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p. 7 (upper left) Mohammed Al Momany, NOAA Coral Kingdom Collection,
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Biologists, Physicists, A Historian and Anthropologist Win Awards

A Point Reyes ornithologist who studies a penguin-like seabird that feeds on commercially exploited fish stocks, an anthropologist at California Polytechnic State University who thinks prehistoric people may have put an early dent in sea otter populations, and a UC San Diego historian of science curious about the origins of U.S. fisheries policy are among this year's recipients of California Sea Grant research grants.

Others receiving awards include a biologist at Humboldt State University who will look at whether migrating geese are overgrazing—or actually helping—eel grass beds in Humboldt Bay and a marine chemist at Scripps Institution of Oceanography whose recent discovery of a new genus of marine bacteria may facilitate the development of antibiotics that can fight “super germs.”

“On behalf of California Sea Grant, I am delighted to initiate a new set of research projects for 2004,” said California Sea Grant Director Russell Moll. “What is most exciting about these new studies is the diversity in topics that include sociological studies of fishing in California and archeological studies of historical coastal development. The new projects will continue the long tradition in excellence of research supported by California Sea Grant.”

In all, California Sea Grant awarded funding for 14 new marine science projects, all of which were reviewed by outside researchers for their scientific merit and relevance to current marine issues. Many of the awards come with support for graduate students. The new projects are slated to begin in March 2004.

“I am very excited and a little surprised about the grant,” said William Sydeman, an ornithologist and director of the marine ecology division at PRBO Conservation Science, formerly the Point Reyes Bird Observatory. “It is quite wonderful.”

Sydeman studies marine mammals, seabirds and other



The murre is a comely penguin-like bird that feeds on commercially exploited fish stocks. Sea Grant is funding an in-depth study of the bird's diet. Photo courtesy Point Reyes Bird Observatory archives

animals at the top of the food chain and lately has been investigating the effects of climate change and climate variability on the ecosystem around the Farallon Islands—home to some of the largest seabird and marine mammal colonies in the United States.

For his Sea Grant project, he and colleague Nadav Nur, also at PRBO Conservation Science, will study the dietary habits of a diving seabird called the murre. The bird—the Northern Hemisphere's counterpart to the penguin—feeds

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Elephant seals on the Farallon Islands. Photo: Jan Roletto

California Sea Grant Awards (continued) on krill as well as squid, and juvenile rockfish, hake and salmon, all of which are fished commercially.

“What we hope to do is look at the birds’ feeding habits and relate this to their population size,” he said. From this, the scientists will be able to estimate the amount of food required to sustain the birds. The method can be repeated for other species elsewhere in the California Current system.

“In the past, we’ve looked at fish stocks and said, ‘How much can we take?’” he said. “A different level of questioning is to ask, ‘What can we take and still maintain sufficient reserves for the ecosystem?’”

State and federal lawmakers now require ecosystem-based fisheries management plans. This project, Sydeman said, will help agencies meet new mandates.

While Sydeman looks to future fisheries management plans, two other winners will delve into the past for clues about the human dimensions of fisheries and coastal resource management.

Terry Jones, an anthropologist at California Polytechnic State University in San Luis Obispo and

a leading authority on the region’s prehistory, will study a collection of bone and shell fragments excavated from Diablo Canyon during construction of the nuclear power plant. The remains are believed to represent one of the longest continuous

records of coastal inhabitation in western North America.

Jones’ work may shed light on the extent of early man’s hunting of marine mammals, such as sea otters, and the effects of this exploitation on the structure of marine mammal populations and kelp forest communities.

The Chumash Indians, who inhabited Central California for many thousands of years before the Spanish arrived in the 18th century, were avid hunters of sea otters and foraged extensively for shellfish such as abalone and mussels.

Jones wants to see whether there is archaeological evidence of changes in the assemblages of species hunted and fished over time. This rare window into the past, perhaps as far back as 8,000 B.C., will help scientists develop a longer term perspective and knowledge of the characteristics of past coastal ecosystems and the effects of predation on them.

“I think we are going to see that the marine nearshore ecosystem was affected by people very early on,” Jones said. “Practically every species in the marine ecosystem was being exploited regularly for

10,000 years, but it was still a very productive system.”

