



## Science Lesson 9: Photoquadrat 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
- conduct a random sampling to collect quantitative data

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

“When you have completed this lesson you will be able sample the reef habitat using a digital camera for the quantitative survey.”

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

Students will set up and survey a coral reef transect photographing 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:**

Benthic, survey, random sample, coral reef ecology, photoquadrat, monopod, digital photo, known area

### **Materials:**

Diving mask and snorkel, sun screen and towel, 20 meter metric tape, digital camera with water housing and monopod, 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 of the transect

area. Sites can be chosen with historic and current monitoring activities to compare data collection and analysis.

A photoquadrat is created by taking a photo of a known area of the reef. This is achieved by taking the photo at a known height above the bottom of the reef using a monopod. It is also important that the camera be zoomed all the way out so as not to change the dimensions of the quadrat. This sample of a known area can then be further sampled for cover using a random sampling program or a traditional quadrat sample of the photograph.

The protocol was inspired by the Coral Reef Assessment and Monitoring Program CRAMP.

## **Activity Overview**

1. Students will board boats with safety equipment, snorkels and masks, transect lines, clipboards and data sheets, monopods and digital cameras with underwater housing. 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 pairs of students in 20 meter sections with five meters separating each section.
2. Each pair of snorkelers will have a pre-generated list of five random number pairs organized by the first number from lowest to highest on their data sheet. The numbers will tell the photographer where to place the photoquadrat. The first number is generated from 0 to 20 and the second number 1 to 5. The first number is the distance in meters from the start of the transect and the second is the movement right or left to the transect line with the number one being two meters to the left, 3 on the transect, and five two meters to the right of the transect line.
3. The divers will proceed to the first point and dive to the bottom placing the monopod on the substrate at a level orientation. A second picture with an indication of the photoquadrat location should be taken at the same site.
4. When all of the sites have been photographed the divers retrieve the transect line and return to the boat.
5. After downloading the photos and saving those on hard drive and disk for archiving, the files are color corrected in Photoshop and then opened in the Pointgrid software for digital sampling of the benthic area.

## **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, Point intercept survey, 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>