

Modified SWAMP protocol specific to BMI collection

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Suggestions For Meadows

For meadows: The number of sample sites and replicates will depend on the scope and funding of a project. Any data is better than no data; however, monitoring or assessment programs should do their best to capture the natural variation in BMI assemblages amongst both time and space. Basic tenants to follow:

- sampling should occur in replicate,
- in multiple habitats, (riffles, pools etc)
- at different locations in a transect (ie along the side of the stream and in the middle of the stream as well),
- at multiple sites ranging from near where the stream enters the meadow and near where the stream exits the meadow.

By sampling the widest range of locations, programs should be able to capture the maximum amount of the natural variation and represent the BMI community in meadows as accurately as possible. BMI sampling also needs to occur at least several times in order to be really useful.

Steps for Sampling

Step 1.

Identify a point that is approximately 25% of the stream width from the bank. Always be as objective as possible when choosing the sampling spot; resist the urge to sample the “best looking” or most convenient area of the streambed.

Step 2.

Once the sampling spot is identified, place the 500- μ m D-frame net in the water 5-10 cm downstream of the sampling location, depending on flow. Determine net placement based on where disturbed sediment is flowing; you want disturbed sediment to flow easily into the net. Position the net so its mouth is perpendicular to, and facing into, the flow of the water. If there is sufficient current in the area at the sampling spot to fully extend the net, use the normal D-net collection technique (as described in steps 3-6 below) to collect the sub-sample.

Step 3.

Holding the net in position on the substrate, visually define a square shape (a “sampling plot”) on the stream bottom upstream of the net opening, approximately one net-width wide and one net-width long. Because standard D-nets are 12 inches wide, the area within this plot is 1 sq. ft (0.09 sq m). Restrict sampling to within that area.

Step 4.

Working backward from the upstream edge of the sampling plot, check the sampling plot for heavy organisms such as mussels, caddis cases, and snails. Remove these organisms from the substrate by hand and place them into the net. Carefully pick up and rub stones directly in front of the net to remove attached animals. Pick up and clean all of the large rocks within the sampling plot such that all the organisms attached to them are washed downstream into the net. Set these rocks outside the sampling plot after they have been cleaned. Large rocks that protrude less than halfway into the sampling area should be pushed aside. If the substrate is consolidated, bedrock, or comprised of large, heavy rocks, kick and dislodge the substrate (with the feet) to displace BMIs into the net. If a rock cannot be removed from the stream bottom, rub it with your hands or feet (concentrating on cracks or indentations), thereby loosening any attached insects. While disturbing the plot, let the water current carry all loosened material into the net. Do not use a brush to dislodge organisms from substrates.

Step 5.

Once the coarser substrates have been removed from the sampling plot, dig through the remaining underlying material with fingers or a digging tool (e.g., rebar or an abalone iron) to a depth of 1-10 cm (less in sandy streams), where gravels and finer particles are often dominant. Thoroughly manipulate the substrates in the plot to encourage flow to dislodge any resistant organisms. Note: the sampler may spend as much time as necessary to inspect and clean larger substrates, but should take a standard time for the disturbance portion of this step. To the extent practical, reduce the amount of sand particles in the net, as they damage organisms and degrade taxonomic data quality. For slack-water habitats, vigorously kick the remaining finer substrate within the plot using the feet while dragging the net repeatedly through the disturbed area just above the bottom. Keep moving the net so that the organisms trapped in the net will not escape. Continue kicking the substrate and moving the net. For vegetation-choked sampling points, sweep the net through the vegetation. When finished, remove the net from the water with a quick, upward motion to wash the organisms to the bottom of the net.

Step 6.

Let the water run clear before carefully lifting the net. Dip the lower portion of net in the stream several times to remove fine sediments and to concentrate organisms into the end of the net, while being careful to prevent water or foreign material from entering the mouth of the net. Be particularly careful to avoid “backflow” situations, in which collected material restricts flow through the net and the resulting turbulent flow causes collected material to escape the net; this is a major potential source of loss of BMIs during sampling.

Step 7.

Repeat at other sampling locations.

Step 8.

Once samples are collected, fill and label sample jars for transportation to the lab and identification.