

Wetlands versus Stream Macroinvertebrates



Purpose: To investigate various biomes through observation and comparison of the diversity of life, in particular, the specific number of species, biomass and type of organisms.

Summary: In this exercise, students will use their data from the activity Who Lives in the Water? or Missing Macroinvertebrates and compare it to a macroinvertebrate sample collected from a wetland site.

Background: For background information, see:

- The Macroinvertebrate section of the Utah Stream Team Manual which defines a macroinvertebrate and discusses how macroinvertebrate populations change due to natural and human influences, why macroinvertebrates are important in aquatic ecosystems, how to collect a sample and how to interpret the results.
- The activity Who Lives in the Water? or Missing Macroinvertebrates.

Materials:

- Collection nets
- 1 plastic pan
- Transfer pipettes
- Plastic petri dishes
- Magnifying glasses
- Copies of macroinvertebrate keys
- Copies of student worksheet
- Copies of macroinvertebrate sampling instructions
- Data from activity Who Lives in the Water? or Missing Macroinvertebrates.
- Bucket
- Waders
- Clipboard
- Pencils

Duration:
Classroom
20 minutes
Outdoors
2 sessions,
40 min. each

Setting:
Classroom
Outdoors

Link to the Utah Core Curriculum:
Earth Systems—
9th grade
Standard II-2a
Standard II-2b
Standard II-3a
Standard II-3b

ILO's:
1 a,b,c,d,e,g
2 b
3 a, c, d
4 a-e
(if students report data)
6 b, c

Wetlands versus Stream Macroinvertebrates



Classroom Activity:

1. Ask the students to list differences between a stream biome and a wetland biome (e.g., water velocity, temperature, depth, width, vegetation, sediment, inhabitants). Tell them that for this activity they will compare the diversity of macroinvertebrates found in a stream to those found in a wetland.
2. Explain to the students that they will be using their data from the activity *Who Lives in the Water?* to compare with the new data they collect from a wetland biome.
3. Ask the students about the differences they expect to see in the macroinvertebrates from the two types of biomes. Why would there be differences?
4. Be sure the students are familiar with the macroinvertebrate keys they will be using in the field and also the sampling procedures. If you would like a larger, laminated version of the key provided, please contact USU Water Quality Extension at (435) 797-2580.

Field Activity:

1. Set up stations for sampling macroinvertebrates. These areas should be easily accessible and safe to enter. Each station should include:
 - Wetland sampling instruction sheets (it helps to laminate these!)
 - Waders
 - Collection net
 - Plastic pan
 - Transfer pipettes
 - Magnifying glasses
 - Petri dishes
 - Macroinvertebrate keys

Safety First!

Always consider safety factors when working near water.

2. Divide the students into groups. The groups should be made up of no more than six students to be sure everyone gets to

Wetlands versus Stream Macroinvertebrates

participate. Provide each group with clipboards, pencils, and worksheets. Each group will sample at a different station.

3. Have the students follow the instructions for sampling macroinvertebrates on the macroinvertebrate sampling sheet, and record the information on the macroinvertebrate sorting worksheet.

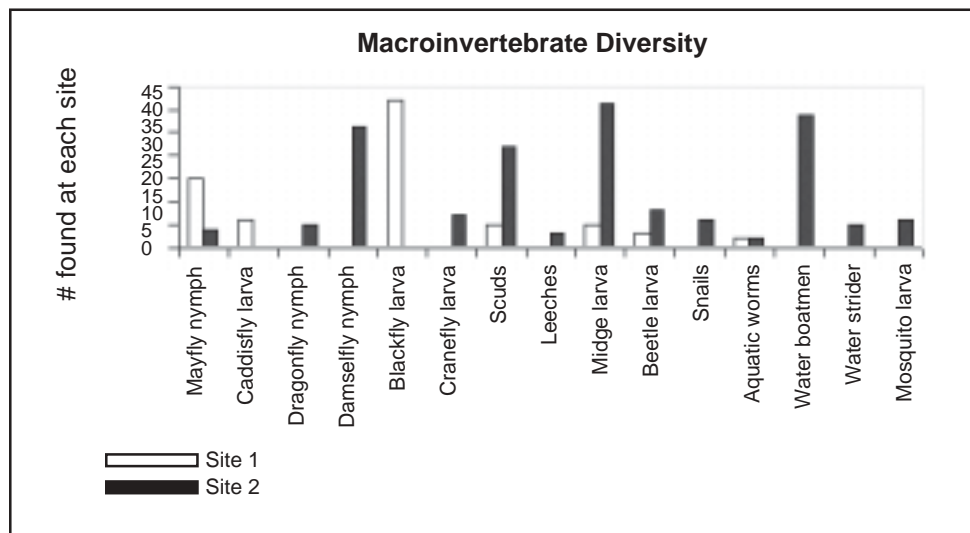
ACTIVITY EXTENSIONS:

- Research factors that would contribute to a decline in the diversity of macroinvertebrates (refer to the activity What's in the Water and/or see the activity Missing Macroinvertebrates).

