

## Lesson 14

# Water Finds

Why do we examine aquatic insects?  
Why are they important to determining the health of the stream?  
What other observations about the stream indicate health?

**GOAL** To understand that aquatic insects indicate health of stream.

**OBJECTIVES** Students will:

- ✓ find and identify aquatic insects
- ✓ work together to search for and collect insects
- ✓ use equipment in the proper manner

**MATERIALS** plastic containers, clipboards, identification chart (Macroinvertebrate Chart.gif on CD), pollution tolerance index, biotic index sheets, pencils, magnifying lenses, wading boots (optional), lenses, pocket microscopes

### CORE CURRICULUM CONTENT STANDARDS

- **Math 1(1,2), 2(1)**
- **Science 1(1), 3(1,2,4), 6(3), 8(2,3)**
- **Social Studies 9(1), 10(2,3), 13(5)**

**VOCABULARY** biotic index, magnify, identify, observation

### PROCEDURES

1. Select a site within the watershed for a field trip. Students will study site to determine health of stream through the study of presence (or absence) of various macroinvertebrates.
2. Prior to site visit, safety considerations and access to stream need to be determined.
3. Upon arriving at site location, distribute instructions and equipment.
4. Explain to the students how to look for and identify aquatic insects. Have students work in groups (with an adult leader) and look under rocks, in vegetation, and at the bottom of streams for aquatic creatures. Distribute plastic containers, nets, clipboards, pencils, and biotic index sheets. Some of the students may wear wading boots, if available. Have students use magnifying lenses or pocket scopes to observe some of the smaller insects.
5. Have students fill plastic containers with water and place macroinvertebrates in the containers for further study. Have students draw creature on identification chart.
6. Have students identify insects with the help of the biotic index key (Macroinvertebrate Chart.gif on CD). Have them determine the type of macroinvertebrate found through this key. Have them calculate the pollution tolerance index by multiplying index value by number of species. (*Sheet at end of lesson.*) This will help students determine the health of the stream.
7. After insects are identified and examined, have students release macroinvertebrates back into the stream.

8. If students are not able to visit a stream, or as a follow-up activity, have students participate in a simulated stream field trip:
  - a. Instruct students to imagine they are going on a field trip to a stream bank. They walk down to the edge of the stream and listen to the ripples of the water. The current of the stream flows rapidly over the rocks and carries cool, clear water downstream.
9. Have students draw a picture of the stream bank. Have students reflect on appearance of the stream that they observed or imagine how a healthy stream might look.
10. Have students listen to two descriptions of insects. They may use on-line dichotomous key ([www.people.virginia.edu/~sos-/w/a/stream-study/keyintro.html](http://www.people.virginia.edu/~sos-/w/a/stream-study/keyintro.html)) to determine insect type.
11. Descriptions are:
  - a. insect has segmented legs, six legs, long body, 3 tails, and gills (*mayfly*)
  - b. insect has segmented legs, six legs, long body, no tail, hard, wide abdomen and large eyes (*dragonfly*)
  - c. Go to website listed above, click on (a) to identify mayfly and (b) to identify dragonfly.
12. Have students complete worksheet if they did not visit an actual stream.

## EXTENSIONS

1. Have students use water thermometers to take temperature of water. Ask what conclusions can be made regarding the temperature and insects that live there. Ask if insects require a cool or warm environment.
2. Ask what the absence of insects tells about the stream (*problem with water quality*). If the stream has only one type of insect, have students determine health of the stream.

## RESOURCES

Edelstein, Karen, *Pond and Stream Safari: A Guide to the Ecology of Aquatic Invertebrates*, 1993, Cornell University Media Services.

Etgen, John, *Healthy Water, Healthy People, Water Quality Educators Guide*, 2003, The Watercourse, Bozeman, Montana 59717 - 0575

