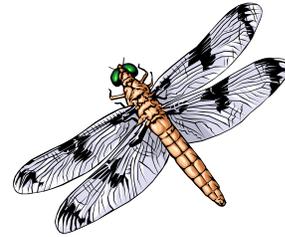


Pond Insect Investigation



In a Nutshell



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

Grades	2
Seasons	Spring
Location	Bass Ponds Trailhead, Long Meadow Lake Unit

Learning Objectives

After participating in these activities, 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.

Literature Connections

- ***Eliza and the Dragonfly*** by Susie Rinehart
- ***Song of the Water Boatman*** by Joyce Sidman
- ***Diving Beetles*** by Sandra Markle
- ***Water Insects*** by Sylvia Johnson
- ***Golden Guide to Pond Life*** by George Reid
- ***Do Bees Sneeze?*** by James Wangberg
- ***Look Closer: Bugs*** by DK Publishing
- ***1000 Facts on Bugs*** by Barbara Taylor
- ***How Do Flies Walk Upside Down?*** by Melvin and Gilda Berger



Minnesota Valley National Wildlife Refuge

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 match-up insects game.

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 on land.

Classroom Connection

- Build an insect collage collection for your classroom. Invite students to bring in magazine/internet pictures, their own drawings, any photographs of the insects they may have taken themselves. Students can sort their pictures by color, wings, shape, size, etc. to get them thinking about the different kinds of insects.
- With jars and hand lenses, students can explore near their school to find out what types of insects are living nearby and where (in the mowed grass, in tall grasses, on trees, on the school building, etc.). **PLEASE HAVE STUDENTS RETURN THE INSECTS TO THE OUTDOORS ONCE THEY HAVE HAD THE OPPORTUNITY TO SEE THEM.**
- Students can do a research project on an insect to learn about its lifecycle, behavior, habitat, etc.
- Students can build their own insect using a variety of free/low cost materials. Remember, all insects must have: head, thorax, abdomen, 2 antennae, 6 legs, and wings (that may or may not be visible). They can then write a poem or story about their insect.

Online Teacher Resources

- **Wonderful Wacky Water Critters** by the Wisconsin DNR, Extension Publication
 - <http://clean-water.uwex.edu/pubs/pdf/wwwc.pdf>
 - **Young Naturalists:** Minnesota Conservation Volunteer Magazine
 - ***The Magic of Morphing*** by Mary Hoff
 - ***Damsels and Dragons*** by Janice Welsh
- Stories and Teacher's Guides can be found at:
<http://www.dnr.state.mn.us/mcvmagazine/young-naturalists.html>



Pond Insect Survey

Pre-Activity

Materials

- Insect costume kit: head (helmet), thorax (green felt piece), abdomen (purple felt piece to tie around waste), exoskeleton (body shield over green felt), antennae, wings, compound eye “glasses”, and six legs (student’s two arms and 4 stuffed “legs” to attach to the thorax with safety pins)
- Aquatic adaptations: breathing tube (snorkel), feathers, (gills) air bubble (small inflated balloon or ball), 2 long spoons (set of paddle-like legs)
- Kaleidoscopes to represent compound eyes (1 per student/pair of students)
- *Classification of Animals* poster
- Deer vertebrae
- Picture for each vertebrate class (birds, mammals, fish, reptiles, amphibians)
- Pictures of aquatic insects (breathing and movement)
- Adult and Larvae match-up game cards
- *Wonderful, Wacky, Water Critters* booklets

Animal Groups

Explain to students how animal groups are organized by physical characteristics, using the *Classification of Animals* poster. To explain the difference between Vertebrates and Invertebrates (non-vertebrates), use the deer vertebrae and pictures of each vertebrate class to show students the first animal group (*Aves*, *Mammalia*, *Amphibia*, *Reptilia*, and 3 different classes of fish).

Insects are part of the invertebrate group and are in the *Insecta* class. Discuss with students that some creatures, often referred to as “bugs”, are not insects at all! Examples of other invertebrates often mistakenly grouped with insects are spiders, daddy longlegs, and ticks (*Arachnids*), and centipedes (*Myriapods*). Using the poster, briefly look at a few of these different invertebrate groups using the and what organisms are in them before focusing on the *Insecta* class.

Insect Dress-Up

Begin this activity by asking students to think about different insect characteristics and make a list on the board. Ask students to think about what body parts are needed to make a “bug” a real insect? Select a student volunteer who is not easily embarrassed or shy to come to the front of the group. Begin adding costume pieces that represent each characteristic one piece at a time (refer to list in “materials” section for what each piece represents and order for putting on each piece). When appropriate for your class, hand out the kaleidoscopes per 1-2 students so they can see what it is like to view the world through compound eyes like an insect.

