

\$1.4 Million Awarded to Six New Research Projects

LA JOLLA – California Sea Grant has awarded \$1.4 million to support six new marine research projects.

The projects, which include support for seven graduate students, address a breadth of topics important to California, including wetland restoration, beach preservation, invasive species control, plankton ecology, larval transport and sustainable aquaculture.

THE NEW PROJECTS AND THEIR LEAD INVESTIGATORS ARE:

FUNDING STATS

Number of preliminary proposals submitted to California Sea Grant:	84
Number invited to submit full proposals:	23
Number of projects funded:	6
Average award amount, including graduate support:	\$241,360
Average duration of grant:	2.5 years
Number of graduate students supported:	7

Improving Wetland Restoration: Testing Tamarisk's Legacy Effects

Paul Dayton, UC San Diego and Theresa Talley, UC Davis

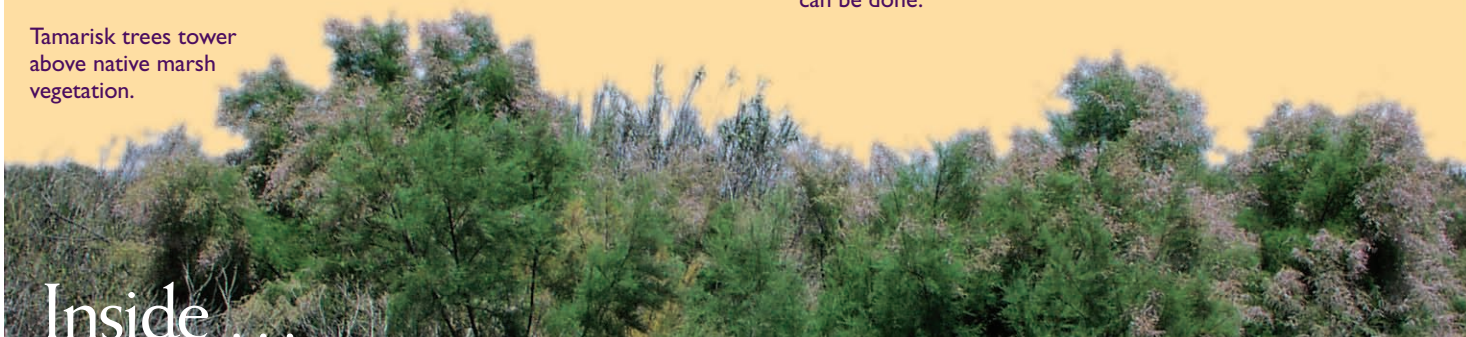
An invasive non-native tree known as salt cedar or tamarisk has invaded wetland marshes at NOAA's Tijuana River National Estuarine Research Reserve in San Diego. To control their spread, managers are chopping down the trees, in the hope that the cleared areas will be re-vegetated with native plants. This project will examine whether this is indeed happening and if not why and how it can be fixed. It is hoped that what is learned will help the reserve improve ongoing wetland restoration in rare marsh habitats and do so at reduced cost.



Christina S. Johnson

This site at the Tijuana River National Estuarine Research Reserve was cleared of tamarisk, but native plants are not re-growing in their place. A new Sea Grant project will examine why and what can be done.

Tamarisk trees tower above native marsh vegetation.



Inside . . .

- 2 New Research Projects
- 4 Exercise Speeds Fish Growth
- 4 Walkable Map at La Jolla Shores

- 5 Nature's Beautiful Ocean Instruments
- 6 New Quagga and Zebra Mussel Guide

\$1.4 Million Awarded (cont'd.)



Wolcott Henry 2005/Marine Photobank

Intense coastal development in Southern California impacts beach ecosystems.

Threatened Beach Ecosystems: Evaluating Trends

Jenifer Dugan and Adrian Wenner, UC Santa Barbara, and David Revell, Philip Williams & Associates, Ltd.

What is the fate of California's beloved beaches in the face of rising sea levels and continuing population growth? An interdisciplinary team of scientists will address the topic by compiling historical datasets and re-sampling historical study sites. From this, they will construct a 30-year history of the ecology and physical characteristics of sandy beaches from Morro Bay to San Diego. They will then analyze this record to look for meaningful trends explaining processes affecting sand supply, beach width, biological diversity and community structure. The historical record will also be used to identify potentially rare, declining or locally extinct intertidal species. Findings will be shared with managers to improve beach management and conservation.

