

Standard Operating Procedure 9: Qualitative Sampling of Macroinvertebrates, version 1.0

The purpose of qualitative sampling of macroinvertebrates is to help estimate the total taxa richness within a reach. Macroinvertebrates are microhabitat specialists. Although cobble/pebble riffles are the preferred microhabitat for the majority of taxa living in streams, numerous other taxa live only in microhabitats that are not amenable to sampling with quantitative devices such as the Portable Invertebrate Box Sampler (PIBS) or Surber sampler. Qualitative samples are taken with a D-frame dip net with a 500- μ m mesh bag. Common microhabitats other than riffles include: root mat/undercut bank, leaf packs, aquatic rooted macrophytes, terrestrial plants hanging in the water, large woody debris, boulder/outcrop, and sand/silt. These additional microhabitats occur in calm as well as fast flowing water. The activities involved with qualitative sampling include: choosing the sample locations, taking the sample, and preserving the sample. Required equipment for this task is a D-frame dip net with a 500- μ m mesh bag, a bag to retain the sample, label with proper site number and replicate, cover datasheet, and 95% ethanol.

Choosing the Sample Locations

One qualitative sample is taken at each stream site (100 meter reach). This sample is a composite of subsamples taken in all of the available microhabitats within the reach. Upon arriving at a designated site, survey the reach from the bank and make note of which microhabitats occur and where they occur within the reach. A subsample should be taken from each microhabitat. For microhabitats that occur in several locations within the reach, take part of the subsample in the upstream half of the reach and part of the subsample in the downstream half of the reach.

Taking the Sample

Qualitative samples are taken with a D-frame dip net, which is used in different manners according to the microhabitat. In general, the personnel sampling with the D-frame dip net should follow the person sampling with the PIBS/Surber as they move up the transect to prevent disturbing riffles for the quantitative samples.

In the root mat/undercut bank, aquatic rooted macrophytes, terrestrial plants hanging in the water, and sand/silt microhabitats, the subsample is taken by gently jabbing the D-frame dip net into the microhabitat several times. The soft jabs should be used to disturb and dislodge macroinvertebrates so that they are available for collection. Depending on the circumstances, a hand or boot may also be used to splash or further disturb macroinvertebrates from the microhabitat.

For the leaf pack subsample, hold the net behind a leaf pack and place a handful of leaves in the net.

The large woody debris and boulder/outcrop subsamples are taken by holding the frame of the net against the surface of the microhabitat, rubbing the surface with the hands, and allowing the dislodged material to wash into the net. These subsamples should be taken in calm and rapidly flowing water.

Standardize the qualitative samples by expending approximately equal effort taking the subsamples from each microhabitat (number of jabs, amount of leaves, area rubbed by hand). Standardization does not have to be as rigorous as the quantitative samples because the qualitative samples are only used to develop a list of taxa present. In general, it takes approximately the same amount of time to collect the single qualitative sample as it takes to collect the three quantitative samples.

All subsamples from different microhabitats are combined in one sample bag. The D-frame dip net should be emptied into the sample bag at frequent intervals (at least after each microhabitat) as the qualitative sampling progresses.

Qualitative samples tend to be bulky and should be reduced in volume by removing large pieces of substrate. Eliminate large intact leaves, segments of live plants, woody debris, and stones by washing them vigorously underwater in the D-frame dip net. Examine each large piece of substrate rapidly by eye for any clinging organisms, then discard the large pieces of substrate. Wash the remaining sample into a corner of the D-frame dip net and put into the sample bag. Remove any salamanders or fish from the sample and return them to the stream. Vertebrates are not included in the macroinvertebrate monitoring program, so there is no reason to include them in the sample. Move to the next microhabitat and repeat. The final entire qualitative sample should not contain more than approximately one pint of material.

Record the Label ID, Sampler (i.e. “D-net”) and the collector’s initials on the site form.

Preserving the Samples

The qualitative benthic samples are preserved in the same manner as the quantitative ones.

Place the samples (as described above) into 1-gallon twist tie bags with the appropriate label.

1. Tags for the PIBS or Surber consist of the site number followed by QT1, QT2, and QT3 representing each of the Quantitative samples. An example using site 1F002 would be “1F002QT1”, “1F002QT2”, and “1F002QT3”. One tag will go in each sample bag starting with QT1 at the lower end of the site and progressing to QT3 at the top of the site (as quantitative samples are collected from a downstream to upstream direction).
2. The tag for the D-net sample is the site number followed by QL for qualitative. An example using site 1F002 would be “1F002QL”. This tag will go in the bag for the D-net sample.
3. A fifth tag is made with just the site number and attached to the outside of the main bag.

Sample bags measure approximately 25 x 35 cm (10 x 14 inches). Quart and Gallon Freezer Ziplock Brand bags can also be used. Generic brands do not seal as well. When the samples are first collected at the study site, tie the open ends loosely to contain the material but to allow for easy untying for preservation. Upon returning to the field packs or vehicle, open the bags and add undiluted 95% ethanol as a preservative. Add enough alcohol to cover the entire sample. Check to see if the bag is leaking. If so, add extra ethanol and place the original bag into a second bag. After tying each sample bag tightly, place all four sample bags (i.e. three

quantitative samples (see SOP 8) and one qualitative sample) into one bag and affix a site label to the outside of that bag. Place the samples in a small cooler or 5-gallon bucket for transport in the vehicle. Try to not stack them on top of each other to prevent rupturing the sample bags. If your hike is more than 15 minutes from the vehicle, carry 0.5 gallons of 95% ethanol to the site and preserve the samples at the site.

Upon returning to headquarters, samples are stored in large plastic totes lined with two trash bags and labeled as aquatic macroinvertebrate specimens. These totes will ultimately be transported to the contractor for macroinvertebrate identification. Place the samples collected that day in a single layer in the trash bags. As noted above, stacking the sample bags can cause them to rupture. Twist the large trash bags closed and place the cover on the box. Samples from 8 to 12 sites can usually be stored in each tote box.

SOP Revision History

All protocols, regardless of how sound they are originally, require modification as new and different information becomes available. SOP version numbers increase incrementally by tenths (e.g. version 1.1, version 1.2...etc.) for minor changes. Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0 ...). Small changes or additions to existing methods will be reviewed in-house by Shenandoah or Mid-Atlantic Network staff. However, if a complete change in methods is sought, an outside review is required.

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #