Rocky Substrates in Running Water Macroinvertebrate Protocol

Field Guide

Task

Collect three samples of macroinvertebrates. Where you sample depends on what is available at your site.

Select sampling areas in the following order:

1. 3 different riffles
2. 2 different riffles, 1 run
3. 2 different runs, 1 riffle

If there is no combination of 3 different riffles and runs, then include a pool habitat as long as the pool contains a rocky substrate. If pools and other habitats are present, use the *Multi-habitat Freshwater Macroinvertebrate Protocol*.

What You Need

- ☐ *Freshwater Macroinvertebrate Identification Data Sheet*
- ☐ *Sorting, Identifying and Counting Freshwater Macroinvertebrate Protocol Lab Guide*
- ☐ Hydrosphere Investigation Site Map
- ☐ Equipment and *Hydrosphere Data Sheets* for collection of water chemistry measurements (optional)
- ☐ Square of white fabric (at least 110 cm by 110 cm)
- ☐ Two to six 5-L white buckets
- ☐ Forceps
- ☐ Stop Watch or watch
- ☐ Latex gloves
- ☐ Kick-net
- ☐ Sieve (0.5 mm or smaller)
- ☐ 1 x 1 meter quadrat
- ☐ One to four spray bottles (1 to 2-L)

In the Field

1. Locate the areas where you will collect your three samples on your map and in the water.
2. If collecting water chemistry measurements, do before collecting macroinvertebrates. Be careful not to disturb the areas where you will be collecting macroinvertebrates.
3. Fill a bucket with water from the site.
4. While holding the sieve over a second bucket, pour water through the sieve. Use the sieved water to fill (and refill as needed) the plastic squirt or spray bottles. Keep sieved water in the shade.
5. Rinse sieve downstream of the sampling sites.
6. Begin sampling in the area farthest downstream. Work in a team of 3 or 4. Place the 1 x 1 meter quadrat on the bottom of the stream so that two sides are perpendicular to the water flow.

7. You and a partner hold the Kick-net vertically in the water column, perpendicular to the water flow. Press the Kick-net firmly against the bottom of the streambed lined up with the quadrat and one meter downstream of the quadrat. Water must not flow above or under the net.
8. Start working in the part of the quadrat farthest away from the net. Two other students overturn and scrape the undersides of rocks and wood found in the quadrat. The rocks and wood may be placed outside the quadrat until the sample is collected. Place large crustaceans and mollusks directly in the bucket. If large organisms escape outside the quadrat, mentally note their identity and numbers to record on the *Freshwater Macroinvertebrate Identification Data Sheet* later.
9. After scrapping rocks and wood, use your feet, hands or a stick to disturb the stream bottom within the quadrat for exactly 3 minutes. One student watches the time while one or more students kick.
10. Lift the Kick-net from the water by moving the bottom of the frame forward in a scooping motion so that nothing escapes from the net.
11. Return to shore with net.
12. Place the net over the square of white fabric.
13. Carefully remove large organisms and large debris with your hands or forceps and put them in a tray half filled with the sieved water from the site.
14. Two students lift the net while others squirt water on the net to concentrate all organisms and small debris in one corner of the net.
15. Place the corner of the net with the sample into a bucket. Tip the net and squirt water to move all of the contents into the bucket.
16. Rinse the square of white fabric into the bucket to make sure that you have all the macroinvertebrates in the sample.
17. Place the bucket in the shade until you are ready to sort, identify, and count organisms.
18. Repeat steps 6 -17 for the other two samples.
19. Use the *Sorting, Identifying and Counting Freshwater Macroinvertebrate Protocol Lab Guide* to sort, identify and count the macroinvertebrates you collected.

Multi-habitat Freshwater Macroinvertebrate Protocol

Field Guide

Task

Collect macroinvertebrate samples from one or more of following habitat types: vegetated banks, submersed vegetation, snags, logs, roots, mud, sand, and gravel. The number of samples for each habitat type is proportional to the area that habitat type covers at your hydrosphere study site. Collect a total of 20 samples.

What You Need

- ☐ *Freshwater Macroinvertebrate Identification Data Sheet*
- ☐ Hydrosphere Investigation Site Map
- ☐ Equipment and *Hydrosphere Data Sheets* for collection of water chemistry measurements (optional)
- ☐ One to four spray bottles (1 to 2-L)
- ☐ Two to six 5-L white buckets
- ☐ 1 x 1 meter quadrat (for mud, sand and gravel habitats)
- ☐ Sieve (0.5 mm or smaller)
- ☐ Latex gloves
- ☐ Trowel or shovel
- ☐ D-net
- ☐ Calculator (optional)

In the Field

1. Locate the areas where you will collect your samples on your map and in the water.
2. Estimate the proportion of each accessible habitat type within your hydrosphere study site.
3. Use the *Freshwater Macroinvertebrate Identification Data Sheet* to calculate the number of samples collected within each habitat type for a total of 20 samples.
4. If collecting water chemistry measurements, do before collecting macroinvertebrates. Be careful not to disturb the areas where you will be collecting macroinvertebrates.
5. Fill a bucket with water from the site.
6. While holding the sieve over a second bucket, pour water through the sieve. Use the sieved water to fill (and refill as needed) the spray bottles. Keep sieved water in the shade.
7. Rinse sieve downstream of the sampling sites (or away from sites if water is not flowing).
8. Start macroinvertebrate sampling downstream and move upstream as you collect samples from different habitat types. If the water is not visibly moving, collect samples in the order that will minimize the impact of taking one sample on taking the others.