Add the aquatic adaptations one piece at a time. The snorkel represents the breathing tube of insects such as 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. The feathers represent the gills of insects such as **Damselfly larvae** that get their oxygen from the water will gills like fish. Show students the laminated pictures of these insects as you discuss how they breathe.



Giant Water Bug



Water Scorpion



Damselfly Larvae

Other water insects, like **Backswimmers** and **Water Boatman**, carry an air bubble with them that allows them to swim underwater for longer periods of time, like a scuba air tank (small inflated balloon or ball). These two insects are equipped with a set of paddle-like legs similar to the oars of a boat (the long wooden spoons). This design helps water insects to be fast and efficient swimmers. These two insects look quite similar, but backswimmers swim upside down on their backs! Show students the laminated pictures of these insects as you discuss how they move.



Water Boatman



Backswimmer

Insect Match-up Game

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 one of the match-up game cards to each student. These cards illustrate the larval and adult forms of common pond insects. Ask students to find the classmate holding their match. When the students find their match, have them look up their insect in the *Wonderful, Wacky, Water Critters* booklet to learn more about it. When all students have found their match, ask each pair to introduce their pond insect to the class with a few facts they've learned.

Field Trip Information: Explain to students that during their refuge fieldtrip they will be dip-netting for aquatic invertebrates in a pond. Remind students to wear old clothes and shoes in case they get wet or dirty. Long pants and close-toed shoes are highly recommended. Shorts and flip flops are not appropriate. Encourage students to apply sunscreen and insect repellent if they choose **BEFORE** traveling to the refuge.

Pond Insect Survey

On-site Activity

Materials

- One Aquatic Sampling Kit per student team of 4-6
 - Kit includes: 1 long-handled aquatic net; 1 small dip net; 1 large tub; specimen sorting containers (1 square tray, 1 ice cube tray); 1 gallon bucket; 4 plastic spoons; 1 aquatic insect dichotomous key; 4 hand lens; 1 cooking baster; *Pond Life* field guide
- 2 field microscopes with:
 - 2 well slides, 2 small eye droppers, 2 petri dishes, 1 card table

Pond Insect Hunt

(90 minutes)

Set up team specimen collecting stations, spreading them out along the trail near the dock. If using the field microscopes, set up them up on the card table away from the collecting stations with the eye droppers, petri dishes, and well slides.

****If using the field microscopes, please have an adult present at the table that knows how to help students to properly use the well slides and petri dishes for specimens and focus the microscopes.**

Before dividing the class into teams, review the following sampling tips with the students, teachers, and chaperones:

Sampling Tips for Teachers, Students and Chaperones

- **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 other container.**
- Show the students how to use the dip net to collect creatures from the water in a "figure S" motion, like sweeping the floor. Explain how to extend the handle of the aquatic nets.
- Using the gallon bucket, fill up the large tubs with water, having students take turns. 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. There will likely be insects in the bin even before using the nets!
- 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 take their net back to their team's large 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 as it will cloud the water in the clear plastic tub and make it difficult to find and catch aquatic insects. Demonstrate how to swish net to get some of the mud out they

may have scooped up. *A SMALL amount of mud is ok in the tub! Just not so much that it becomes difficult to see what is in the water.*

- Only one student from each team on the dock per net (2 students/team). 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 their hand lenses to view the insects up close.
- Every team member should have at least 3-5 attempts (depending on time) at netting insects off the dock. Nets need to be taken away with enough time for your wrap-up so students can focus on what is in their tubs and work on their journal pages.

IMPORTANT NOTE: Please return live specimens to the pond/wetland area where they were collected. DO NOT DUMP TUB OUT ON TRAIL. Thoroughly rinse ALL equipment and leave out to dry.

Wrap-up Management Connection

(20 min)

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:

- ***Which of the creatures you caught today were insects?***
Remind students many insects found in the water are in their larval stage and may not have all the insect characteristics discussed earlier.
- ***Which appear to be part of another group in the animal kingdom?***
Students should be aware that aquatic worms, crayfish, leeches, snails, minnows and tadpoles are not members of the insect family.
- ***How do these creatures depend on each other and a healthy pond habitat?***
Young aquatic insects, amphibians and fish are the building blocks of the refuge wetlands 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.

INSECT SONG (sung to the “Head, Shoulders, Knees and Toes” tune)

Head (*touch head*)

Thorax (*touch shoulders*)

Abdomen, Abdomen (*touch stomach*)

(*Repeat 2 times*)

6 Legs (*wiggle 3 fingers on each hand*)

And Wings (*flap arms up and down*)

And 2 Antennae! (*Stick 2 fingers out from forehead*)

Head, Thorax, Abdomen, Abdomen!



