
Wenk Associates

Part 2: Macroinvertebrate Stream Quality Assessment

2.3 Lesson Overview

Lesson Summary

In this activity, students identify and categorize the macroinvertebrates they have collected from their local stream. This collection may be done utilizing the methods outlined in **Lessons 3.1 and 3.2 of Part 3 Macroinvertebrate Design Challenge** or using a method of your choice. They will use their findings to determine stream quality and make suggestions for how to reduce human impacts on their local stream.

Estimated Time

Two, 45-minute class periods

Driving questions

What does the community of macroinvertebrates in our stream tell us about its water quality? What can we do to improve the macroinvertebrate community in our stream?

Necessary Teacher Prior Knowledge

Macroinvertebrates are often used as indicators of water quality because they have the following three traits:

1) They spend all or most of their lives in water
2) They are easy to collect
3) They differ in their tolerance to pollution

Therefore, looking at macroinvertebrates and characteristics is a great way to examine the relationship between form and function. In general, those who are filter feeders and have exposed gills are more sensitive to environmental stress, while those that are air breathers and have hard exteriors are more tolerant to environmental stresses.

If you have never worked with macroinvertebrates, you will want to familiarize yourself with the cards ahead of time to assist in grouping and interpretation.

See **2.4a Common Macros Pictorial Guide** in the Materials tab for notes and photos to help identifying common macros.

Materials Needed (One per small group. Recommend having 3-5 students per group)

- Aquatic Macroinvertebrate Sorting and Identification Guide Placemat from Tip of the Mitt Watershed Council (https://docslib.org/doc/2926092/aquatic-macroinvertebrate-sorting-and-identification-guide#google_vignette). Must be printed large; best if printed on waterproof paper or laminated.
- MiCorps Stream Macroinvertebrate Datasheet (https://micorps.net/wp-content/uploads/2021/08/VSMP-Macro-OrderLevel-Datasheet-2020.pdf) or access **Macroinvertebrate Stream Quality Assessment Sheet.**
- **2.4c Macroinvertebrate Stream Quality Assessment and Analysis Worksheet**
- Hester Dendy samplers
- Leaf packs and/or macroinvertebrates collected by kick sampling.
- Large Pan/Tray
- Petri Dishes
- Wash Water Bottles
- Hand Lens or Dissecting Microscope
- Tweezers
- If you want to preserve specimens:
    - 95% ethyl alcohol
    - 2-4 dram vials

Prior to the Lesson

- Before students identify their macroinvertebrates, it would be helpful to have students practice using the sorting guide placemat and **2.2a.Macroinvertebrate ID Cards** is if you did not do **Lesson 2.2 Card Sort Lesson**.
- This macro identifying and assessment lesson **can be done up to two weeks after the class has collected the macros,** provided you keep the macroinvertebrates in water in a refrigerator.
- It is helpful to have community partners present for this. Usually, a local watershed organization is a great place to connect with for volunteers.

Uploading Your Data

The Lower Grand River Organization of Watershed has an online data repository where you can upload and share the data you collect from your habitat assessment and macroinvertebrate sampling. To do this, go to the LGROW website at www.lgrow.org. Along the top menu, select “Other Resources” and then click on “Data Repository.” There is a searchable map where you can see other chemical and biological data that has been collected. To add your data, click on “Tutorial” and follow the directions. If you use the procedures outlined in this unit, the Biological Index Name would be:

Biological—Hester-Dendy—MiCorps Scoring System
Habitat—EPA Rapid Biological Assessment.

Advantages and Disadvantages of Spring or Fall Sampling

Spring Sampling

Advantages: Spring samples have more mature insect-larvae, making identification easier.
Disadvantages: Spring samples are more likely to be affected by the catastrophic effects of spring floods. Spring samples are also less likely to reflect localized impacts resulting from organic enrichment (e.g., barnyard runoff) because intolerant macroinvertebrates can re-colonize and inhabit impact areas as long as colder water temperatures reduce dissolved oxygen stress and provide temporarily favorable conditions.

Fall Sampling

Advantages: Fall samples are more likely to detect the extent of organic enrichment (low D.O.) problems. Fall samples more closely follow the summer and fall stresses of warm water temperatures, low-flows, and low-D.O. associated with point source and nonpoint source pollution sources, while limiting the time that may elapse in which favorable conditions have existed for the emigration of intolerant species into impacted areas.
Disadvantages: Small or immature larvae of some insect taxa make identification to genus or species level difficult or impossible; however, in most cases insects collected in September and October should be identifiable by a qualified taxonomist.

Source: State of Wisconsin Department of Natural Resources Guidelines for Collecting Macroinvertebrate Samples from Wadable Streams