David Hubbard



Commercial white seabass pellet feed.
Hubb-SeaWorld Research Institute

Reducing Fishmeal in Aquaculture Feeds

Mark Drawbridge, Hubbs-SeaWorld Research Institute, Frederic Barrows, Fish Technology Center at USDA, and Ronald Hardy, Aquaculture Research Institute, University of Idaho

Addressing arguably the single greatest challenge facing the mariculture industry, Sea Grant researchers will develop low-fishmeal diets for yellowtail and white seabass. Both are high-value species that aquaculture proponents believe would be top candidates for commercial offshore culture in the Southern California Bight. In the first phase of the project, scientists will develop a replacement protein based on a mix of soy, canola, corn, barley, poultry-by-product meal and blood meal. Once appropriate protein sources, amino acid balances and mineral supplements are determined, scientists will optimize the feed's protein to energy (calorie) content. They will then investigate alternatives to fish oil, which is in shorter supply than fishmeal. The goal is to produce commercially viable feeds with 75 percent less fishmeal and 50 percent less fish oil.



Researcher Mark Drawbridge feeds white seabass at the Hubbs-SeaWorld hatchery in Carlsbad.

Hubb-SeaWorld Research Institute

\$1.4 Million Awarded

Releasing Snail Parasites to Halt New Zealand Mud Snails?

Thomas Dudley, UC Santa Barbara, Kevin Lafferty, USGS, and Armand Kuris, UC Santa Barbara

Researchers will investigate the efficacy and safety of releasing trematode parasites to control New Zealand mud snail populations in the Great Lakes and Western states, including California, where the snail has invaded the American River, Lake Shasta, Alameda, Piru and Malibu creeks, among others. In the first year, scientists will test the host specificity of the parasites to ensure they cannot infect native species. They will then evaluate their effectiveness at reducing mud snail population growth. Field experiments will be conducted in California and also in the mud snail's native New Zealand habitat.



Jennifer Fisher, UC, Davis

Understanding Invertebrate Larval Transport

Steven Morgan and John Largier, UC Davis

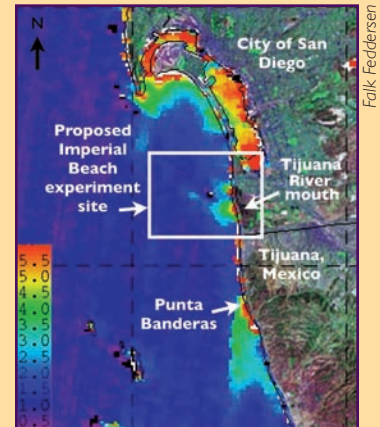
The scientists leading this project theorize that invertebrate larvae exert considerable control over their movements and can remain close to shore, even during strong upwelling events. To test this, scientists will survey larvae at two locations with persistent upwelling, including Point Arena, the strongest upwelling center in California, and Bodega Head. The findings will add to what is known about larval transport mechanisms, connectivity and self-recruitment, and the role of physical forcing on larval supply.

Freshwater Inputs and Nearshore Plankton Ecology

Falk Feddersen, Peter Franks, and Robert Guza, UC San Diego

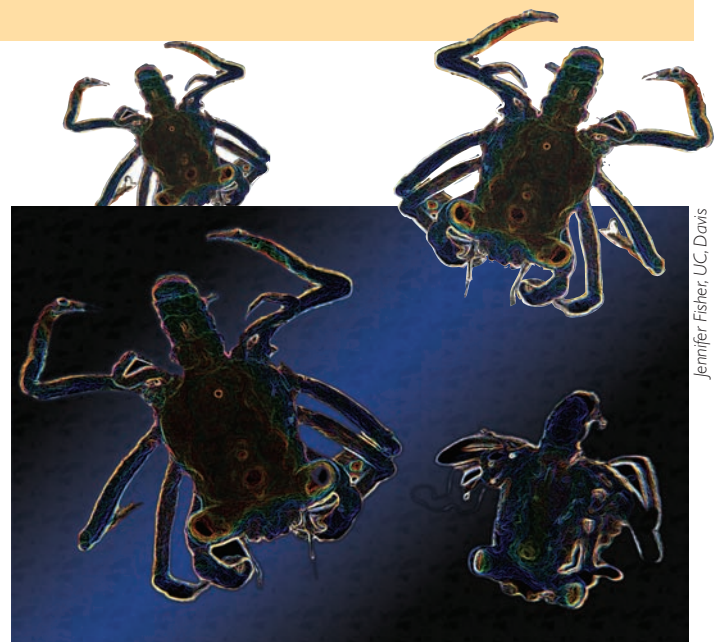
Researchers will conduct field experiments at Imperial Beach in southern San Diego County to understand the physical drivers of beach water quality. In particular, they will seek to identify sources of nearshore nutrient pollution and their relation to phytoplankton "patchiness" and episodic algal blooms. They also hope to quantify how nearshore conditions (i.e., tides, waves, currents and mixing) affect distributions of phytoplankton and fecal indicator bacteria.

