Wetland Invertebrates

Grade Level:
5th

Time:
45 min.

Season:
Spring or Fall

Objectives:
Students will be able to...

- Define the term macroinvertebrate
- Use a dichotomous key to identify aquatic macroinvertebrate
- Determine water quality based on the organisms that are present

Key Concepts:
- Macroinvertebrate
- Water quality
- Benthic
- Diversity
- Density
- Tolerant
- Intolerant

Summary

Students will conduct a wetland investigation by wading in the water and collecting samples of macroinvertebrates. They will use a dichotomous key to identify organisms collected. Students will be able to identify water quality by categorizing the type of invertebrates they find.

Background

"The most direct and effective measure of the integrity of a water body is the status of its living systems" (Karr 1998. Project WET Curriculum and Activity Guide, 2.0). While the surface of a body of water might look like nothing is going on, life is teaming below. Aquatic macroinvertebrates are animals without a backbone that are large enough to be seen without a microscope and can help indicate the health of aquatic environments. Many aquatic macroinvertebrates are benthic, meaning they are typically found on the bottom of a streams or lakes. They do not move or travel very far and provide a quick and easy way to tell if a body of water has a lot of pollution or environmental stress.

Having a diverse population of macroinvertebrates is one way to determine water quality during a wetland investigation. When a site has a lot of environmental stressors, low flows leading to warming, pollution, or low dissolved oxygen levels due to algal blooms, etc., the diversity and density of aquatic macroinvertebrates will be noticeably affected. Many are intolerant to stressors and will die off or move locations. Leaving the more tolerant organisms to reside in the area. After collecting species, you can determine the water quality by examining the macroinvertebrates you have caught. Typically, the higher the number of pollution intolerant organisms, the better the water quality.

Materials:

- ❑ Aquatic D-Nets
- ❑ Four-inch fine mesh aquatic nets
- ❑ Waders or muck boots
- ❑ Buckets
- ❑ Sampling pan (white plastic pan)
- ❑ Bug box (small magnifying chamber)
- ❑ Pipettes
- ❑ Macroinvertebrate identification key- laminated
- ❑ Journal
- ❑ Pencil

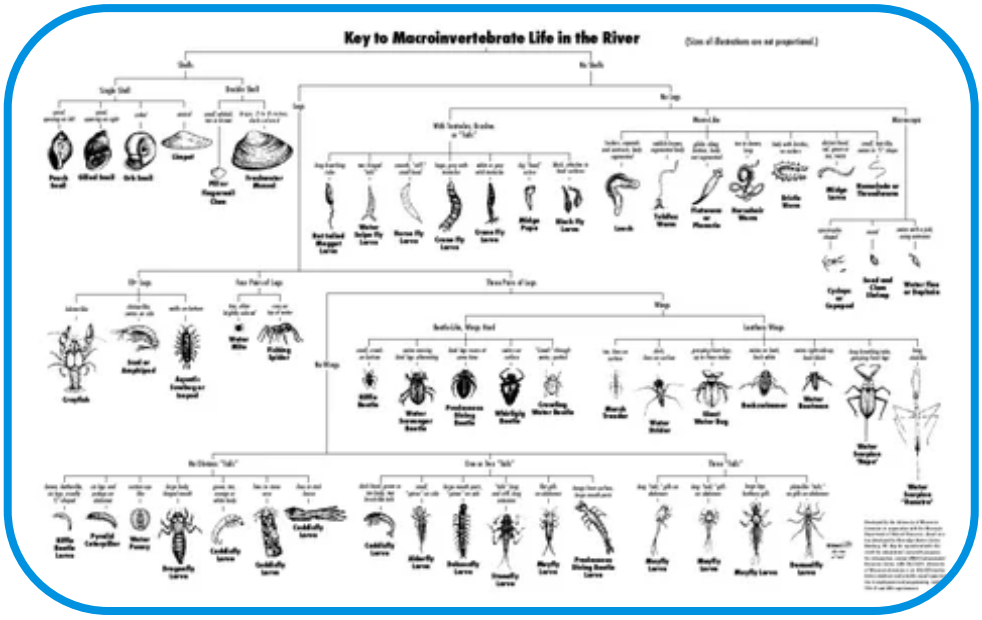
Aquatic D-Net

Sampling Pan

Bug Box

Setup

1. Locate an area in the water to look for invertebrates.
2. Gather all materials.
3. Set up each station to have one sampling pan, two bug boxes, two pipettes, and a *Key to Macroinvertebrate Life in the River*, and *Iowater Benthic Macroinvertebrate Key* (optional).
4. D-Nets and waders will be shared, so keep them in a separate pile.



Procedure

1. Ask the students if they have ever been fishing or playing in the water and observed little bugs? What did they think when they saw those? Did they think they were gross? Cool? What were these bugs doing?
2. Explain to the students that we will be conducting a wetland investigation by finding and identifying aquatic macroinvertebrates.
3. Show the students some examples of macroinvertebrates that they could find in the water or the *Key to Macroinvertebrate Life in the River*.

Procedure (continued)

4. After showing them the Dichotomous Key, explain how to use it.
5. Take the students to the wetland area.
6. Demonstrate how to use a D-Net to gather samples and how their other tools will help them complete their investigation.
7. Divide the students into groups of two or three.
8. Have one student from each group put on a pair of waders or boots and collect samples using nets and buckets.
9. Each group will gather 3-5 samples emptying their nets into their sampling pans.
10. The other students in the group will have the sampling pan filled halfway with water and help clean off the net into the sampling pan.
11. After the students have gathered a good sample, each group will look through their buckets. Some groups may need to let their samples sit to let the sediment settle.
12. Students will use their bug boxes and pipettes to separate out macroinvertebrates to identify.
13. They will use their *Key to Macroinvertebrate Life in the River* to identify their specimens.
14. After they have identified their specimens, use the *Iowater Benthic Macroinvertebrate Key* to help them determine the water quality.
15. Allow students to explore their samples for 10-15 minutes. Then, have them empty their container and a new person collect a new sample if time allows.
16. When there is five minutes left have the students empty out their containers and clean out their nets and return all equipment to a staging area.

Vocabulary

- **Macroinvertebrate – a**nimals without backbones that are large enough to see without a microscope.
- **Benthic –** occurring or found at the bottom of a body of water.
- **Diversity –** the number of different types of organisms in an ecosystem.
- **Density –** the number of individuals in a population.
- **Intolerant –** unable to thrive or survive.
- **Tolerant –** able to survive and thrive under specified conditions or treatment.
- **Specimen -** an individual plant of animal.
- **Dichotomous Key –** a key for the identification of organism based on organism's observable traits. Dichotomous keys consist of a series of choices that will help the user with the correct identification.

Resources

- **Macroinvertebrate dichotomous key**: https://www.tu.org/wp-content/uploads/2019/04/Macroinvertebrate_Key.pdf
- **Iowater Benthic Macroinvertebrate Key:** https://www.polkcountyiowa.gov/media/mtxhcfkh/iowater-benthic-key-old.pdf
- Project WET Foundation. (2013). Water Quality? Ask the Bugs! In *Project WET curriculum and Activity Guide 2.0* (pp. 421–430).
- **Identification Guide to Freshwater Macroinvertebrates:** https://stroudcenter.org/wp-content/uploads/StroudWebsiteMacroKeyFNL.pdf

North Dakota Science Curriculum Standards

This lesson helps support the following state standards:

5-ESS3-1 – Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.