

Environmental Projects Benefiting San Diego Bay

Project title:

Maintaining Healthy Eelgrass Beds: Fishes, Trophic Diversity, and Ecosystem Function

Introduction:

As the human population continues to expand, we are witnessing rapid changes in the environment due to anthropogenic impacts. One of these marked effects has been the global degradation and loss of seagrass habitats (Short and Wyllie-Echeverria 1996, Orth et al. 2006), including those within San Diego Bay (Browning and Speth 1973). It has been suggested that the wide-spread overexploitation of top predators (e.g. piscivorous fishes) in aquatic ecosystems could be indirectly contributing to the loss of seagrass habitats (Williams and Heck 2001). Eelgrass (*Zostera marina*), common to San Diego Bay, has been the most widely studied seagrass species throughout the world; however, relatively few studies have examined how small predators (such as fishes) influence the functioning of eelgrass ecosystems (Duffy et al. 2005), and to my knowledge, none have been conducted in a field setting. While eelgrass restoration and conservation are of great interest within San Diego Bay, the long-term success or failure of these efforts may be strongly influenced by trophic interactions such as grazing and predation.

Progress Report:

To explore the effects of small predators in eelgrass habitats, a caging experiment consisting of four treatments (open plot, predator enclosure, predator enclosure-4 predators, & predator enclosure-8 predators) was established in a randomized block design. Dwarf perch (*Micrometris minimus*) were used as predators because they were the most abundant microcarnivorous fish in eelgrass habitats adjacent to the study site. Predator enclosure treatments were used to observe the effects of invertebrates in the absence of predators, while the two predator enclosure densities were used to evaluate the effects of various levels of predation intensity. Open plots were used to evaluate treatment effects relative to natural, unmanipulated seagrass habitat. Cages were 1 m diameter cylindrical enclosures constructed of a base, rigid internal pvc frame, and a 6 mm clear plastic mesh cover attached to the base by a cinch-strap.

In January 2008, all permits were secured (DFG collecting permit, Harbor Police Dive Permit, SDSU Vertebrate Use Permit, etc.) and an experimental design fashioned, consisting of 6 replicates of each of the 4 treatments (24 plots). Cages were constructed in the lab and installed in a shallow seagrass bed along Shelter Island, San Diego Bay in March 2008. On March 21, fishes were collected by beach seine, measured, and added to predator enclosure treatments at the proper densities. Cages were cleaned twice- or thrice-weekly to remove fouling materials from the mesh. In addition, cages were monitored for damage and treatment integrity during each

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cleaning. All field work, including cage installation and maintenance, was conducted by research divers using SDSU research vessels and SCUBA equipment.

The funded research project is 20% complete as of March 31, 2008. During the next reporting period (April 1 – June 30, 2008), the field component of the research project will be completed and laboratory analyses will commence. By July 1 the funded research project is projected to be 50% complete; on schedule to be 100% complete by December 2008.