Looking at the more recent past, UC San Diego history professor Naomi Oreskes and Sea Grant Trainee Carmel Finley will give a detailed historical analysis of the complex interactions of science, politics and the livelihoods of fishers in the management of U.S. fisheries.

“People have known for more than 100 years that fisheries are in trouble,” Oreskes said. “Why didn’t it get sorted out earlier? That is where historians come in.”

As part of their project, they will explore the origins and scientific underpinnings of basic fisheries management concepts such as Maximum Sustainable Yield, as well as the influence of Cold War attitudes on American fisheries policy. A major goal of the project is to explore the historical factors that influenced the regulation—and subsequent rapid collapse—of the West Coast groundfish fishery.

“I hope that we can get science and policy people to think a little more deeply about issues and not to repeat the same mistakes over and over,” Oreskes said. ■ ■ ■



Dr. Naomi Oreskes. Photo: UC San Diego

San Francisco Bay Designated National Estuarine Research Reserve



A view of the Rush Ranch area of the reserve.

The Golden State has a new National Estuarine Research Reserve, this one located in the San Francisco Bay area. It becomes the third and largest research reserve in the state, encompassing 3,710 acres of coastal habitat, including rare marsh and tidal lands that support a host of bird, fish, mammal, and plant species. Some of these plants and animals are threatened or endangered by extinction, primarily because of habitat loss.

San Francisco Bay once supported 190,000 acres of highly productive tidal marsh. Now, only 16,000 acres of this tidal marsh remain. The newly designated reserve includes some of the highest quality historical wetland and adjacent habitat in two large bays of the estuary.

“Expanding the National Estuarine Research Reserve System to include the San Francisco Bay area is a terrific opportunity both for NOAA and California,” said Eldon Hout, director of NOAA’s Office of Ocean and Coastal Resource Management. “We look forward to supporting important and long-needed tidal marsh restoration in the San Francisco Bay.”

NOAA will provide the bulk of support for constructing and supporting the reserve. San Francisco State University will provide matching funds and will manage the reserve.

The university’s Romberg Tiburon Center for Environmental Studies will serve as the reserve’s headquarters. Joining them in this partnership are California State Parks, the Solano Land Trust, and the Bay Conservation and Development Commission.

NOAA has 26 research reserve sites in the United States. California’s other two reserves are Elkhorn Slough Reserve near Monterey and the Tijuana River National Estuarine Reserve in southern San Diego County.



An area of the marsh plays host to a flock of egrets. Photos: Tom Parker, professor of biology, San Francisco State University

The San Francisco Bay National Estuarine Research Reserve presents exciting new opportunities for area residents. A few highlights of the benefits that the reserve will bring include:

- workshops for environmental professionals on topics such as GIS, restoration science, estuarine ecology, and harmful algal blooms;
- educational programs for students and the public at large;
- national system-wide monitoring program for water quality and weather;
- NOAA Graduate Fellowship Program that supports two graduate fellows each year; and
- improved stewardship of the natural resources of San Francisco Bay.



Grindelia stricta var. *angustifolia*, a plant native to the reserve.

More information may be obtained by contacting Jaime C. Kooser, Reserve Manager at (415) 338-3703 or jkooser@sfsu.edu

Troubled Coral Reefs—A Long History of Decline



Without swift and aggressive protection, the world's coral reefs will die off within the next few decades, scientists report. The decline of these ecosystems probably began centuries ago, long before the advent of industrial fishing, with the removal of large fish, sea turtles, sharks and other large predators. Although disease and coral bleaching are today cited as primary threats to the continued survival of coral reefs, scientists believe that even if all bleaching and disease were to disappear tomorrow, reef systems would still be severely imperiled because they are missing large predators and herbivores.

This dire picture of the health—and future—of the planet's coral reefs was put forth in an article in the August 15 issue of the prestigious journal *Science* (see ordering information on p. 8). Sea Grant Marine Advisor Deborah McArdle was one of 12 coauthors of the report, titled “Global Trajectories of

the Long-Term Decline of Coral Reef Ecosystems.” The paper's lead author was John Pandolfi, a paleobiologist at the National Museum of Natural History.

