OPIHI (Our Project In Hawaii's Intertidal) Sampling Protocol

OPIHI is a rocky intertidal monitoring project that uses standardized sampling techniques to estimate the abundance of key species. Although each field trip will vary, the same basic protocols are followed at each intertidal site monitored by OPIHI throughout the Hawaiian Islands.

You will be assigned a group of 3-4 students and will work with them recording data along a transect line.

First Things First

As soon as you are assigned your group and introduced yourself, help the students fill out the top of their data sheet and record the conditions at the site. This is a critical step often overlooked in the excitement of setting up, so please help your group remember this important task.

Species Identification

Species can be identified using pictorial species ID cards we have developed for this project and field guides. You are not expected to be able to identify all (or any!) of the organisms we find at a site. (However, species identification resources are listed at the end of this guide if you are interested.) Your role is to help the students look though the cards and books and work with them to identify a species. Many of the species found at a site will not be on the ID cards, and you'll have to consult a book. Species should be recorded utilizing scientific names unless they cannot be identified. These "unknowns" can be recorded as "other snail" or "other algae", etc. Tiny algae that cannot be identified and are grasslike in shape are "turf algae", pink, purple or pale orange crusts on rocks are recorded as "coralline algae."

The ID cards were developed for intertidal sites on Oahu. Therefore, if you are assisting on a field trip on another island where the species composition is different, the students will have to consult a book more frequently and write in the scientific names of species on their data sheets.

**If your group is unsure about a species identification, ask other groups of students, the other science assistants, and the teacher for help! Pooling knowledge leads to much more accurate identifications.

Transect Lines

Transect lines (plastic measuring tapes) will be laid out by each team of students perpendicular to the water's edge. Help the students lay the lines as straight as possible and maintain equal spacing between groups (generally about 2m). The "0" mark should be in the water. The end of the transect line should be at high

tide level. Since the field trips are scheduled around low tides, you'll have to help the students determine where the high tide level is by looking for pools of water, exposed intertidal organisms and algae, compacted sand, or a line of marine debris (ie. drift algae, sticks, shells) that mark the highest point to which the ocean rises.

The length of transect laid out will depend on the size of the intertidal site. The state department of education does not allow public school students to get wet past their knees. Thus, your transect cannot extend into an area that is too deep. The teacher will have an idea of how far the lines should extend into the water. All the transects lines should extend the same length.

Teams will record data using the transect point-intercept method, recording what lies directly under designated points along the transect line listed on their data sheets. This should be only one species (whatever is on top). For instance, if a snail is on top of an urchin who is on top of an alga that is growing on rock, we would record the snail. We will be recording bare substrate, like rock or sand, but not dead or transient objects like rubbish or driftwood or water. Look boxes (if available) are useful in deeper water.

**Work your way into or out of the water depending on the tide (e.g. if the tide is coming in, you'll want your team or start at the deepest point on the transect). The teacher should be able to tell you this information at the start of the field trip.

Quadrats

**If a class is going on multiple trips to an intertidal site, on the first field trip the teacher may choose not to use quadrats but to use the time in the intertidal to get comfortable using transects and doing a long "diversity search" (see below).

Quadrats (12" PVC squares divided into 36 smaller squares (25 points) with fishing line) are placed along the transect line at designated points. The quadrat should always be placed in the same position, which the class should have decided on a practiced before the field trip. For instance, the quadrat might always be placed on the right side of the transect line with the bottom left corner abutting the designated point on the line. Or the center of the quadrat may always be placed directly over the designated transect point. As long as your group and the whole class is consistent, it does not matter how the quadrat is placed.

Students can record two types of data.

Quadrat point-intercept: The students record what species is under each of the 25 points where the fishing lines cross. Again, this should only be one thing – whatever is on top. They should make sure their point count equals 25 before moving on.

Quadrat percent cover: The students visually estimate how much cover each species takes up in the area within the quadrat. This is done by estimating the percentage different substrate or organisms takes up looking at the entire area of the quadrat (ie. 50 percent sand). Using this method, you do not have to pay attention to the quadrat lines. Alternately, the students may estimate percent cover by recording the number of small squares formed by the fishing line equivalent to that area (ie. 18 squares sand). The students will be able to tell you which method they are using and have practiced in class. Students should double check that their totals for each quadrat add up to 100 percent or 36 squares. Organisms taking up less than 1 square in area can be recorded as fractions, i.e., .5 or .25 squares. Some organisms may be able to be identified but don't take up very much area at all. If they are very small they can be recorded as "< 1" percent/square and not counted in the total percent or number of squares.

Often, a class will just record data using one type of quadrat method. The students should be familiar with the method they will be using. The number of quadrats placed per transect will vary with teacher and intertidal site. The transect points where the students will lay their quadrats should be labeled on their data sheets.

Diversity Search

After finishing with the sampling methods, the students can do a diversity search in the area looking for more species. The teacher may choose to have the students identify any species they find.

Sampling in Cobble Areas

At intertidal sites characterized by cobble (multiple individual rocks, e.g. Sand Island, Oahu; and Mapulehu, Molokai) many of the interesting organisms are found under the rocks, and thus the OPIHI protocol must be modified slightly to capture this hidden diversity. This sampling method is in addition to the standard transect and quadrat measurements taken at a site.

Along the transect, students should turn over rocks at designated points. These may be the same points sampled at for during transect point-intercept or a subset of these points. The students' data sheets will let you know which transects points will incorporate rock turning. If there is no rock under the designated transect point, or the rock directly under the point is too big to flip, the students should flip the nearest rock that is manageable. If there are no rocks within a 1m circumference of the designated point or they are all too big to turn, students should write "N/A" for that point.

The number and species of solitary organisms, like barnacles, under the rock should be counted (e.g. “10 *Nerita picea*”). Students should also count the number of mobile organisms like crabs and brittle stars that may be found hiding under the rock. These will scurry away once the rock is overturned and need to be counted first. Small organisms can be placed into a container to facilitate identification and counting. Some organisms may encrust the bottom of the rock, like sponges. Instead of counting them, estimate the area of the rock underside they cover (e.g. *Palythoa cesais* 30%). Upon completing the count, all organisms should be released to the area near the rock and the rock should be returned to the position in which it was found.

Some classes many make a quick estimate of rock size by measuring the length and width of the base of the rock from the center.

Species Identification Resources

Abbott, Huisman, and Smith

- Best Hawaii marine algae book

Hoover, John. Hawaii’s Sea Creatures: A guide to Hawaii’s Marine Invertebrates

- Best Hawaii invertebrate book, although please remember it is not inclusive (that would make it MUCH bigger!) and covers invertebrates found at many different depths, not just the intertidal.

We rarely capture fish, so identifying them is not essential. The teacher will have a couple of fish books at the intertidal site in the event they are cornered long enough to be identified.

Bishop Museum website: http://hbs.bishopmuseum.org/hbs1.html

University of Hawaii at Manoa’s Algae Pages:
http://www.botany.hawaii.edu/reefalgae/default.htm
http://www.hawaii.edu/reefalgae/invasives/index.htm