Standard Operation Procedure (SOP) #21

Snail (hīhīwai) Surveys in Hawaii

Version 1.02 (June 3, 2024)

Change History

New Version #	Revision Date	Author	Changes Made	Reasons for Change	Previous Version #
1.01	6/16/2022	Amanda McCutcheon, Anne Farahi	Minor text edits. Added the datasheet, figure with picture of snail eggs.	A few edits and additions were needed for clarification. The datasheet was originally in an Appendix.	1.0
1.02	6/3/2023	Kim Weisenborn	Updated datasheet.	Datasheet had been updated.	1.01

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

Purpose

This SOP describes conducting a snail survey using a quadrat sampling design. This SOP will be used in Hawaii on the island of Maui at HALE and on the island of Molokaʻi at KALA.

Overview of Procedure

Sampling moves from downstream to upstream. A total of 10 quadrats per reach will be surveyed. At KALA, sampling requires one observer collecting snails, and a second observer measuring snails and recording data. At HALE, there are unfortunately very few snails so the snail survey can be done simultaneously with the fish and shrimp survey and a second observer (to measure and record) is only necessary if a snail is found. The observers first collect and measures all snails and count all post-larval snails (spat) that measure less than 5 mm (Ford 1979; Hodges 1992) then proceed to an adjacent area to count egg capsules. The datasheet is included below. Snails are included on the field guide provided in SOP #20 Fish (ʻoʻopu) and Shrimp (ʻōpae) Surveys in Hawaii.

Conducting a Survey for Snails

Within each reach 10 random number pairs are generated using the Cartesian coordinate system. These number pairs are the same coordinates used to conduct the fish and shrimp surveys. The Y coordinate represents the distance in meters upstream between 0 and 30. The X coordinate varies between 0 and 10 and represents distance across the stream as a percentage (1 = 10%, 2 = 20%, etc.).

Coordinates should be ordered using the Y coordinate starting with 0 to facilitate movement upstream. When facing upstream, 0 begins on the left bank. To count snails each observer paces off the meters to the appropriate quadrat location based on the coordinate system and places a thin wire ¼ m^2 quadrat plot frame on the stream bed. Wearing a mask and snorkel, the observer collects all snails (visible or located between and beneath boulders) within the quadrat and measures them with calipers. As demonstrated in Figure SOP 21.1, shell lengths are measured to the nearest millimeter, as the longest distance between the apex (origin of whorl) and the anterior margin (Ford 1979). All loose gravel, cobble, and rocks are then picked up, searched, and replaced, and additional snails found within the quadrat are collected and measured. Snails are returned to the stream after being measured. Place the snail so that it can reattach to the substrate; don't just toss it back in or it may be eaten by a prawn. The number of post-larval snails (referred to as spat on the datasheet) within each quadrat is also counted and recorded. After all snails in the quadrat are measured, the quadrat is flipped upstream and to the right. The observer then counts unhatched egg capsules in the undisturbed top, left 156 cm^2 quadrat (one-quarter of the plot frame) (Figure SOP 21.2).

Figure SOP 21.1. Measure the snail as the longest distance from the apex of the shell to the anterior margin (indicated by the pink line).

Figure SOP 21.2. Snail egg capsules look like white sesame seeds.

HAWAII SNAIL (HIHIWAI) DATASHEET

Park:	Stream:	Reach:	Date:
Observer:		Collect:	Measure:

Quadrat (y, x)							Spat < 5mm	Eggs
Quadrat Notes:								
Quadrat (y, x)							Spat < 5mm	Eggs
Quadrat Notes:								
Quadrat (y, x)							Spat < 5mm	Eggs
Quadrat Notes:								
Quadrat (y, x)							Spat < 5mm	Eggs
Quadrat Notes:								
Quadrat (y, x)							Spat < 5mm	Eggs
Quadrat Notes:								