Their conclusions are based on rigorous analyses of historical and archaeological records at 14 major reef areas in the Pacific and Atlantic Oceans and the Red Sea. From these records, some of which extend back thousands of years, the scientists reconstructed ecological “trajectories” that depict changes in the abundances of large and small herbivores and carnivores, corals and suspension feeders through time.

As part of her contribution to this massive undertaking, McArdle analyzed a variety of historical and scientific records in the Virgin Islands. These records included archeological middens, narratives from journalists and naturalists, explorers' log books and missionaries' records.

Her analyses, as well as those of her colleagues, revealed many interesting patterns; but what was perhaps most striking was just how early human activities

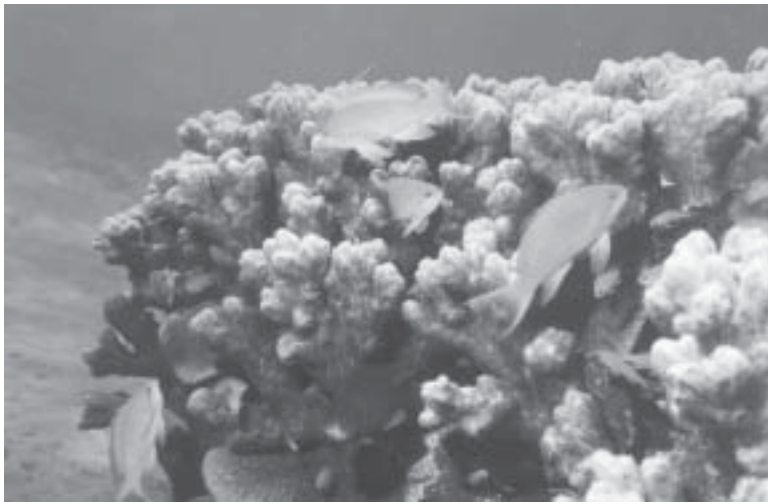
began impacting reefs, perhaps as early as the hunter-gatherer era of human history. By 1900, sea turtles, large fishes, sharks and seals had been depleted or were already rare at about 80 percent of reefs.

The removal of large animals leads to a systematic decline of the entire reef ecosystem—the proverbial domino effect. Big animals play disproportionately big roles in the ecosystem. If they are removed, there are disproportionately large effects on reefs.

“When abundant enough, these animals influence the quality and the shape of whole assemblages of other species,” McArdle said. “When their populations collapse, it sets the stage for degradation throughout the ecosystem. Their removal tips a delicate balance that leaves the ecosystem more vulnerable. For example, the algae now killing many coral reefs in the Caribbean can be traced to the killing of the green turtle more than 3000 years ago.”

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Coral Reefs (continued)

All is not lost, however. The reefs can be restored. “Recognition of what has been lost also shows what could be gained,” McArdle said. “Many of the depleted animals are not extinct and could be brought back. We hope that this historical perspective will give policy-makers new insights when developing restoration targets for ocean ecosystems. Understanding the past may help us to more successfully manage for the future.” ■ ■ ■

2004 Ocean Research Conference—A New Forum for Encouraging Interdisciplinary Collaborations



California Sea Grant Director Russell Moll is co-chairing the 2004 Ocean Research Conference to be held February 15–20 in Honolulu. It will be the first joint conference of the American Society of Limnology and Oceanography, and The Oceanography Society.

“The meeting will bring a diverse group of scientists into a single venue,” Moll said. “The most beneficial outcome will be that scientists from different disciplines will meet and share ideas and perhaps together stimulate new interdisciplinary science.”

About 1,300 scientists have submitted abstracts on a broad range of topics, including ocean observing systems, molecular marine ecology and remote sensing. University of Southern California Sea Grant Director Linda Duguay has also organized a special session on the impacts of a new educational initiative led by the National Science Foundation. This initiative has led to the creation of seven regional Centers for Ocean Sciences Education Excellence, two of which are located in California.

National Science Foundation Director Rita Colwell is a plenary speaker at the upcoming meeting, as is National Sea Grant College Program Director Ron Baird.

The American Society of Limnology and Oceanography is a leading professional organization for researchers and educators in the aquatic sciences. The Oceanography Society is nonprofit association of oceanographers based in Washington, D.C.

To learn more about the Ocean Research Conference visit: <http://aslo.org/honolulu2004/> ■ ■ ■



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■ REPRINTS

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