Sea urchin recruitment brush methods and general information

General: This study aims to follow population dynamics of Sea Urchin settlers (*Strongylocentrotus purpuratus* and *Mesocentrotus franciscanus*) over time and space. Settlement is measured as the number of individuals found on 85 cm^2 wood-backed brushes with polypropelene bristles. Brushes are fastened to ropes and deployed in two week intervals from 1990 to present from the piers at the following six sites: Anacapa Island, Ellwood Pier, Gaviota Pier, Stearns Wharf, Scripps Pier, Ocean Beach Pier and Point Cabrillo (see Temporal, Geographic and spatial coverage page for GPS coordinates). By 1997 taxonomic coverage at all sites was extended to include settlement of molluscs and crabs.

Deployment: Two pairs of brushes are cable tied back to back on a ½" rope that extends from the pier to 1m from the seafloor. Knots are tied in the rope above and below each brush pair to keep them in place. Prior to deployment, a ½" channel should be routed in each brush and brushes should be leached in seawater for a minimum of 1 month. The number of pairs of brushes on a line varies among sites and years (minimum of 2 pairs deployed, maximum of 5 pairs deployed per rope). Typically, there are 2 pairs of brushes deployed on each line (see Figure 1) and two lines deployed per site. The first pair of brushes is fastened ~ 1 meter above the seafloor and the second pair is attached to the rope ~ 1 brush-length (~ 20 cm) above the first. In this case the brush designations are (starting from the uppermost pair): top1 top2 (upper pair) bot 1 bot 2 (for the lower pair).

Retrieval: Brushes are retrieved two weeks after deployment, placed in a labeled Ziploc bag (one brush per bag) and brought to the lab for examination. At this time, new brushes are deployed in the place of those retrieved. If possible, the rope should be cleaned or replaced for the next deployment to reduce fouling, which may become settling areas for the urchins rather than the brushes.

Lab examination: Once brought into the lab, brushes are removed one by one from collection bags, placed bristles down in a sonicator, and filled with seawater till the brush is covered. Collection bags are rinsed and reused for the next deployment. The sonicator should be used on each brush for a minimum of 5 minutes while removing the brush from the water and scrubbing the bristles back and forth with a heavy probe or pencil over the water to remove any material still clinging. If no sonicator is available, scrubbing and alternating with squirted seawater can be done until all the material seems to be cleaned off. Once all material is removed, rinse the brush and allow it to dry for the next deployment.

Filter the sample through 350-micron mesh and put the material in a Petri dish for examination under a microscope. Use a consistent method for scanning each Petri dish. Count, remove and identify all urchins.

Collected urchins should be placed in vials with 95% ETOH and a label or tape with the following information:

- Date of collection, including year
- Location of site
- Location of brush on the rope, ie. top or bot
- Number of urchins in the vial.

Use **one vial per brush and one brush per vial** for urchins. Other material that may be collected can be combined in one vial per date and site.

Data sheets should list:

The beginning and ending date that the brushes were in the water
The loss or entanglement of any brushes
The number of urchins found

When no urchins are found put zeros on the data sheet to indicate that it is not missing data.

Identifying urchins: The urchin species most commonly found is *Strongylocentrotus purpuratus*. It can be distinguished from *S. franciscanus* by the lack of dorsal pedicellariae (although it often has latitudinal pedicellariae), *S. franciscanus* will have 1-3 (see Figure 2 (drawing) and Figure 3 (photos)). The white sea urchin, *Lytechinus anamesus* also possess dorsal pedicellariae but does not have any pigmentation and the spines are slightly longer in most cases. Pigmentation cannot be used to distinguish *S. purpuratus* from *S. franciscanus*; only the presence of dorsal pedicellariae can be used. When possible look at the animals when they are still alive, it is much easier to see their skeletal structures.

Supplies needed for recruitment brushes

Field supplies:

Rope long enough to reach 1 meter above bottom, varies by location

Weight heavy enough to keep the rope straight but not too heavy that it can't be lifted by one person

Brushes (Durabroom model 028S, Industries for the Blind, Inc. 445 S. Curtis Rd. West Allis, WI 53214, 800.642.8778, ibmilw.com)

Cable ties

Cable tie cutter

Bags for the brushes with brush location written on them

Lab supplies:

Sonicator if possible (we use a Fisher Scientific FS30)

Petri dish

Cup with 350-micron screen (can't be bought, needs to be made by cutting the side out of a cup and gluing the screen over the opening)

Dissecting microscope

Micro-forceps

Seawater supply

Vials and labels or tape

Data sheets

95% ETOH

Figure 1. Diagram of brushes deployed in the field. Four brushes deployed in the Point Loma kelp forest showing designation of bottom (bot 1 & 2) and top (top 1 & 2) brushes.

