Pass around riker mounts or vials containing real pond insects to familiarize students with the insects they may see during their field trip.

Pond Insect Survey

On-site Activity

Materials

- One Aquatic Sampling Kit per student team of 4-6
Kit includes: 2 aquatic nets, 2 skim nets, 4 specimen collection containers, plastic spoons, laminated key to aquatic organisms, one magnifying glass per student, pond life field guide.
- Field microscopes (4-6)
- Well slides
- Plastic eye droppers
- Card table

At the conclusion of the lesson: Return live specimens to the wetland areas where they were collected (if there is time, it is best to have students participate at the conclusion of their session). Be sure all microscopes and slide preparation materials are clean, dry and covered before storing. Thoroughly rinse equipment and leave out to dry in the visitor center classroom. Please inventory and note any low quantities of supplies or broken equipment.

Pond Insect Hunt

(90 minutes at Bass Ponds with set-up and clean-up)

Set up team specimen collecting stations along the shoreline or dock. Fill team tubs and collection containers with water. Set up the field microscopes on the card table away from the collecting stations. Place one plastic eye dropper and petri dish with each microscope. Place one well slide on each microscope stage.

Divide the class into teams. Assign each team to one collecting site and sampling kit. All plants and wildlife that live in a wetland depend on water for survival. It's important to always have pond creatures and the plants in water, whether it's a petri dish, ice cube tray, or bowl. Show the students how to use the dip net to collect creatures from the water in a "figure 5" motion, like sweeping the floor. Explain how to extend the handle of the aquatic nets. Review the following sampling tips with the students, teachers, and chaperones.

Sampling Tips for Teachers, Students and Chaperones

- Fill up the large bins with water, having each student take a turn. Bins should be at minimum half full. Students should look for insects in the large bin once water has been collected prior to passing out dip nets. They'll be surprised at how many insects are collected from the water buckets.
- Give only 1 dip net per team. After each team member has done 3-4 sweeps from the pond remove dip nets. This allows the students to concentrate on observing the insects they collected. If time permitting, dip net again to collect more aquatic insects.
- It is OK to pick up some aquatic plants in the dip nets. Many aquatic organisms live among the plants.
- Many pond creatures are very small and well camouflaged. Students should assume with every swipe through the water something will be caught in the net. With this assumption, students should take their net back to their teams' clear plastic tub and swish it through the water before determining that it is empty. Until pond insects are back in water and swimming, it is possible for students to not realize they have caught something.
- Students should avoid scooping up a lot of mud from the bottom of the pond. Mud will cloud the water in the clear plastic tub. The cloudy water will make it difficult to find and catch aquatic insects.
- If students are working from a dock or steps, allow only one student from each team on the dock/steps per dip net. This will help reduce the chance of someone accidentally falling into the water.
- Students waiting for their turn on the dock or steps can use their time to transfer specimens from the large team tub into the smaller collecting containers and use the microscopes to view the insects up close.

Wrap-up Management Connection

(20 minutes)

Protecting the Pond Food Web

At the end of this activity to bring the teams together to discuss what the class caught. Use the *Pond Life* key to help answer the questions below. When the activity is complete, carefully return everything back to the pond and rinse out the equipment.

- *Which creatures are clearly insects?*
Remind students many insects found in the water are in their larval stage and may not have all the characteristics discussed earlier. Remind students of the *Are You Me?* cards used during the pre-activity.
- *Which appear to be part of some other animal group?*
Students should be aware that aquatic worms, sow bugs, leeches, snails and tadpoles are not members of the insect family, despite their size.
- *How do these creatures depend on each other?*
Wetlands, like the pond, are often compared to a nursery. Young aquatic insects, amphibians and fish are the building blocks of the refuge food web. Without them, many of our migratory ducks, geese and birds would not be able to survive. Protecting pond habitat is a critical part of managing the refuge.

Pond Insect Survey

Inside-Alternative

Materials

- One Aquatic Sampling Kit per student team of 4-6
Kit includes: 4 specimen collection containers, plastic spoons, laminated key to aquatic organisms, one magnifying glass per student, pond life field guide.
- Field microscopes (4-6)
- Well slides
- Plastic eye droppers
- Card table

Pond Insect Hunt

Before the class arrives, collect pond water and pond life samples from a nearby pond (Courtyard Ponds or drive to Bass Ponds). Set up team specimen sampling stations in the classroom as you would outside but without the nets. Fill each tub with pond water and aquatic life.