Applying the Data:

Use the following suggestions to have the students compare their data.

1. Have the students graph the number of each species or types found at each site. Are there entire groups present at one site, but missing at another?
2. Have the students graph the number of individuals found at each site. See example below.
3. Have the students estimate the biomass (organisms per unit area) at each site.



Wetlands versus Stream Macroinvertebrates



Further Discussion:

1. Were there some types of organisms found in both biomes and other types of organisms not found in one or the other?

The most obvious difference in large macroinvertebrates in a wetland is the presence of dragonfly and damselfly larvae. These are rarely found in moving streams because they require emergent vegetation such as cattails for resting, and for laying their eggs. You may also find considerably more swimming beetles (Order Coleoptera) or boatmen and backswimmers (Order Hemiptera) in a wetland than in a stream, because they do better in still water.

Zooplankton are also typically found in wetland ponds. Look for Daphnia and other microscopic animals swimming in the water.

Animals found in moving water may be more stream lined or have adaptations for clinging to rocks compared to animals who live in still water. They may be less streamlined and have adaptations for swimming.

2. What features of those habitats might have caused these differences?

The most obvious difference between the two habitats is flow. Water slowly moves through a wetland, but there is not any measurable velocity. Materials settle in these conditions, typically resulting in a soft, mucky bottom rather than the rocky bottom of many fast streams. Standing water may warm up faster than running water, resulting in changes in oxygen. Both systems have standing plants and mats of plants that cover some of the surfaces, but a pond/wetland is much more likely to have an abundance of suspended single celled plants (algae).

Macroinvertebrate Sorting - Wetlands

| MACROINVERTEBRATES | TALLY OF TYPES OF INDIVIDUALS |
|--|-------------------------------|
| Ephemeroptera (mayflies) | |
| Odonata (dragonflies and damselflies) | |
| Plecoptera (stoneflies) | |
| Trichoptera (caddisflies) | |
| Diptera (flies) | |
| Megaloptera (fishflies and dobsonflies) | |
| Coleoptera (beetles) | |
| Amphipoda (shrimp and scuds) | |
| Isopoda (sow bugs) | |
| Decapoda (crayfish) | |
| Gastropoda (snails) | |
| Pelecypoda (mussels and clams) | |
| Oligochaeta (All segmented worms except leeches) | |
| Hirudinea (leeches) | |
| Other | |

Macroinvertebrate Sampling - Wetlands

Time – 40 minutes

Persons – 2

Materials -

- 1 net
- plastic pan
- transfer pipettes
- plastic petri dishes
- magnifying glasses
- dichotomous key
- ruler

OPTIONAL

- 5 gallon plastic bucket (for decanting)
- waders (for sampling in cold or deep water)

Step 1 - Choose your sample site

Select sampling reaches that are safe and easily accessed by everyone in your group.

Step 2 – Collect your sample.

1. Wade into the water and scoop material from the wetland bottom. Be sure to not scoop up too much sediment with your sample.
2. Push and pull the net through aquatic vegetation.
3. Hand pick organisms from sticks and other structures.
4. Continue this process until you have approximately 100 organisms.