Pond Insect Survey Inside-Alternative

Materials

- One Aquatic Sampling Kit per station:
 - Kit includes: Specimen sorting containers (1 square tray, 1 ice cube tray); 4 plastic spoons; 1 aquatic insect dichotomous key; 4 hand lens; 1 cooking baster; *Pond Life* field guide
- 1 field microscopes per station with a:
 - well slide, small eye droppers, petri dishes

Pond Insect Hunt

Before the class arrives, collect pond water and pond life samples from a nearby pond (small pond behind visitor center, Peterson Pond at bottom of the Hillside Trail, or drive to Bass Ponds). Set up 5-6 team specimen sampling stations with field microscope supplies in the classroom or lower level of the visitor center and fill each tub with the water you collected.

Assign each team of 4-6 students to one sampling station. Before sending teams to their assigned stations:

- **Remind them 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 other container.**
- Show the students how to collect creatures from the water using their plastic spoon and cooking baster in order to put them into their sorting containers.
- Give a demonstration for how to properly use the field microscopes and well slides.

Rotate students through the stations, having them return all of their organisms to the main tub, rinsing the containers, spoons, slides, etc. before moving on to the next station. Depending on time available and student engagement/behavior, give them around 10 minutes at each station.

Wrap-up Management Connection

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:

- ***Which of the creatures you saw today were insects?***
Remind students many insects found in the water are in their larval stage and may not have all the insect characteristics discussed earlier.

- **Which appear to be part of another group in the animal kingdom?**
Students should be aware that aquatic worms, crayfish, leeches, snails, minnows and tadpoles are not members of the insect family.
- **How do these creatures depend on each other and a healthy pond habitat?**
Young aquatic insects, amphibians and fish are the building blocks of the refuge wetlands 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.

INSECT SONG (sung to the “Head, Shoulders, Knees and Toes” tune)

Head (*touch head*)

Thorax (*touch shoulders*)

Abdomen, Abdomen (*touch stomach*)

(*Repeat 2 times*)

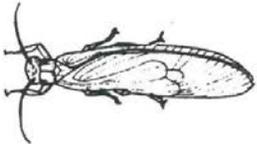
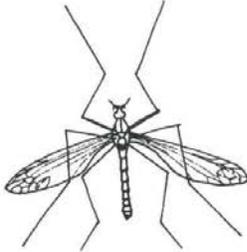
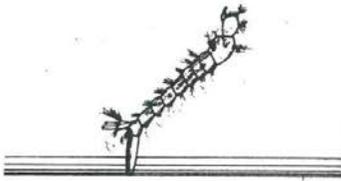
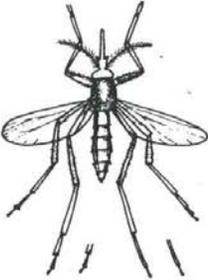
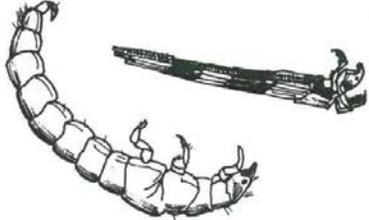
6 Legs (*wiggle 3 fingers on each hand*)

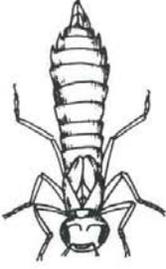
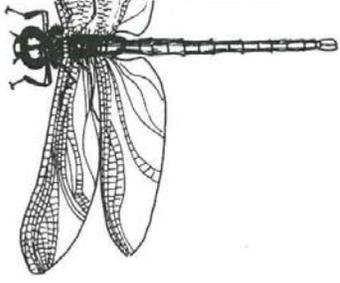
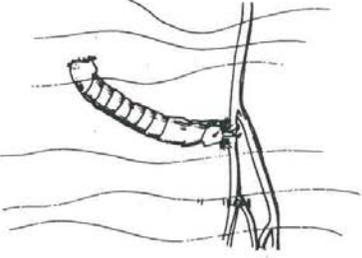
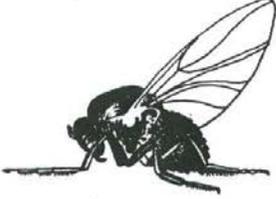
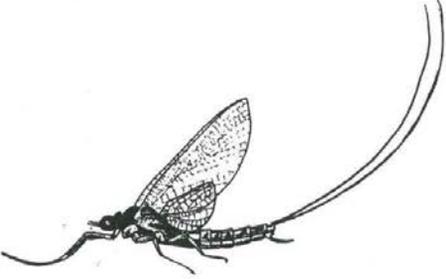
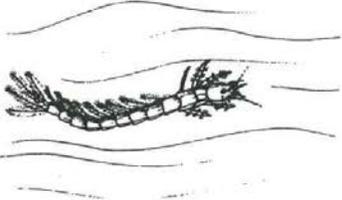
And Wings (*flap arms up and down*)

And 2 Antennae! (*Stick 2 fingers out from forehead*)



Head, Thorax, Abdomen, Abdomen!

<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> 

<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)