Set up the field microscopes on a table away from the collecting stations. Place one plastic eye dropper and petri dish with each microscope. Place one well slide on each microscope stage.

Divide the class into teams. Assign each team to one sampling station. Remind students that all plants and wildlife that live in a wetland depend on water for survival. It's important to always have pond creatures and the plants in water, whether it's a petri dish, ice cube tray, or bowl. Show the students how to collect creatures from the water using a plastic spoon. Rotate students through the stations giving them about 10 minutes at each.

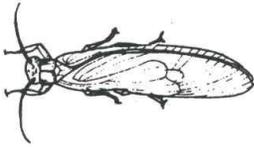
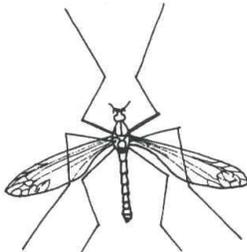
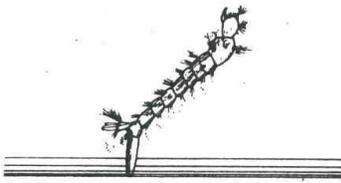
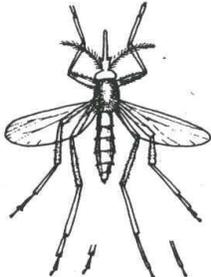
Protecting the Pond Food Web

At the end of this activity discuss what the class found in their pond stations. Use the *Pond Life* key to help answer the questions below.

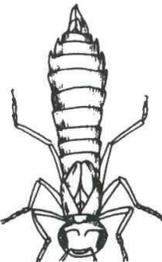
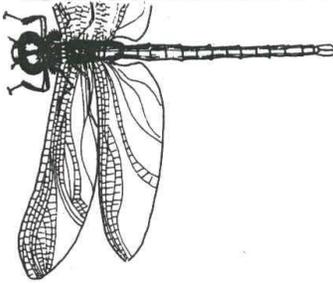
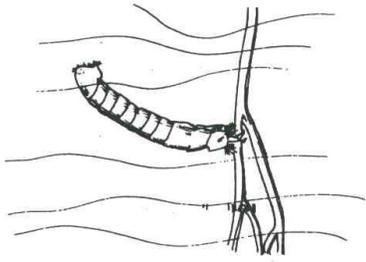
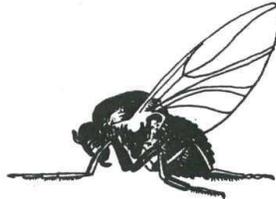
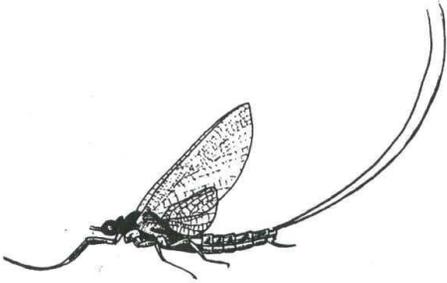
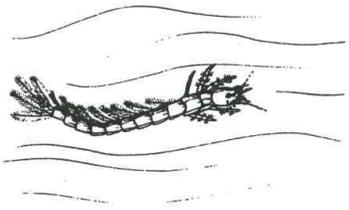
- *Which creatures are clearly insects?*

Remind students many insects found in the water are in their larval stage and may not have all the characteristics discussed earlier. Remind students of the *Are You Me?* cards used during the pre-activity.

- *Which appear to be part of some other animal group?*
Students should be aware that aquatic worms, sow bugs, leeches, snails and tadpoles are not members of the insect family, despite their size.
- *How do these creatures depend on each other?*
Wetlands, like the pond, are often compared to a nursery. Young aquatic insects, amphibians and fish are the building blocks of the refuge food web. Without them, many of our migratory ducks, geese and birds would not be able to survive. Protecting pond habitat is a critical part of managing the refuge.

<p>Stonefly Nymph</p> 	<p>Stonefly</p> 
<p>Cranefly Larva</p> 	<p>Cranefly</p> 
<p>Mosquito Larva</p> 	<p>Mosquito</p> 
<p>Caddisfly Larvae</p> 	<p>Caddisfly</p> 

Are You Me? from Project Wild Aquatic (pg. 2)

<p>Dragonfly Nymph</p> 	<p>Dragonfly</p> 
<p>Black Fly Larva</p> 	<p>Black Fly</p> 
<p>Mayfly Nymph</p> 	<p>Mayfly</p> 
<p>Whirling Larva</p> 	<p>Whirling Beetle</p> 

Are You Me? from Project Wild Aquatic (pg. 2)