9. Use the *Field Guides* to collect samples in
    - submersed vegetation,
    - vegetated banks or around snags, logs, and roots,
    - muddy bottom, and
    - gravel and sand.
10. Record the number of samples taken in each habitat on the *Freshwater Macroinvertebrate Identification Data Sheet*. The total should be 20 samples. If the number of samples per habitat is different than what was planned, explain why in the comment section.

Freshwater Macroinvertebrate Sampling Technique

for Submersed Vegetation

Field Guide

In the Field

1. Put the D-net in the water until it almost reaches the bottom in front of the vegetation. Make sure that the net is folded out away from the opening and ready to sample.
2. Push the D-net horizontally into the vegetation bouncing the net into the sediments twice.
3. Vertically bring the D-net up through the vegetation at a constant rate until you reach the surface of the water.
4. Slowly lift the D-net out of the water. As the water flows through, make sure that no organisms escape by climbing out. This is one sample.
5. Use the sieved water in squirt bottle to concentrate all organisms and debris at the bottom of the net.
6. Grab the bottom of the net and overturn the net carefully to release all of its content into a bucket. Use the squirt bottles to make sure that all organisms and debris have been transferred to the bucket.
7. Place the bucket(s) in the shade until you are ready to sort, count and identify organisms.
8. Repeat steps 1-7 until you have collected the number of samples you need for this habitat type.

Freshwater Macroinvertebrate Sampling Technique

for Vegetated Banks or Around Snags, Logs, and Roots

Field Guide

In the Field

1. Hold the D-net in the air so that it unfolds and is ready to sample.
2. In a constant motion, submerge the net in the water, move it into the vegetated bank, or around the snag(s), log(s), or root(s) heading towards the bottom.
3. Bounce the net into the sediments twice.
4. Bring the net up through the water.
5. Slowly lift the D-net out of the water. As the water flows through, make sure that no organisms escape by climbing out. This is one sample.
6. Use the sieved water in squirt bottle to concentrate all organisms and debris at the bottom of the net.
7. Grab the bottom of the net and overturn the net carefully to release all of its content into a bucket. Use the squirt bottles to make sure that all organisms and debris have been transferred to the bucket.
8. Place the bucket(s) in the shade until you are ready to sort, count and identify organisms.
9. Repeat steps 1-8 until you have collected the number of samples you need for this habitat type.

Freshwater Macroinvertebrate Sampling Technique

for Muddy Bottom

Field Guide

In the Field

1. Use a quadrat or estimate a 1 x 1 m square.
2. Place the mouth of the D-net inside one side of the quadrat (downstream if moving water) and lower it 4 cm into the sediments.
3. Move the net over the 1 x 1 m square and then slowly lift the D-net partly out of the water.
4. Move the bottom of the net back and forth in the water to wash out some of the sediments.
5. Lift the net out of the water and as the water flows through, make sure no organisms escape by climbing out. One student may have to hold the net itself underneath since it may be quite heavy. This is one sample.
6. Use the sieved water in squirt bottle to concentrate all organisms and debris at the bottom of the net.
7. Grab the bottom of the net and overturn the net carefully to release all of its content into a bucket. Use the squirt bottles to make sure that all organisms and debris have been transferred to the bucket.
8. Place the bucket(s) in the shade until you are ready to sort, count and identify organisms.
9. Repeat steps 1-8 until you have collected the number of samples you need for this habitat type.

Freshwater Macroinvertebrate Sampling Technique

for Gravel and Sand

Field Guide

In the Field

1. Lay the quadrat on the sand or gravel and place the D-net downstream (if moving water) inside and along one side of the quadrat.
2. One student holds the net while another uses a trowel or shovel to lift the top 4 cm of the substrate and place it into the net. Move the net next to where the student is digging until the whole quadrat is sampled.
3. Slowly lift the D-net partly out of the water. Move the bottom of the net back and forth in the water to wash out the finer sediments.
4. Lift the net out of the water and as the water flows through, make sure no organisms escape by climbing out. One student should hold the net itself underneath to prevent the net from ripping since the sample may be heavy. This is one sample.
5. Use the sieved water in squirt bottle to concentrate all organisms and debris at the bottom of the net.
6. Grab the bottom of the net and overturn the net carefully to release all of its content into a bucket. Use the squirt bottles to make sure that all organisms and debris have been transferred to the bucket.
7. Place the bucket(s) in the shade until you are ready to sort, count and identify organisms.
8. Repeat steps 1-7 until you have collected the number of samples you need for this habitat type.