



Directions

1. The Almar Avenue site is along West Cliff Drive in the city of Santa Cruz, between Almar and Fair Avenues. From Mission St (Highway 1) turn on Swift Street. Go to the end and turn left on West Cliff Drive. Follow West Cliff until Fair Avenue, and park on West Cliff Drive just past Fair Avenue.
2. A set of stairs next to a large cypress tree, across from 1212 West Cliff Drive, conveniently leads from the pedestrian/bike path to the site.
3. At the bottom of the stairs, the monitoring sites are split into two separate areas. See Figure 6 and the instructions for the monitoring you intend to perform.
4. Restrooms are located either at Natural Bridges State Beach (east on West Cliff Drive) or at Lighthouse Field near the lighthouse (west on West Cliff Drive).



Figure 1. The Almar Avenue site is along West Cliff Drive in Santa Cruz, CA.



Figure 2. Almar Avenue site, looking towards West Cliff Drive and the cypress tree.

Sampling procedures

Four sampling methods are used at Almar Avenue 1) Vertical transect, 2) Total organism counts in a permanent area, 3) Random quadrats in a permanent plot, 4). Size measurements in a permanent area.



Figure 3. Surfgrass is common in the low intertidal at the Almar Avenue site.



Vertical Transect

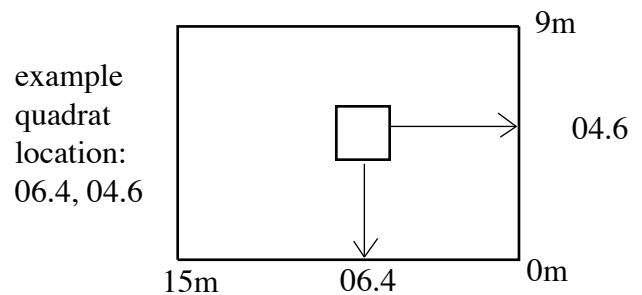
1. Once at the bottom of the stairs, to the left is the location for the vertical transect. The vertical transect is delineated with two steel rods one at 0m and another at 17.8 m, and one eyebolt at 12.5m. The GPS locations for the top and bottom rods and the eyebolt are: N 36° 57.076' W 122° 02.552', N 36° 57.071' W 122° 02.545', and N 36° 57.068' W 122° 02.543', respectively. See Figure 6.
2. Center the quadrats over the transect tape every 3m at: 0m, 3m, 6m, 9m, 12m, 15m, and 17.8m.
3. Record the species abundance within each quadrat as instructed on the data sheet. For algae, only the square(s) that contain a holdfast should be recorded. Count only live organisms, this may require some close investigation.

Random Quadrats in a Permanent Plot

1. The permanent plot at Almar Avenue is a 15 x 9m plot to the right (west) of the bottom of the stairs within the permanent plot for sea stars, see Figure 6. The 0m eyebolt for this plot is on the southwestern edge of the rocky outcrop. Attach the zero end of a meter tape to the 0m eyebolt at the base of the rock outcrop and extend it along the southern, seaward edge of the platform to the 15m eyebolt. Mussels may crowd over the 15-m eyebolt requiring you to lay the line over the eyebolt, holding it in place with a weight.
2. The position of the quadrats is determined by a series of two, three-digit numbers, selected at random before going out in the field. The first number should be between 00.0 and 15.0. The second number should be between 00.0 and 09.0. Find the first number on the meter tape of the permanent plot, and then extend a second meter tape, perpendicular to the first, until it reaches the second number. Place the quadrat down so that the number is in the center.



Figure 4. Almar Avenue site at 0m of random plot.



3. Data sheets for the random quadrats are the same as those used for the vertical transects. Record the species abundance within each quadrat as instructed on the data sheet. For algae, only the square(s) that contain the holdfast should be recorded. Count only live organisms, this may require some close investigation.



Total Organism Counts and Size Measurements in a Permanent Area

Species counted are ochre sea stars, two solitary anemones, sunburst and giant green anemones, and owl limpets (also measured). Teams of 2 or 3 students should tackle total organism counts for one species at a time. Systematically search the whole area by moving back and forth across it, searching successive swaths about the width of your outstretched arms.