Other goals are to quantify relative concentrations of free-living fecal indicator bacteria, diagnose conditions under which they attach to phytoplankton and determine whether attachment influences rates of bacterial loss.



Falk Feddersen

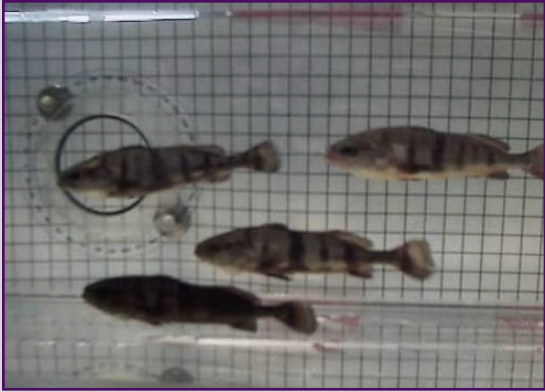
An October 2007 satellite image of surface chlorophyll-a in the San Diego Bight region. The white box represents the site of the 2009 Imperial Beach experiment. High chlorophyll-a levels are frequent near the Tijuana River mouth and sewage outfall at Punta Banderas in Mexico.



Jennifer Fisher, UC, Davis

Stylized images of shore crab postlarvae, *Pachygrapsus crassipes* (left) and *Hemigrapsus nudus* (right). California Sea Grant biologists believe that larvae and postlarvae control their depth in the water column.

Exercising Fish to Speed Growth Rates



White seabass in flume.

Chris Peters

LONG BEACH – It sounds crazy, exercising fish to improve their growth rates. But that is exactly what researchers have found occurs with juvenile yellowtail.

Moderate exercise, corresponding to about 60 percent of a fish's maximum aerobic capacity, increased fish body mass by 17 percent after 34 days, as compared to unexercised control fish, they report.

This translated into "fit" fish weighing 60.3 grams at the end of the study, about the weight of a Snickers candy bar, vs. 52.6 grams for the couch-potato fish.

Kevin Kelley, a marine biology professor at Cal State University, Long Beach and an investigator on the project, believes that the exercise-growth link is related to reduced stress in exercised fish, as measured by lower bloodstream levels of the stress hormone cortisol.

"Cortisol tells the body to conserve energy and not do energy-expensive things like grow," Kelley says. "By lowering cortisol, you enhance growth rates. This is the punch line of the study. Exercise is about stress management as much as it is about being fit."



Walkable Map Unveiled at La Jolla Shores

LA JOLLA – People swim, surf and paddle through the La Jolla Underwater Park and Ecological Reserve. Now, they may walk on it – or at least on a 2,300-square-foot rendering of the offshore, imbedded with bronze sculptures of more than 50 native sea creatures.

The life-sized, accurately colored sculptures are keyed to color photos on the nearby restroom wall at La Jolla Shores' Kellogg Park.

About 300 people, including San Diego Mayor Jerry Sanders, attended the ribbon-cutting ceremony for "The Map." California Sea Grant donated \$5,000 to the \$350,000 marine outreach project, which the Birch Aquarium is incorporating into its educational program.



Marsha Gear/CSG

"The Map," designed by artists Lynn Reeves and Rick Sparhawk, will introduce the marine realm to thousands who annually visit La Jolla in San Diego.

Nature's Beautiful Ocean Instruments

SANTA CRUZ – The bright purple and orange creature (right) is a type of sea slug, known commonly as a Spanish shawl. Normally, it is rare north of Point Conception, except during El Niño conditions. Last November, however, UC Santa Barbara biologist Jeff Goddard discovered four of the striking mollusks in tidepools at Scott Creek in Santa Cruz County.

"I was amazed," he says. "We've been in La Niña conditions for the past year so their presence didn't make sense to me."

He has since been able to explain their unexpected presence to an abnormally intense, short-lived northward jet of water, recorded in early September by a network of high-frequency radar stations maintained by the Central and Northern California Ocean Observing System. The flow was also correlated to anomalously high sea levels.

