

SOP #18: *Geomorphology*

Version 1.0 (November 7, 2018)

Revision History Log: Only changes in this specific SOP will be logged here. For minor changes, version numbers increase incrementally by hundredths (e.g., version 1.01, version 1.02). Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0). Record the previous version number, new version number, date of revision, author of the revision; identify paragraphs and pages where changes are made, the reason for making the changes, and the person who approved the revision.

Previous Version Number	New Version Number	Revision Date	Author	Changes Made	Reasons for Change	Network Regional Reviewer Approval

Purpose

This Standard Operating Procedure (SOP) describes methods for characterizing habitat conditions at pool sites for the Pacific Island Network Anchialine Pool Monitoring Protocol. Habitat variables that are measured include (1) riparian canopy closure, (2) pool substrate pebble size, (3) water depth, and (4) detritus depth. Each of these variables is measured at various points along a transect.

Transect Location and Setup

The first step to characterizing habitat at a sample pool is to define the transect location. A single transect is selected for habitat characterization at each pool. The transect runs through the center of the pool and the angle at which it crosses the pool should be representative of the pool. The transect is recorded on the map sketch. The same transect is surveyed every visit.

Once the location/angle of the transect is defined, a measuring tape should be pulled across the pool along the transect. If possible, the measuring tape should be set up without walking through the pool, so as to not disturb the detritus in the bottom of the pool. Rather, it is preferable to stretch the measuring tape across the pool by securing one end of the tape at one end of the transect and then carrying the other end of the measuring tape around the perimeter of the pool to the other end of the transect. The measuring tape is then pulled taut and secured on the bank of the pool. Transect length and start time should be recorded on the data sheet. The individual making the habitat measurements should begin at one end of the transect and walk along the transect (through the pool) one time. During this single traverse along the transect, riparian

canopy closure, substrate particle (pebble) size, water depth, and detritus depth should be recorded as described below.

Riparian Canopy Density

Riparian canopy density is measured at four locations at the bank facing outward: the northern, southern, eastern, and western points from the center of the pool. Riparian canopy density is measured using a concave spherical densiometer (Figure 18.1). The densiometer is modified by drawing a right angle on the mirror surface with an indelible marker. This is standard for use in aquatic systems (Brasher et al. 2011, Fitzpatrick et al. 1998). The densiometer is held 20cm above the water surface. The densiometer should be held at an angle such that your forehead appears in the top-center of the mirror. The measurement is made by counting the number of point intersections covered by vegetation (maximum is 17; Figure 18.2). This number is recorded on the data sheet.



Figure 18.1. Using a spherical densiometer to measure riparian canopy closure.

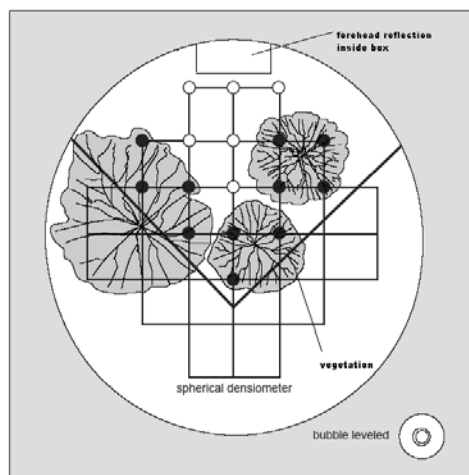


Figure 18.2. A concave spherical densiometer. Note the indelible marker line marking the right angle (above which points are counted), and 17 points of intersection. Closed circles represent line

intersections where vegetation is present and consequently counted in measurement of canopy closure. In this example in 11 out of 17 points are covered by vegetation (Fitzpatrick et al. 1998).

Substrate Particle Size

Beginning at the “Bank 1” or start of the transect (measuring tape reads 0), the individual making the measurements should enter the pool carrying a meter stick. Every 0.25 meters (using the measuring tape pulled across the transect as a guide) the observer should put the meter stick into the water until it touches the substrate. Then, the length of pebble (substrate), in centimeters that the meter stick lands on should be measured across its widest point. The individual making the measurement tells the recorder (on the bank) the pebble size and they record this information on the data sheet. If the meter stick lands on bedrock, a value of “999” is recorded. If the meter stick lands on silt, a value of “0” is recorded, and if the meter stick lands on sand, a value of 0.1 is recorded. This process is repeated every 0.25 meters until the observer reaches the opposite end of the transect (Bank 2).

Water Depth

At the same locations where pebble size measurements are made (i.e., every 0.25 meters) the observer should measure the water depth, in centimeters, using the meter stick. These depths are then reported to a second individual (on the bank) who records this information on the data sheet. Water depth is defined as the vertical distance between the water surface and the top of the substrate. This process is repeated every 0.25 meters until the observer reaches the opposite end of the transect (Bank 2). Tidal stage is also recorded.

Detritus Characterization

At the same locations where pebble size and water depth measurements are made (i.e., every 0.25 meters) the observer should record substrate type (e.g. detritus, sand, rock, aquatic plants, the presence of algae, etc.), including measuring detritus depth in centimeters with the meter stick. This is most easily accomplished by inserting the meter stick to the bottom of the detritus layer, marking the intersection between the top of the detritus layer and the bottom of the water column with your hand, and then removing the meter stick from the water to read the depth of the detritus layer. These depths should be told to a second individual (on the bank) who records this information on the data sheet. Detritus depth is defined as the depth of the top layer of settled decaying material, from the bottom of the water column to the top of the sediment layer. The material composing the detritus layer is variable between different pools and is recorded. For example, in pools where there are abundant invasive fish, the detritus layer will be mainly composed of fish excrement; whereas in pools with thick overhanging riparian vegetation, the detritus layer will be mainly composed of decaying leaves. Locations that occur on bare rock would have a detritus depth of zero. This process is repeated every 0.25 meters until the observer reaches the opposite end of the transect (Bank 2).

Aquatic Plants

The presence, species, and spatial extent of aquatic plants will be included in maps.

Pool Size

The size of pools will be calculated from maps.

Following completion of all habitat measurements (riparian canopy closure, pebble size, water depth, and detritus depth) the “end time” should be recorded.

References

- Brasher, A. M. D., T. Jones, A. C. Farahi, M. P. Miller, and K. Kozar. 2011. Stream monitoring protocol: fish, shrimp, and snails; Pacific Island Network. Natural Resource Report NPS/PACN/NRR—2011/468. National Park Service, Fort Collins, Colorado.
- Fitzpatrick, F. A., I. R. Waite, P. J. D’Arconte, M. R. Meador, M. A. Maupin, and M. E. Gurtz. 1998. Revised methods for characterizing stream habitat in the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 98-4052.