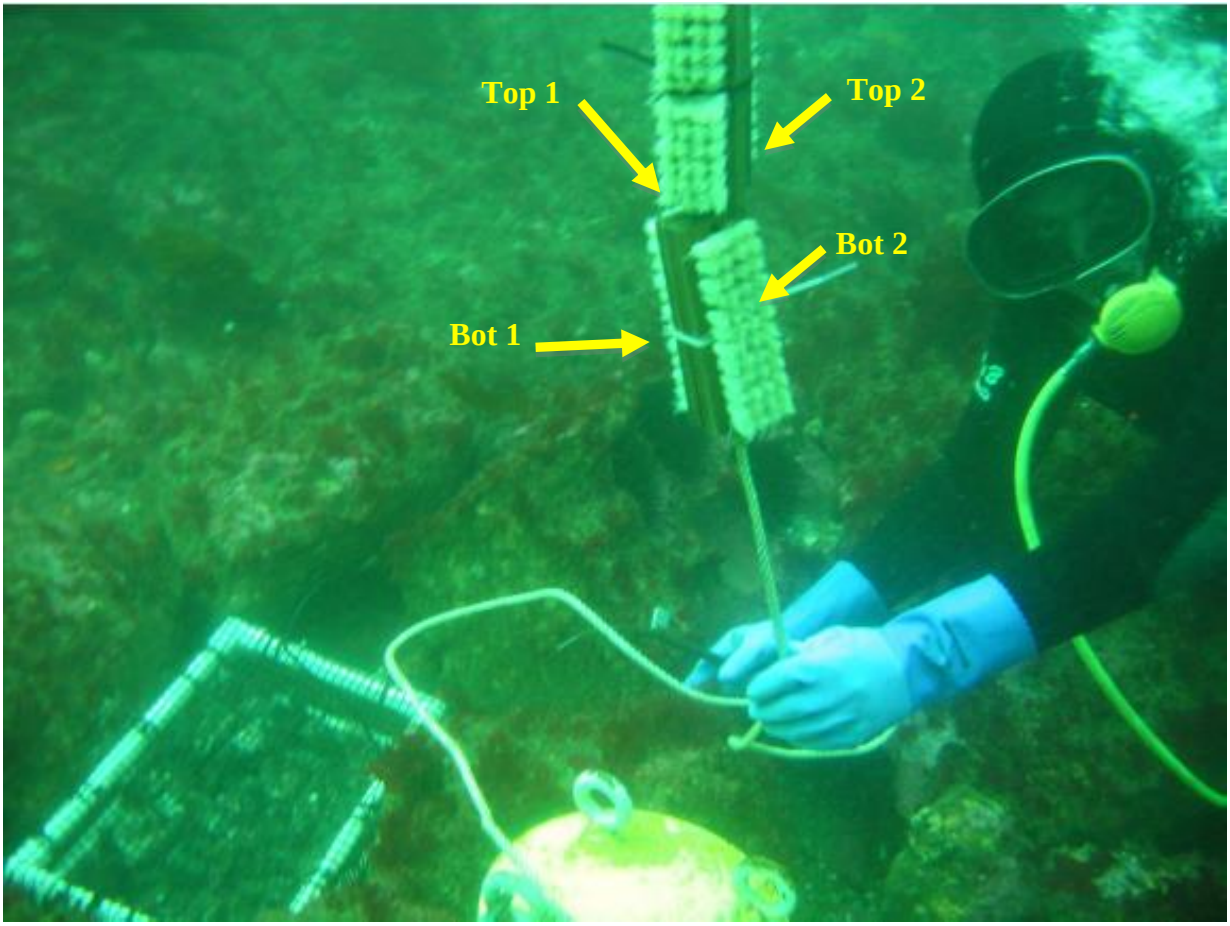
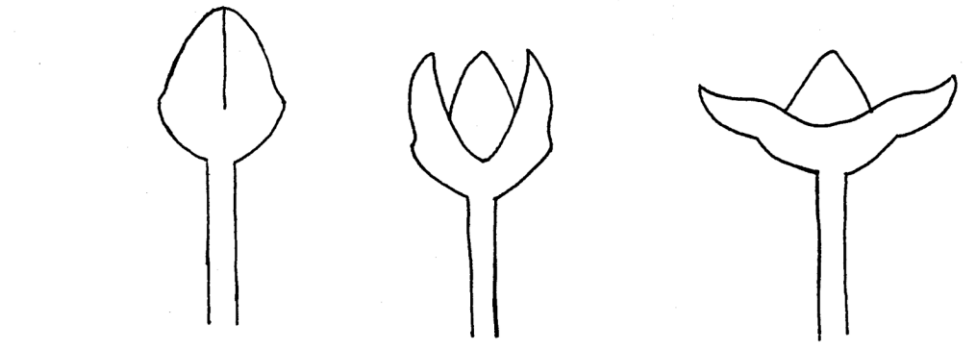
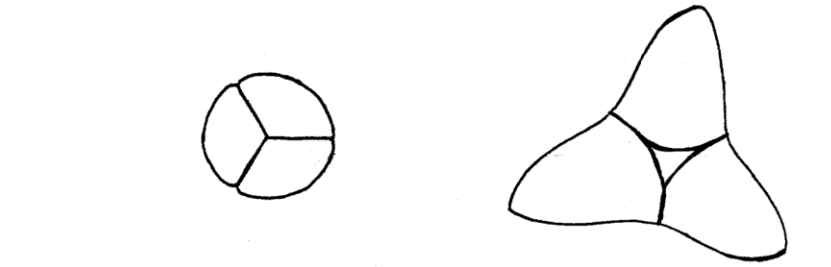


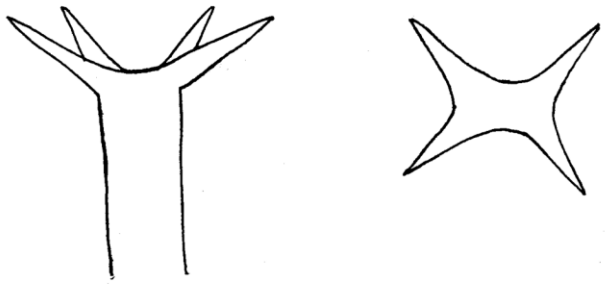
Figure 2. Schematic diagrams of sea urchin pedicellaria and spines.



Closed pedicellaria side view. Open pedicellaria side view.



Closed pedicellaria top view. Open pedicellaria top view.



Juvenile spine side view. Juvenile spine top view.
The juvenile spines are four pronged.

Figure 3. Juvenile spines and dorsal pedicellaria on red sea urchin settlers.