

Muddy Bottom Protocol

Objective:

Use D-Net to take 20 jabs in the muddy bottom habitats available at the site, collect 100+ macroinvertebrates to identify and tally. Use the VA SOS metrics datasheet to calculate a stream health score.

Step 1: Identify Habitat Composition

Identify which of the four Muddy Bottom habitats are available within the 100 meter site you have selected. The habitat areas are: woody snags, banks, submerged aquatic vegetation, and riffle areas (cobble-stone sized rocks).

Plan to divide your 20 jabs among the habitats available in proportion to their abundance at the site. For example, if 50% of your site is bank, 25% is woody snag, and 25% is submerged aquatic vegetation (SAV) - do 10 jabs in bank, 5 jabs in woody snag, 5 jabs in SAV.

Not all four habitats will always be present at every Muddy Bottom site.



Woody Snag



Stream Bank



**Submerged Aquatic
Vegetation**



Riffle Areas

NOTE: Riffle areas are the areas of highest oxygenation in a stream. When riffles are present, the highest concentration of macroinvertebrates will be found there. If you have four riffles at a site, you should use the Rocky Bottom protocol to get the most accurate and representative score. Use the Muddy Bottom protocol when less than 4 riffles are available.

Step 2: Perform 20 Jabs Along Site

A single jab consists of aggressively thrusting the net into the target habitat for a distance of approximately 1 meter; i.e. the distance the net can be swept while standing in one place. This initial “jab” is followed by 2-3 sweeps of the same area to collect the dislodged organisms.

The following techniques are recommended for sampling the four major productive habitats in muddy bottom streams.

- **Woody snags** – snags or submerged woody debris are sampled by jabbing in medium sized snag material (sticks and branches). Large material (e.g., logs) may be sampled by scraping the net along the surface. Woody debris may be picked up, held in the net, and rubbed by hand.
- **Banks** – stream banks with roots and snag material are sampled similar to snags. Vegetated banks are preferred over unvegetated banks. If the bank is undercut, be sure to jab back under the bank, drawing the net from the stream bottom to the top of the undercut bank.
- **Submerged aquatic vegetation** – submerged macrophytes are sampled in deep water by drawing the net through the vegetation from the bottom to the surface of the water. Macrophytes in shallow water are sampled by bumping the net along the bottom in the macrophyte bed.
- **Riffle areas** – riffles should be sampled by placing the net firmly along the bottom of the stream and using your hand to “rub” around the cobbles in the riffle.

The sample is transferred to the sieve bucket (or other seining device) by banging the net over the bucket opening or by inverting the net into a partially submerged bucket. Contents of the net are transferred into the sieve bucket after each jab. Mark on your datasheet how many jabs were done in each habitat.



Step 3: Processing Your Sample

- Thoroughly mix the sample in the sieve bucket by swishing it around in shallow water. Be sure to keep the entire sample in the bucket!
- Empty the contents of your sieve bucket onto a flat, light colored surface, such as a white sheet, or table. Use a spray bottle to remove all organisms from the bucket. Examine bucket to ensure all bugs have been removed.
- Spread the sample across a square portion of your surface (as large an area as needed so that the material is not clumped into piles). Using a stick as a guide, divide your sample into 4 grids to make 4 squares of the same size. Randomly select one of these squares to start your picking.



- Using forceps, spoons, or pipettes, pick ALL macroinvertebrates from the first grid square and place into ice cube trays. Count the bugs collected from the grid. If you have collected 100+ organisms (not including scuds), you are done and do not need to pick the other grids. If you have not reached 100 organisms, proceed to the second grid. Repeat process until you have reached 100 non-scud organisms OR have fully picked all four grids.

NOTE: You must **FULLY** pick each grid before continuing to the next. Do not stop at 100 non-scud organisms if there are more left in the grid. Picking every bug ensures that the composition of the stream is accurately reflected when calculating a stream health score.

NOTE: Because scuds can be so abundant in a muddy bottom stream, do not count them towards your 100 organism minimum. Collect at least 100 non-scud organisms from your grids to ensure a representative sample is being counted. When doing your metric calculations, you **WILL** include scuds in the total count.