



LiMPETS Monitoring Site: Shell Beach



Directions

This site is located at the north end of Shell Beach. From US 101, take the Spyglass exit and turn towards the ocean. Turn right onto Shell Beach Rd. Drive 0.2 miles and park in the public access lot on the right across from the Cliffs Resort (Figure 1). There is a public path on the right of the hotel that leads 0.1 miles to stairs and beach access (Figure 2).

All of the monitoring will take place on a discrete raised reef below the stairs. The transect start is approximately 23 meters southeast from the corner of the stair landing (Figure 3).

GPS coordinates: start of transect 35 09.908 120 41.540, end of transect 35 09.892 120 41.544



Figure 1: Location of Shell Beach parking area and site.

Sampling procedures

Locations of sampling areas and procedures are outlined below. Three sampling methods are used at Shell Beach for monitoring:

- 1) Random quadrats
- 2) Size measurements (owl limpets)
- 3) Total organism counts (ochre sea stars)



Figure 2. Location of public trail alongside Cliffs Resort.



Figure 3. Overview of reef from stairs

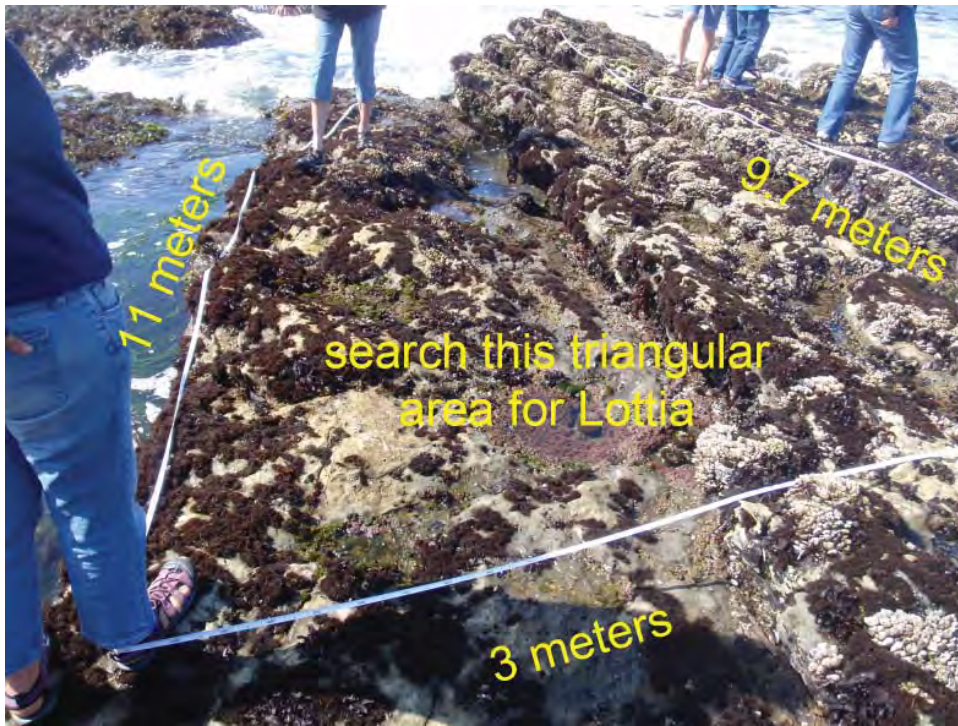


Figure 6. The owl limpet search area is a triangle on the eastern edge of the permanent reef.



1. Random Quadrats

The beginning of the transect is located on the reef 23 meters from the corner of the stair landing. You will step over a major crack in the reef and the transect begins on the offshore side of this crack (Figure 4). Run the transect out for 36 meters in a SE direction. The transect will end in a small pool (Figure 5).

GPS start: 35 09.908 120 41.540

GPS end: 35 09.892 120 41.544

The permanent plot within which random quadrat counts are taken is centered on this transect and is approximately 300m² in size. The plot is broken down into 3 zones, each 10 meters long: Barnacle, Turfweed and Mussel. Survey 10 random quadrats in each zone for 30 total.

- Using the random number table, choose a number between 00.0 and 10.0 for the Barnacle zone, 10 and 20 for the Turfweed zone and 20.0 to 36.0 for the Mussel zone. Locate this number along tape.
- Choose a second random number between 0.0 and 10. This number indicates how far from the base transect line you will place your quadrat. Use the third random number table to decide whether your location will be east or west of the base transect. Lay down a second transect tape, perpendicular to the first, to find this location. If the location is off the edge of the reef, try the opposing side of the tape.
- Center the quadrat over the meter tape.
- Record species abundance within the quadrats as directed on the "Random Quadrat Data Sheet."
- Count only live organisms and algae attached within the quadrat.
- Complete 10 quadrats for each of the three permanent areas, for 30 quads total.

Note: In some cases, the random numbers will place the quadrat in a deep pool or drop-off. When this happens, place the quadrat on a level area as close to the designated coordinates as possible.

2. Size Measurements

Owl limpets: Owl limpets are surveyed in a permanent area on the rocky reef near the end of the transect, to



Figure 4. Transect showing start.



Figure 5. End of the transect, at 36m at a small pool.

the east (left) side (Figure 6). Locate this area. This area is triangular in shape. Start the transect tape at the outer most SE edge of the reef flat, where there is a distinct ledge. Run the tape back towards the cliffs 11 meters. Make a 70 degree turn to the left for 3 meters at a rocky knob, again turn 70 degrees to the left and return 8.7 meters back to the start.



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Count all limpets over 2.5 cm within this area.

- Designate one person as the recorder. This person is responsible for completing the data sheet. The others should be searching for limpets and should tell the recorder what they see as they see it.
- Use the rulers (or if in a crack, the paper clips) to measure the length of each limpet. Round up to the nearest 0.5 cm. Do not count limpets that are smaller than 2.5 cm.
- Look carefully in cracks, crevices and under ledges
- Of course, some individuals will be missed, so counts are just estimates of the true abundance. If 5-10 teams count owl limpets in the same area, the average number counted provides a reasonable estimate that can be compared over time.



Figure 7: Measure owl limpets lengthwise using a ruler. Round up to the nearest 0.5 cm. The limpet above should be recorded as “5 cm” in length.

3. Total Organism Counts

Ochre sea stars

Ochre sea stars are surveyed on the entire reef and along the sides. Surge channels on either side of the reef mark the sides of the plot. Dimensions of this area are approximately 50 m x 20 m.

- Use a meter tape to measure and mark the boundaries of the area (see Figure 4).
- Systematically search the whole area in teams of 2 or 3, moving back and forth in successive swaths about the width of your outstretched arms.
- Record what you see, as you go.
- Record ochre sea stars as “orange” or “purple/brown”.
- When counts are finished, record the length of the count, in minutes, on the data sheet. Each count should last approximately 20 minutes.



Figure 8: Count all ochre sea stars found within the permanent area. Record individuals as “orange” or “purple/brown”.