1. Ochre sea stars (*Pisaster ochraceus*): Both sea star color phases (orange and brown/purple) are counted. The orange color phase will be easy to spot, while the purple/brown phase will require close inspection of rocks, overhangs and under algae. The platform to the right (west) of the stairs is well delineated and can be used to count sea stars both on the top of the platform and around the sides of the platform. See the red area in Figure 6 below.

2. Giant green anemone (*Anthopleura xanthogrammica*) and the sunburst anemone (*Anthopleura sola*): The delineated area where solitary sea anemones are counted is on top of the platform with the vertical transect, between the base of the stairs and the 0m mark of the vertical transect. A transect tape or other suitable line can be stretched from the 0m rod of the vertical transect to the southeast corner of the stairs. The large, solitary anemones occur mainly in pools. See the blue area in Figure 6.

Size Measurements in a Permanent Area for Owl Limpets

Owl limpets (*Lottia gigantea*) are found mostly around the raised outcrop to the right (west) of the bottom of the stairs. This area is inside of the permanent plot for sea stars. Only limpets 2.5cm or larger are counted and measured using a caliper or flexible ruler. See the green area in Figure 6.



Figure 5. Closeup of an owl limpet.

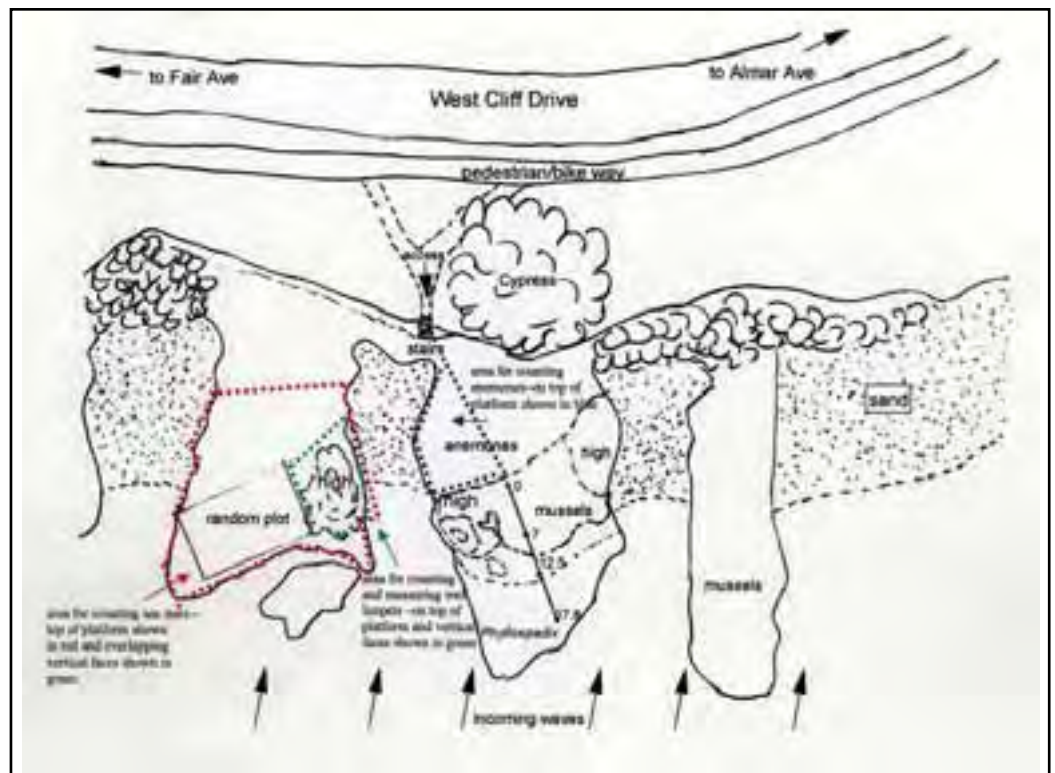


Figure 6. Hand drawn map of the monitoring area