"Based on their size, I figured that the nudibranchs (sea slugs) were about two months old and sure enough two months earlier, we see evidence of a strong northward current along the coast," Goddard says.



Gary McDonald

A Spanish shawl nudibranch, *Flabellina iodinea*.

"They usually aren't present at this site or anywhere in the intertidal north of Point Conception," he says.

Sea Grant is funding Goddard to see if nudibranchs, which have short life spans and are relatively immobile, can be used to better understand how climate patterns affect fine-scale intertidal ecology in California. As part of this project, he is studying the historical nudibranch record at several sites, including Monterey, Santa Cruz, Half Moon Bay and Duxbury Reef, and correlating their diversity and abundance to El Niño and La Niña cycles and the Pacific Decadal Oscillation.

El Niño episodes lead to sea slug population booms, he reports, not because of warming but because of enhanced onshore flows that sweep larvae to the coast. The reverse occurs during La Niña cycles: Sea slug numbers decline, probably because of stronger upwelling and stronger offshore flows.

Scientists have documented similar patterns with another coastal invertebrate, barnacles. "What we are seeing with adult nudibranchs is consistent with what other researchers are finding with the settlement of intertidal barnacles," he says. "The nudibranchs are like bright flags, and I feel like I'm beginning to get a handle on what the flags signify."



Jeff Goddard
"Oceanographers tell us pulses of poleward flow are frequent in late summer off California. What is cool is that we now can make a pretty convincing case that surface currents transported nudibranch larvae around Point Conception."

Working backward from the surface current data, Goddard predicted that larvae also should have been swept to Sand Dollar Beach in southern Monterey

Spanish shawls crawling on their sole prey, the hydroid *Eudendrium ramosum*.

County. This was borne out, as in December he found three more adult Spanish shawls at the study site.

California Sea Grant

Russell A. Moll, Director
Shauna Oh, Assistant Director
Paul G. Olin, Extension Director
Marsha Gear, Communications Director

SEA GRANT NEWS
Christina S. Johnson,
Editor and Writer
Abigail L. Clayton,
Graphic Designer
Joann Furse, Assistant Editor
Steve Gabrysh, Marketing

This publication was supported by the National Sea Grant College Program of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration under NOAA Grant #NA08OAR4170669, project number C/P-1, through the California Sea Grant College Program. The views expressed herein do not necessarily reflect the views of any of those organizations.

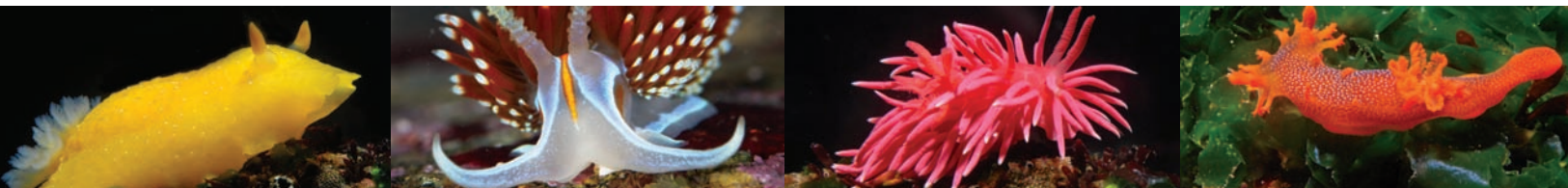


University of California San Diego
California Sea Grant College Program
9500 Gilman Drive Dept 0232
La Jolla CA 92093-0232
<http://www.csgc.ucsd.edu>

PRESORTED
STANDARD
US POSTAGE
PAID
SAN DIEGO CA
PERMIT 1909

Address Service Requested

UC 2009
Year of Science



Sea Grant
California

Sea Grant News

APRIL 2009

NEW CALIFORNIA SEA GRANT PUBLICATION

Early Detection Monitoring Manual for Quagga and Zebra Mussels

By **Carolynn S. Culver, California Sea Grant Marine Advisor, et al.**

In this new publication, you will learn how to detect and monitor quagga and zebra mussel invasions in small lakes, reservoirs and streams believed to be free of the exotic bivalves.

Cost: \$10 (includes postage and sales) through the California Sea Grant Bookstore at www.csgc.ucsd.edu. You may also contact California Sea Grant Communications at pubadmin@seamail.ucsd.edu or 858-534-4446.



Zebra mussels.

Michigan Sea Grant/D. Brenner