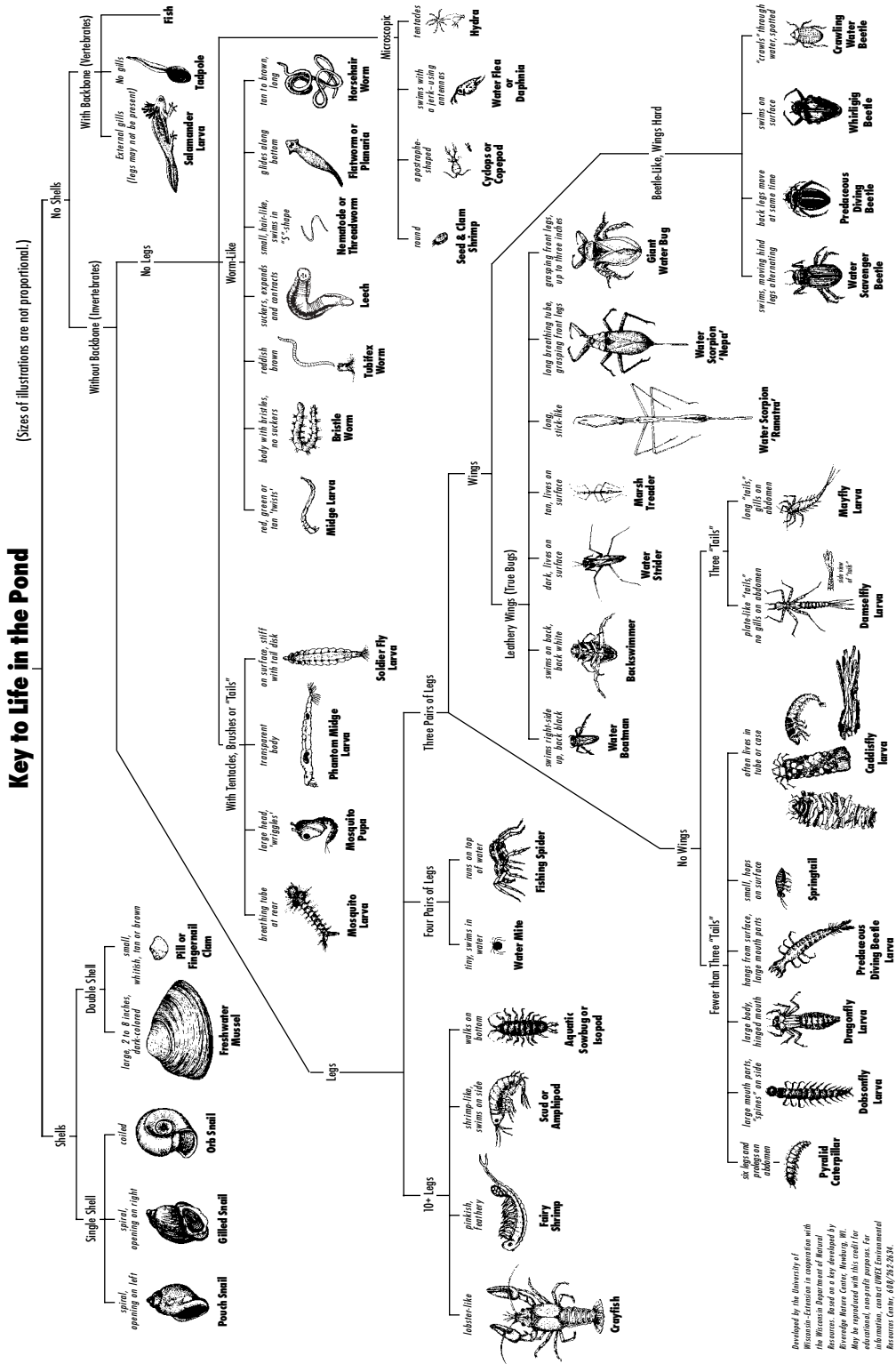
Step 3 – Empty your sample.

1. Hold your sampling net over a plastic pan and use a bucket of water to wash the material into the pan.
2. If your sample contains a lot of sediment, stir the sample in the pan to suspend the animals, and then pour the suspended material back into your net. Rinse the sediment from the pan, and then wash the animals from the net back into the pan.

Step 4 – Sort out 100 macroinvertebrates.

1. Pour most of the water from the pan so that materials and animals are no longer floating. Distribute the material evenly in the bottom of the pan.
2. Take a ruler and divide the material in half. Remove one half of the material from the pan.
3. Redistribute the material again over the bottom of the pan and divide this material again with a ruler.
4. Continue this process until you have a sample with about 100 organisms total.
5. Add some stream water back into the pan for easier sorting.
6. Sort and identify the macroinvertebrates using the key, petri dishes and pipettes.
7. Keep track of the number of the types of organisms on the macroinvertebrate sorting worksheet. For example, if you collect two mayflies, but they have distinct differences, then you have two types of mayflies.

Key to Pond Macroinvertebrates



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