We found significant community-level differences among site categories in mDMS plots (Fig. 4) using a standardized comprehensive community monitoring survey protocol (for details see Hamilton et al. 2010 PNAS 107:18722-18727 and Claisse et al. 2012 PLoS ONE 7:e52905). Sites included established kelp forests (green), urchin barrens (red) and those adjacent to urchin barrens (grey). We only used data from the 5 m depth zone where most barrens occur. Species-specific site means were calculated by pooling data over both years. For fishes, estimated lengths were converted to weights using length-weight relationships.

- We found significant community-level differences among site categories in mDMS plots (Fig. 2, 4, 7, 8).
- Site category differences were then illustrated in selected species which made large contributions to the overall community dissimilarity between site categories (based on SIMPER analyses; Fig. 3, 5, 6, 9).
- Is some cases these reflect negative impacts of urchin barrens on important fish species (e.g., lobster and kelp bass; Fig. 3, 9).

High densities of the unfished purple urchin (Strongylocentrotus purpuratus) result in “urchin barrens” largely devoid of macroalgae across 61 ha of rocky reef along the Palos Verdes Peninsula in southern California (Fig. 1; extent of mapped urchin barrens shown in red). The study presented here is focused on evaluating the potential effects of kelp forest habitat restoration by comparing the differences between urchin barrens and kelp forest habitats.

POTENTIAL IMPACTS OF KELP FOREST HABITAT RESTORATION ALONG THE PALOS VERDES PENINSULA

Jeremy T. Claisse1, Jonathan P. Williams1, Laurel A. Zahn1, Daniel J. Pondella1 & Tom Ford2

1Vantuna Research Group, Department of Biology, Occidental College, Los Angeles, CA 90041
2The Bay Foundation, Los Angeles, CA 90045

Kelp forest habitat restoration has the potential to increase red sea urchin gonad biomass

While purple urchins are the primary cause of barrens in the study area, the harvest of the larger red urchin (Strongylocentrotus franciscanus) for their gonads (aka “unis”) is one of the most valuable commercial fisheries in California. We used Monte Carlo simulations to synthesize the variability in density, size structure, and size-specific gonad weight from empirically collected data to estimate the red urchin gonad biomass available to the fishery (1) currently in urchin barrens and (2) post-restoration, assuming conditions in restored barrens are similar to those observed in kelp forest habitat.

Over the past 20 years pilot kelp restoration projects in the region have demonstrated re-establishment of giant kelp (Macrocystis pyrifera) after removal of urchins from barrens, with 98% of the urchins removed being the unfished purple urchin. The larger red urchin is an important commercial fishery species in California (see section below).

Since July 2013, a large scale kelp forest habitat restoration effort (via targeted destruction of purple urchins - right) is being carried out by a coalition including two NGOs (The Bay Foundation and Los Angeles Waterkeeper) and three commercial sea urchin harvesters. The current restoration efforts will leave the fished red urchin in place. Community and species-specific production effects of restoration will be monitored over the coming years and compared with the results presented here.

Kelp forest habitat restoration has the potential to increase red sea urchin gonad biomass

For more details see: Claisse et al. (2013) Kelp forest habitat restoration has the potential to increase sea urchin gonad biomass. Ecosphere 4: art18

Userful Info:

- Funding: USC Sea Grant under Grant No. 10-069 issued by the California Coastal Conservancy.
- NOAA Restoration Center and the Monterey Bay National Marine Sanctuary Restoration Program.
- Contributions to the study: D. Witting, C. Williams, B. Power, B. Mees, L. Protopopadakis, B. Greene, M. Winston, R. Stolos, D. Michels, A. Mikovari, B. Young, J. Horner, S. Lucie, J. Lyon, D. Coleman, N. Hall, M. Quill, T. Boyd and the students, volunteers and employers from The Bay Foundation, Los Angeles Waterkeeper, the Center for Santa Monica Bay Studies at Loyola Marymount University and the Vantuna Research Group.

Contact Info:

Jeremy T. Claisse
Adjunct Assistant Prof., Biology Dept. Postdoc, Vantuna Research Group Occidental College, Los Angeles, CA email: claisse@oxy.edu www.oxxy.edu/vantuna-research-group

youtbe: VROMarineBio
facebook: oxymarinbiologist