
STREAMWATCH SCHOOLS BIOLOGICAL TEST PROCEDURE (GRADES K- 2)

Supplies:

- Water shoes (old sneakers work too...any close-toed shoes are fine!)
- Small nets (aquarium nets are perfect) for collecting macroinvertebrates (small animals-may be referred to as “macros” for short)
- Small trays or dishes for observing macroinvertebrates. They should be at least one inch deep. White trays are preferable, so the macros are easier to see (plastic take-out containers work very well!)
- Larger containers or buckets for observing animals that may be too large for the small trays. They should also be at least one inch deep and preferably white.
- Macroinvertebrate identification key
- Small spoons, watercolor paintbrushes, and/or forceps
- Data sheet
- Clipboard and pencil

***Note:** The Watershed Institute may be able to provide some of these materials for your class. More information is available on our website or you can email dbush@thewatershed.org for more information.

Description:

This document will describe how we can study the animals living in a stream. Some organisms are more tolerant of “poor” water quality than others. The presence or absence of certain species can therefore help us determine water quality. We can then perform chemical tests to confirm that conclusion. **Bold** text indicates something that is important to keep in mind.

Procedure:

- 1) Using your data sheet, perform a visual assessment of your sample site (includes weather, temperature, time since last rain or snow, “use your senses,” “what’s around the stream,” and stream characteristics).
- 2) Getting the temperature
 - a) Start with air temperature. Wait at least 2 minutes before recording the temperature so the thermometer has time to change.
 - b) Hold the thermometer under the stream water for 2 minutes (or have a really good listener do it for you!). Record the temperature.
 - c) Hold the thermometer under the stream water for 2 minutes (or have a really good listener do it for you!). Record the temperature.



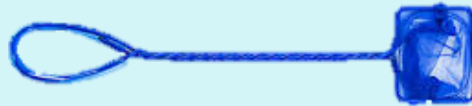
- 3) Fill the small trays with stream water so they're ready for the macros.

Collect macroinvertebrates.

- 4) Finding a good spot:
 - a) Try to find a location along the stream where the ground is flat and clear of slippery rocks.
 - b) Macros like to be where there are lots of ripples and bubbles in the water—more oxygen for them!
 - c) The best practice is to not let students in the water deeper than their knees. If you can't see the bottom, you can stay along the edge of the water but should not go in.

Using the nets

- 5) Have students use the small nets to try to catch what they see!



- a) The nets can be fragile, so students should not put rocks, sticks, or mud in them.

- 6) When someone catches something, have them bring it over to the small trays filled with water. It may be helpful to use the spoons, forceps, or paintbrushes to move the macros into the trays.
 - a) Remember some animals you find may be too large to comfortably fit in the small trays. This is when you could use a larger container or bucket, if you have them.
- 7) If you have a hard time transferring macros from the net, you can turn the net inside-out and put the mesh side of the net under the water in the tray and try moving them that way.



- 8) If you didn't find many macros, try a new spot.

Flipping rocks:

This is a great option if you don't have enough nets for everyone or if your class is having a hard time catching anything.

- 9) If there are lots of rocks at your stream site, you can have some students look for macros under the rocks.
 - a) Make sure they're looking *closely* for small movements on the rocks.
 - b) Use the spoons, paintbrushes, or forceps to gently move macros from the rocks to the small trays.
 - c) **When someone is done looking at a rock, make sure it is gently returned to the same place it was found. Remember that these rocks are the animals' homes!**



Note: Make sure you place the macros you've collected in a shady spot so it doesn't get too hot for them. Whenever possible, try to make sure no individual macro stays out of the stream for more than about 10 minutes; they want to go back home!

Analysis:

4.) On the “Biological Assessment” page of your data sheet, record the air and water temperature that you found. Then, have the students circle the animals that look like what they saw at the stream.

The form is titled "Watershed Institute Biological Assessment for StreamWatch Schools (Grades K-2)". It includes two temperature recording lines: "Air Temperature _____°C" and "Water Temperature _____°C". Below these is a section titled "Living Things: (Circle images that best describe what you see)". This section contains a grid of 20 small images of various organisms: a red worm, a blue jay, a brown circular object, an orange worm, a light-colored insect, a long brown insect, a grasshopper, a dragonfly, a blue beetle, a green turtle, a brown snake, a green fish, a brown frog, a green dragonfly, a brown earthworm, a brown crayfish, a brown snail, a mallard duck, a brown earthworm, a white egret, and a brown insect.

Optional: You may choose to bring a macroinvertebrate identification key with you to the stream. These will be available on our website and will help you and your students identify the macroinvertebrates you find. Often, younger students want to know the names of what they’re seeing. An example is shown below.

Stream Insects & Crustaceans

GROUP ONE TAXA

Pollution sensitive organisms found in good quality water.

1 **Stonefly: Order Plecoptera.** 1/2" - 1 1/2", 6 legs with hooked tips, antennae, 2 hair-like tails. Simozón (no gills) on lower half of body. (See arrow.)

2 **Caddisfly: Order Trichoptera.** Up to 1", 6 hooked legs on upper third of body, 2 hooks at back end. May be in a stick, rock or leaf case with its head sticking out. May have fluffy gill tufts on underside.

3 **Water Penny: Order Coleoptera.** 1/4", flat saucer-shaped body with a raised bump on one side and 6 tiny legs and fluffy gills on the other side. Immature beetle.

4 **Riffle Beetle: Order Coleoptera.** 1/4", oval body covered with tiny hairs, 6 legs, antennae. Walks slowly underneath. Does not swim on surface.

5 **Mayfly: Order Ephemeroptera.** 1/4" - 1", brown, moxie, plate-like or leafy gills on sides of lower body (see arrow), 6 large hooked legs, antennae, 2 or 3 long, hair-like tails. Tails may be webbed together.

