



## Science Lesson 8: Point Intercept Survey of the Ocean Floor

### **Hawaii DOE Content Standards:**

Science standards: 1, 2, 3, 4

### **Key concepts:**

Coral reef biology, scientific investigation and data collection, statistical and graphical analyses of data

**Performance indicators:** After completing this lesson, students will . . .

- identify and describe coral reef organisms and their environment
- collect data
- use mathematical concepts to interpret the data

### **Note to the Student:**

"When you have completed this lesson you will be able to identify coral species and calculate their population density on the reef using statistical analyses."

### **Activity at a glance:**

Students will set up and survey a coral reef transect noting the benthic environment.

**Time:** Four-hour ocean lab

**Prerequisite skills:** Swimming, snorkeling

**Skills to be introduced:** Biological surveying

### **Assessment:**

Data sheets with good data and data evaluation, journal, reflections and reports for final portfolio

### **Vocabulary from the REEF Check survey Protocol:**

**Hard coral (HC):** Includes Finger Coral *Porites compressa* , Rice Coral *Montipora capitata*, Mushroom Coral *Fungia scutaria*, these are the reef building corals associated with "coral heads."

**Soft coral (SC):** Include zoanthids, but not sea anemones (the latter go into "Other"). Sea anemones do not occupy much space in the same manner as zoanthids or soft corals.

**Recently killed coral (RKC):** The aim is to record coral that has died within the past year. The coral may be standing or broken into pieces, but appears fresh, white with corallite structures still recognizable, only partially overgrown by encrusting algae, etc.

**Nutrient Indicator Algae (NIA):** The aim is to record blooms of algae that may be responding to high levels of nutrient input. Examples of these types of algae are *Ulva*, various blue green algae, and bubble algae. Algae that are a normal part of a healthy reef, such as *Sargassum* and *Halimeda*, should NOT be recorded as NIA. Instead, record the substrate directly beneath the algae and note this in the comments section.

**Sponge (SP):** All sponges (but no tunicates) are included; the aim is to detect sponge blooms that cover large areas of reef in response to disturbances.

**Rock (RC):** Any hard substrate, whether it is covered (e.g., in turf or encrusting coralline algae, barnacles, oysters, etc.), would be placed in this category. Rock will also include dead coral that is more than about 1 year old, (i.e. it is worn down so that few corallite structures are visible, and covered with a thick layer of encrusting organisms and/or algae).

**Rubble (RB):** Includes rocks between 0.5 and 15 cm diameter. If it is larger than 15 cm, it is rock; smaller than 0.5 cm, it is sand.

**Sand (SD):** In the water, sand falls quickly to the bottom after being dropped.

**Silt/Clay (SI):** Sediment that remains in suspension if disturbed. Note that these are practical definitions, and not geotechnical. Often, silt is present on top of other indicators such as rock. In these instances, silt is recorded if the silt layer is thicker than 1 mm or covers the underlying substrate such that you cannot observe the color of what is underneath. If the color of the underlying substrate can be discerned, then the contact will be counted as the underlying substrate, NOT silt.

**Other (OT):** Any other sessile organism including sea anemones, tunicates, gorgonians or non-living

#### **Additional Vocabulary:**

Benthic, survey, random sample, coral reef ecology

#### **Materials:**

Diving mask and snorkel, sun screen and towel, 20 meter metric tape, weight on string, waterproof data sheets and clipboards, safety equipment, dive buoys

#### **Introduction:**

Coral reef communities represent a diverse, robust, highly interdependent, and environmentally sensitive ecological system. The goal of this activity is to survey a living coral community and document the composition and condition of the organisms in the transect area. Sites can be chosen with historic and current monitoring activities to increase and compare data collection and analysis.

The protocol was inspired by the Reef Check International monitoring program.





## Activity Overview

1. Students will board boats with safety equipment, snorkels and masks, transect lines, clipboards and data sheets. At the survey site students will split into teams to carry out the reef survey protocol. Two students will lie the transect line. The transect line should follow the reef parallel to the shore at a depth of one to two meters. The hundred meter transect will be investigated by 4 pairs of students in 20 meter sections with five meters separating each section.
2. Pairs of students will survey the bottom using the REEF check substrate classification protocol and a plumb line. The plumb line is a 5 mm diameter metal nut or other small metal object (e.g. a fishing weight) tied to a 1.5 m length of string. The weight is dropped at each sampling point and it lands on only one substrate type, which is recorded on to a waterproof data sheets.
3. Students will double check the data sheets on the boat. Substrate type will be recorded at 0.5 m intervals along the line, i.e. at: 0.0 m, 0.5 m, 1.0 m, 1.5 m etc. up to 19.5 m (40 data points per 20 m transect segment)

## Cultural Values

### **Pono**

Understanding the value, beauty, and sensitivity of coral reef ecology

### **Malama**

Learning about and caring for the ocean life

### **Laulima**

Working together as a team to get to the site and collect data.

### **Kokua**

Taking initiative, doing service, clean up, maintenance

### **Lokahi**

Unity, harmony, leadership skills

## Adaptations/ Extensions

**Connections to other curricula or lessons:** Water quality, Mapping, Governance, Rugosity, Photoquadrat, Science lectures 4 & 5, Math lessons 1-6

## Safety

Always check weather and surf conditions before going out on the ocean. Winds should be below 15 knots and surf below the advisory level for the relevant shore.

It is important to mark the dive area with orange floats at each pair of divers. This is to alert other boaters to the presence of divers. Also training in CPR is recommended for at least one of the staff if not everyone. A cell phone or radio should be carried on board in case there is a need for emergency

support. A first aid kit with tourniquet materials is needed on board the boat. All divers should pass a swim test before the activity and divers should work in pairs in order to aid a buddy in trouble. The orange dive marker should double as a floating safety device. Staff on the boat needs to monitor the divers while in the water in case anyone needs assistance.

## **Resources**

Druehl, Louis. (2000). *Pacific Seaweeds*. Madeira Park, BC: Harbour Publishing.

Gulko, David. (1998). *Hawaiian Coral Reef Ecology*. Honolulu: Mutual Publishing.

Hawaii Coral Reef Assessment and Monitoring Program (CRAMP).  
<http://cramp.wcc.hawaii.edu/>

Hodgson, G., Kiene, W., Mihaly, J., Liebeler, J., Shuman, C., and Maun, L.  
(2004). *Reef Check Instruction Manual: A Guide to Reef Check Coral Reef Monitoring*. UCLA: Reef Check, Institute of the Environment.

Jokiel, Paul. <http://www.hawaii.edu/HIMB/Faculty/jokiel.html>

Krupp, David. <http://www.hawaii.edu/HIMB/Faculty/krupp.html>

