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Progress Report: July-September 2008

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:

From July-September 2008, a species atlas (see attached list) was developed to facilitate the identification and quantification of preserved invertebrate samples (e.g. Amphipoda, Tanaidacea, Caridea, Brachyura, Annelida, Gastropoda, Cnidaria, Turbellaria, etc.). A library of voucher samples was also created to allow validation of invertebrate identifications derived from various texts (e.g. Light's Manual by Smith and Carlton). Two undergraduate research assistances were hired to help with the sorting and identification of all invertebrate samples (2007-8) and final analyses of eelgrass, algae, and fish samples.

Data from this work were compiled and presented in poster format at the 2008 annual meeting of the Western Society of Naturalists in Vancouver, British Colombia (see attached with acknowledgement of Port of San Diego in upper right-hand corner). The funded research project received an award for "Best Poster" based on format and content (e.g. experimental design, statistical analysis, conclusions and data summary).

The funded research project is 70% complete as of September 30, 2008. Though much work has been successfully completed, we have we found it important to further explore the feeding relationships of dominant fish and invertebrate taxa in San Diego Bay eelgrass in order to bolster and better understand our findings from previous field experiments. During the next reporting period (October 1 – December 31, 2008), stable isotope analysis of eelgrass flora and fauna will be compared to stomach contents and the primary literature to verify feeding behaviors of invertebrates and fishes, and identify the relative importance of seagrass as a carbon source in the system. Additional fish collections will be used to better understand the composition of the microcarnivorous fish community, and the impacts a diverse assemblage of predators might have on the system.

This work will be conducted in collaboration with an undergraduate research assistant and will contribute, in part, to the completion of an undergraduate senior research thesis in Spring 2009. All analyses, literature review, and final writing of the project report will be completed in Spring 2009. The final master's thesis of Levi Lewis will be submitted in May 2009, followed by his graduation from San Diego State University. The funded research project is now scheduled to be 100% complete in May 2009 with the final report submitted to the Port of SD by June 1, 2009.

Invertebrate taxonomic key (summary)

TAXA	FAMILY
Amphipoda	Ampeliscidae
	Amphilochidae
	Ampithoidae
	Aoridae
	Caprellidae
	Corophiidae
	Dexaminidae
	Hyalidae
	Ischyroceridae
	Liljeborgiidae
	Oedocerotidae
	Phoxocephalidae
	Pleustidae
	Podoceridae
	Pontogeneidae
	Stenothoidae
	Unidentified
Anomura	Paguridae
Arachnida	Unidentified
Ascidia	Unidentified
Bivalvia	Mytilidae
	Unidentified
	Pectinidae
	Tellinidae
Brachyura	Canceridae
	Grapsidae
	Majidae
	Portunidae
	Unidentified
Bryozoa	Unidentified
Caridea	Bateidae
	Crangonidae
	Hippolytidae
Chaetognatha	Unidentified
Cnidaria	Anthozoa
	Hydroidea
	Unidentified
Copepoda	Calanoidea
	Cycypoidea
	Harpacticoidea
Cumacea	Unidentified
Echinodermata	Unidentified
Isopoda	Anthuridae
	Bopyridae
	Idoteidae
	Sorolidae
	Sphaeromatidae
Mysidacea	Unidentified
Nematoda	Unidentified
Nermertea	Unidentified
Opisthobranchia	Aglagidae
	Aplysiidae
	Bullidae
	Unidentified
Ostracoda	Unidentified
Platyhelminthes	Unidentified

TAXA	FAMILY
Polychaeta	Aoridae
	Capitellidae
	Maldanidae
	Nereidae
	Opheliidae
	Orbinidae
	Phyllodocidae
	Polynoidae
	Serpulidae
	Spionidae
	Syllidae
	Terebellidae
	Unidentified
	Unk.R
	Sabellidae
Prosobranchia	Acmaeidae
	Calyptraeidae
	Columbellidae
	Conidae
	Littorinidae
	Olivellidae
	Unidentified
Pycnogonida	Unidentified
Tanaidacea	Paratanaidae
	Tanaidae
Thalassinoidea	Callianassidae
Unidentified	Unidentified
	Unk.A
	Unk.B
	Unk.C
	Unk.D

“Best Poster”—annual meeting of the Western Society of Naturalists