6 **Gilled Snail: Class Gastropoda.** Shell opening covered by thin plate called operculum. When opening is facing you, shell usually opens on right.

7 **Dobsonfly (Hellgramite): Family Megaloptera.** 3/4" - 4", dark-colored, 6 legs, large pinching jaws, eight pairs feelers on lower half of body with paired cotton-like gill tufts along underside, short antennae, 2 tails and 2 pairs of hoofs at back end.

GROUP TWO TAXA

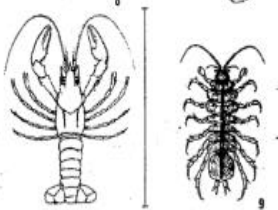
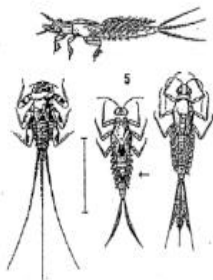
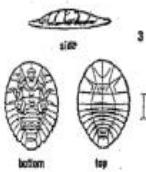
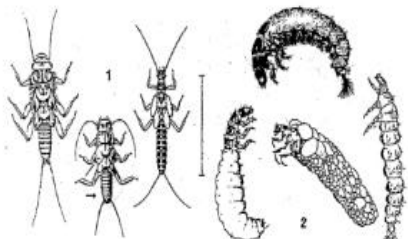
Somewhat pollution tolerant organisms can be in good or fair quality water.

8 **Crayfish: Order Decapoda.** Up to 6", 2 large claws, 8 legs, resembles small lobster.

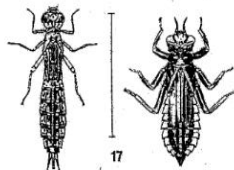
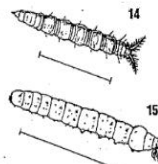
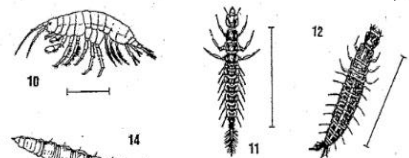
9 **Sowbug: Order Isopoda.** 1/4" - 3/4", gray oblong body wider than it is high, more than 6 legs, long antennae.

Save Our Streams

Inaak Walton League of America
707 Conservation Lane
Gaithersburg, MD 20878-2963
1(800)BUG-WLA



Bar lines indicate relative size



Bar lines indicate relative size

GROUP TWO TAXA CONTINUED

10 **Scud: Order Amphipoda.** 1/4", white to grey, body higher than it is wide, swims sideways, more than 6 legs, resembles small shrimp.

11 **Alderfly Larva: Family Stalidae.** 1" long. Looks like small hellgramite but has 1 long, thin, branched tail at back end (no hooks). No gill tufts underneath.

12 **Fishfly Larva: Family Corydalidae.** Up to 1 1/2" long. Looks like small hellgramite but often a lighter reddish-brown color, or with yellowish streaks. No gill tufts underneath.

13 **Damselfly: Suborder Zygoptera.** 1/2" - 1", large eyes, 6 thin hooked legs, 3 broad ear-shaped tails, positioned like a tripod. Smooth (no gills) on sides of lower half of body. (See arrow.)

14 **Water penny Fly Larva: Family Athericidae (Atherix).** 1/4" - 1", pale to green, tapered body, many caterpillar-like legs, conical head, leafy "horns" at back end.

15 **Crane Fly: Suborder Nematocera.** 1/3" - 2", milky, green, or light brown, plump caterpillar-like segmented body, 4 finger-like lobes at back end.

16 **Beetle Larva: Order Coleoptera.** 1/4" - 1", light-colored, 6 legs on upper half of body, feelers, antennae.

17 **Dragon Fly: Suborder Anisoptera.** 1/2" - 2", large eyes, 6 hooked legs. Wide oval to round abdomen.

18 **Clam: Class Bivalvia.**

GROUP THREE TAXA

Pollution tolerant organisms can be in any quality of water.

19 **Aquatic Worm: Class Oligochaeta.** 1/4" - 2", can be very tiny, thin worm-like body.

20 **Midge Fly Larva: Suborder Nematocera.** Up to 1/4", dark head, worm-like segmented body, 2 tiny legs on each side.

21 **Blackfly Larva: Family Simuliidae.** Up to 1/4", one end of body wider. Black head, suction pad on other end.

22 **Leech: Order Hirudinea.** 1/4" - 2", brown, slimy body, ends with suction pads.

23 **Pouch Snail and Pond Snails: Class Gastropoda.** No operculum. Breathe air. When opening is facing you, shell usually opens on left.

24 **Other Snails: Class Gastropoda.** No operculum. Breathe air. Small shell coils in one plane.



VOCABULARY AND FAQs:

Macroinvertebrates:

This is the word we use to describe most of the animals we find in a stream. The word comes from “macro,” which means we can see the animals with the naked eye, and “invertebrate,” which means they do not have a backbone. It should be noted that this term does not apply to fish, since they have a backbone.

Upstream:

The direction where the stream water is *coming from*. *Downstream* is the direction the water is flowing.

- **What can we do if we can't find any macroinvertebrates?**
 - Often, this problem can be solved by looking at your nets/the rocks of your stream *very* closely. Look for small movements on the rocks, leaves, and sticks. If you still can't find anything, try looking in a different spot. Macros love spots where there are lots of ripples and bubbles in the water because that's where there will be more oxygen. If you still don't have any luck, there are a few other options that you can focus on instead. You can look for signs that animals passed through the area (feathers, poop, tracks, etc.). You can also put more focus on the chemical tests and see if you can use that data to explain *why* you're not finding any macros.