## GLOSSARY

**biotic index** - an index of or having to do with life or living organisms

**identify** - to ascertain the origin, nature, or definitive characteristics of

**magnify** - to increase the apparent size of, especially by means of a lens

**observation** - the act of noting and recording something, such as a phenomenon, with instruments

## Macroinvertebrate Identification Chart

**Macroinvertebrate**

**Draw how it looks**

**Mayflies** (Order *Ephemeroptera*)

**Stoneflies** (Order *Plecoptera*)

**Caddisflies** (Order *Trichoptera*)

**Dobsonflies** (Order *Megaloptera*)

**Dragonflies** (Order *Odonata*)

**Snails** (Class *Gastropoda*)

**Craneflies** (Order *Diptera*)

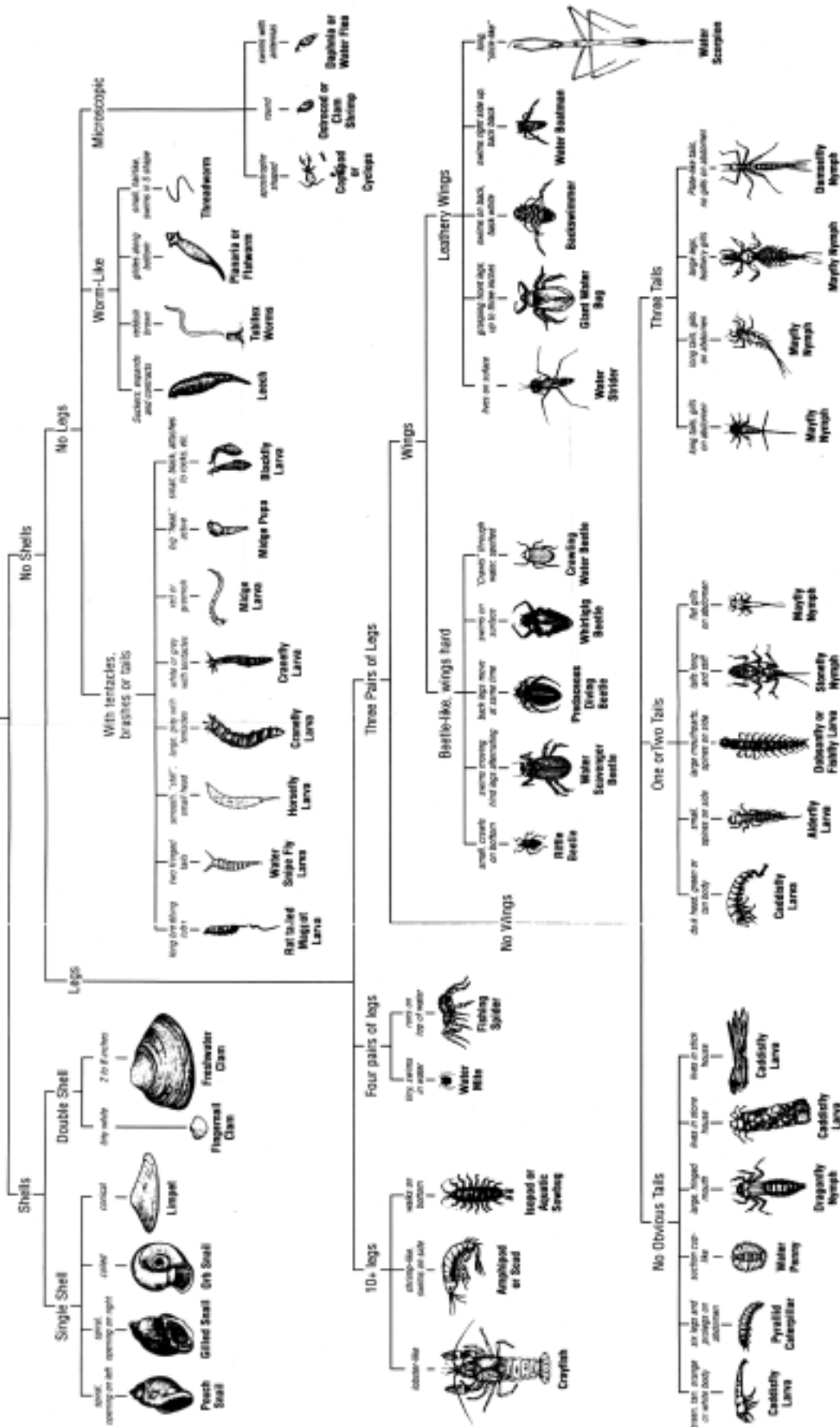
**Midges** (Order *Chironomidae*)

**Tubifex worms** (Class *Oligochaeta*)

**Scuds** (Order *Amphipoda*)

**Leeches** (Class *Hirudinea*)

# Key to Macroinvertebrate Life in the River



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# Macroinvertebrate Data Sheet

## Pollution Tolerance Index

<b>Group 1 Very Intolerant</b> <input type="checkbox"/> Mayflies <input type="checkbox"/> Stoneflies <input type="checkbox"/> Caddisflies <input type="checkbox"/> Dobsonflies <input type="checkbox"/> Dragonflies <input type="checkbox"/> Other	<b>Group 2 Intolerant</b> <input type="checkbox"/> Dragonflies <input type="checkbox"/> Scuds <input type="checkbox"/> Craneflies <input type="checkbox"/> Other	<b>Group 3 Tolerant</b> <input type="checkbox"/> Midges <input type="checkbox"/> Leeches <input type="checkbox"/> Other	<b>Group 4 Very Tolerant</b> <input type="checkbox"/> Snails <input type="checkbox"/> Tubifex Worms <input type="checkbox"/> Other
# of checks = ___ X 4 Group score = ___  Total Score = ___	# of checks = ___ X 3 Group score = ___	# of checks = ___ X 2 Group score = ___	# of checks = ___ X 1 Group score = ___

Water Quality Assessment:

Excellent quality = 23+

Good Quality = 17 – 22

Fair Quality = 11 – 16

Poor Quality = Less than 10

Instructions:

- a. Place a check next to each macroinvertebrate found (not the number found).
- b. Complete the chart for all macroinvertebrates found.
- c. Calculate group scores by multiplying numbers provided.
- d. Total score and compare to assessment.

*Adapted from Healthy Water, Healthy People Water Quality Educators Guide*