

Macroinvertebrates- Activity Summary

Florida Department of Conservation

Time requirement: Allow 3-4 hours for this activity as written (including preparation in the classroom, field time, and reflection time once the trip has ended).

Summary of Activity: “Students will examine different aquatic habitats, collect macroinvertebrates from each and use an index to determine water quality based on the relative presence and absence of tolerant and intolerant species of macroinvertebrates found in each sample.”

Concepts to Teach: Marine and Coastal Ecosystems, Habitats, Watersheds, Water Quality, Macroinvertebrates

Standards Addressed: 6.2L.2, 6.3S.1, 7.2E.1, 7.2E.3, 7.3S.1, 7.3S.2, 8.3S.1

Instructional Strategy: Experiential Learning, Scientific Inquiry

Goal(s): Students will understand how macroinvertebrates can be indicators of environmental and habitat quality.

Specific Objectives:

- Identify common macroinvertebrates
- Explain the meaning of tolerant and intolerant species
- Understand the role of an index as a tool for generating a single number for comparison of diverse entities.

Vocabulary:

Macroinvertebrate, bio-indicator, taxa, substrate

Required Materials:

- Dip Net (D-Net)
- Trays
- Latex gloves
- Squirt Bottles
- Magnifying lenses
- Tweezers
- Buckets
- Macroinvertebrate reference charts
- Eye droppers
- Basting syringes

Prerequisites: None

Background: See the original lesson plan for resources for background information. Also, Macroinvertebrate Lunch (available in the Elementary grade band Watershed Unit) has some background information about specific macroinvertebrates.

Preparation: See Lesson Plan

Lesson Procedure/Activity Description Notes

- This is a field activity specific to a Florida system. Most of the macroinvertebrate species will still be relevant to Oregon systems, but some of the steps in the activity will not be possible (i.e. touring the watershed in a glass-bottom boat-unless you keep one of those handy...).
- For a less involved look into the world of macroinvertebrates, see *Macroinvertebrate Lunch* and *Water Canaries* in the Elementary grade band (Watershed Unit).
- For a non-field experience, try this indoor activity (*From Macroinvertebrate Lunch- Bryant Watershed Project*):

In-classroom activity:

1. Divide the class into teams. Each team is given a bag with the macroinvertebrates they “collected” from the stream. These can be cards with pictures of macroinvertebrates, or a variety of chips/ small objects that represent macroinvertebrates. If you choose to use the small objects, provide an identification key.
2. Each team should identify the number and type of macroinvertebrates that they have and list them on the provided worksheet. Have them also describe the locations where the animals were found.

Use this information as a guide for sensitivity:

- Some macroinvertebrates like caddisfly larvae, riffle beetles and mayfly nymphs are very sensitive to small amounts of pollution. As pollution levels start to rise, these are the first creatures to die.
 - Other macroinvertebrates like clams, crayfish, and sowbugs are more resistant to pollution. A stream that is polluted enough to start killing off these invertebrates is showing a moderate amount of pollution.
 - Finally, the toughest macroinvertebrates are aquatic worms, leeches, blackfly larvae and some snails. If they are the only creatures present in the stream, it may indicate an even higher level of pollution.
 - For a visual guide to the creatures listed here, see:
<http://www.watersheds.org/nature/macrov.htm>
3. Each team must determine whether their sample indicates a stream that is *healthy/non-polluted*, *moderately healthy*, or *polluted*. Teams should present their findings to the class and explain why they have come to their conclusions.

Optional activity: Have students make a bar graph of their results. List the macroinvertebrates found on the x-axis and the quantity on the y-axis.

Assessment

- Haiku's are great ways to have students think more deeply about the subjects they are learning about. What better to write a haiku about than macroinvertebrates and healthy watersheds? Have students create haiku's (5-7-5 syllable tradition) and then illustrate what their haiku is about. Grade these haiku's for accuracy (did they use the 5-7-5 tradition? Is the information they present accurate?) and creativity.
- Students can create a "Healthy Watershed Guide" that details ways in which they can promote a healthier local watershed. This can include information on how they know a watershed is healthy, everyday things they can do to promote this health, and natural history guides for some of the plants, animals, and habitats that can be found within their watershed. Arrange with other teachers to have your students present their work to other classes and start a school-wide awareness about healthy watersheds.

Adaptations & Extensions

- Have students come up with ways in which they can help their watershed. Keep this list posted in the classroom and have students report back about any of these actions that they do over a determined period. Plan incentive activities for students if they reach a certain number. Examples could include a pizza party, free time, etc...
- If you want to add in a level of complexity, try having your students identify creatures using this [dichotomous key](#) from the Joseph W. Jones Ecological Research Center in Georgia. It is also in the Resources section on the wiki as a pdf.

Standards Addressed:

6.2L.2- Explain how individual organisms and populations in an ecosystem interact and how changes in populations are related to resources.

6.3S.1- Based on observation and science principles propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data.

7.2E.1- Describe and evaluate the environmental and societal effects of obtaining, using, and managing waste of renewable and non-renewable resources.

7.2E.3- Evaluate natural processes and human activities that affect global environmental change and suggest and evaluate possible solutions to problems.

7.3S.1- Based on observation and science principles propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data.

7.3S.2- Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.

8.3S.1- Based on observation and science principles propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools, techniques, independent and dependent variables, and controls to collect relevant data.