9.8 PROTOCOL FOR SAMPLING INVERTEBRATES WTH A NEILL SAMPLER

Overview

The Neill sampler is a metal cylinder with a screened opening on one side and an opposite opening with a net attached (Figure 13).

Sources

Alberta Environment (2006), British Columbia MWLAP (2003)

At a glance

1 Evaluate the study area to determine the dominant substrate type(s). Ensure this substrate is sampled at each site, and choose sites where there is sufficient current to inflate the sampler net.

2 Sample in depths of 30 to 50 cm of water.

3 Collect five samples per site, either in a transect perpendicular to shore or at random.

4 Label five Nalgene bottles with site, date, location, sample number, and sampler's initials.

5 Rinse net thoroughly between sample sites.

6 Ensure that the net is securely mounted on the Neill cylinder.

7 Screw a Nalgene bottle onto the net receptacle.

8 Place the loose end of the net with the bottle attached into the top of the cylinder.

9 Moving in an upstream direction, select an area of undisturbed substrate to sample.

check the seal

10 Press the sampler into the substrate with the opening opposite the net facing the current. Feel inside the cylinder to ensure that there is a good seal. The teeth of the cylinder should be completely buried in the substrate.

11 If the seal is inadequate, rinse the net and bottle clean and select another sampling spot.

12 Once the cylinder is firmly anchored in the substrate, hold it there by standing on the lower handles. Flip the net end with the bottle out of the cylinder and into the water.

characterize the benthic habitat of the site

13 Remove any large stones from inside the cylinder. Scrub them gently by hand and rinse them in the cylinder until no invertebrates remain attached to them. OPTIONAL: if not doing a visual characterization of substrate save these rocks to characterize substrate size.

14 Using the small shovel, stir the substrate for about 1 minute. Ensure that the net does not clog. Clogging will keep invertebrates from collecting in it. To prevent clogging gently stroke and shake the net.

15 Stirring the sediment too vigorously, slow flows, or the net clogging can cause particles to escape out of the upstream opening of the cylinder.

16 Let the inflowing water wash all the suspended particles from the cylinder into the net. The water in the cylinder should become as clear as the river water.

17 Gently stroke the net with your hands so that the particles in it move towards and into the Nalgene bottle.

18 Lift the cylinder out of the water and repeatedly rinse the net by plunging it in and out of the water. Wash all particles and invertebrates into the Nalgene bottle. Check for any invertebrates caught in the net and make sure they are collected.

rinsing the net

19 Press the netting against the bottle mouth, invert the bottle and pour out most of the water. Turn the bottle right side up and splash the net with water to return any particles clinging to it into the bottle.

20 Unscrew the Nalgene bottle from the net and preserve the sample with buffered formalin immediately after completing the collections. Add approximately 1 part of full strength buffered formalin to 10 parts of sample (if the sample contains a large amount of organic matter, algae, and invertebrates, add approximately 1/5 the sample volume of buffered formalin).

21 Determine depth of water at each sample location using a meter stick or calibrated shovel.

22 Use a current meter to obtain water velocity at 0.6 of total depth from surface, at each sample location. Count the number of revolutions in 60 seconds. Use earphones if water is turbid. Repeat the procedure for the remaining samples. Always sample upstream, and away from disturbed areas.

23 Take photographs of the site looking both upstream and downstream. Record and collect the following supporting data to characterize the benthic habitat at that site: Water Depth (use a depth sounder, meter stick or velocity meter rod to measure the water depth at the approximate location that the benthic invertebrate sample was collected); Substrate Characterization: (characterize the sediment grain size of erosional substrates by visually estimating the percent aerial coverage of standard particle size categories according to classification systems); and Other: (wetted and bankfull channel widths; GPS coordinates and site description; % macrophyte cover or qualitative description of epilithic algal cover; qualitative description of the amount of silt present). Depending on study design, supporting information may also need to be measured including pH, DO, temperature, and conductivity directly upstream from the approximate location that the benthic invertebrate sample was collected.

photo needed

Under-ice conditions

1 Use an ice auger to survey for possible sites, keeping depths, substrate, and flows as similar as possible between sites. Choice of a site may require deeper water than cylinder height; the nylon bag over the cylinder will prevent escape of invertebrates. Water up to 1 m deep may be sampled, depending on flow.

2 Use chain-saws/augers to excavate a hole in the ice approximately 1 - 1.5 m wide and 2.5 - 3 m long, oriented with long part of hole in direction of flow. Use ice tongs to extract ice blocks, ensuring that substrate is undisturbed. A crew of three is needed to search for and excavate sites for sampling.

3 Attach guy ropes to bottom handles of cylinder and safety ropes to the two persons in dry suits. Other ends of ropes should be fastened to ice picks pounded into ice for safety. Put shovel through top of cylinder bag and pull drawstring tight around handle.

4 During ice-removal and entry into the hole, care should be taken not to disturb the benthic area to be sampled.

3 people are needed

5 Note that three people are needed to sample efficiently and safely. With one person on ice (upstream of hole) handling the cylinder guy ropes and safety ropes, the samplers enter the downstream end of hole and drill the cylinder into undisturbed substrate.

6 The cylinder should be drilled into substrate far enough to ensure a good seal. Note that two people are needed in the water to ensure enough downward force to keep the cylinder anchored into substrate. Use the shovel to agitate the substrate at bottom of cylinder for approximately 2 minutes. Allow the cylinder to sit for 2-3 minutes to allow invertebrates to drift into net and bottle. Stroke net to prevent clogging.

7 Haul the cylinder out of water. Process the sample following open water procedures described in the previous protocol and put a new bottle onto net. The other person in the water will do a velocity measurement with current meter at the sample location as well as a depth measurement. Often, biofilm samples are required in triplicate from each hole, so nine rocks need to be collected.

8 Take necessary precautions to ensure that samples are not frozen during handling and storage. Samples can be stored in an insulated container (e.g., cooler) equipped with hot water bottles.

photo needed

9 Take a photograph at each site and record supporting information such as: GPS coordinates, water velocity and depth, ice depth, and substrate characteristics (visual assessment).

10 Proceed upstream of first replicate location about one pace to obtain undisturbed substrate, and repeat the sampling procedure. The opening should allow collection of five replicates.