



CALIFORNIA OCEAN PROTECTION COUNCIL

Mike Chrisman, Secretary for Resources, Council Chair
John Garamendi, Lieutenant Governor, State Lands Commission Chair
Linda Adams, Secretary for Environmental Protection
Susan Golding, Public Member
Geraldine Knatz, Public Member
Darrell Steinberg, State Senator
Pedro Nava, State Assemblymember

MEMORANDUM

TO: Ocean Protection Council

FROM: Valerie Termini, Ocean Protection Council

DATE: October 25, 2007

RE: Concurrence with OPC priority scientific research projects selected for 2007 Sea Grant awards

ATTACHMENTS: [Table 1: Scientific Research Projects Proposed for Funding](#)
[Exhibit 1: February 2007 Staff Recommendation "Ocean Protection Council and Sea Grant Partnership for Ocean and Coastal Research" \(without Exhibits\)](#)
[Exhibit 2: Ocean Protection Council Priorities and Guidelines for Sea Grant Research Proposals](#)

REQUESTED ACTION:

Staff recommends the council approve the following resolution:

“The Ocean Protection Council concurs that the scientific research projects selected by the California Sea Grant and University of Southern California Sea Grant Programs are consistent with council science and grant priorities approved at the council’s February 8, 2007 meeting.”

BACKGROUND:

At its February 8, 2007 public meeting, the OPC authorized a grant of \$1,000,000 to the state’s two Sea Grant programs to fund scientific research projects that support the council’s priorities (Exhibit 1). California Sea Grant, based at University of California, San Diego Scripps Institution of Oceanography, and the University of Southern California (USC) Sea Grant were identified as the appropriate entities to administer the solicitation, peer-review, and grant award process for research proposals submitted for funding in 2007. The staff recommendation and grant agreements require that prior to awarding funds the council’s concurrence must be obtained for the selected research projects recommended by Sea Grant.

The February 8 council grant included the condition that the solicitation for proposals indicate that projects must illustrate a strong connection to management by specifying outreach mechanisms to integrate results with state management needs. The solicitation for research projects sought proposals that develop ecosystem models and assessments to understand and predict the impact of natural and anthropogenic processes, including climate variability and climate change, on ocean and coastal ecosystems and human communities. It noted that priority will be given to proposals that:

- examine existing data sets or integrate data from the Southern California Coastal Ocean Observing System (SCCOOS) or the Central and Northern California Ocean Observing System (CeNCOOS)
- utilize or apply new seafloor and habitat maps
- identify interspecies and habitat/species relationships
- develop appropriate indicators and metrics for adaptive management
- examine status and trends through synoptic and long-term assessments
- identify sources and processes of ocean pollution that impact the health of humans and the marine environment
- integrate research and monitoring across disciplines and programs optimizing the approach to ecosystem based management

The solicitation also sought proposals that develop biophysical-socioeconomic models and assessments to evaluate the impact of multiple human uses on ecosystems and understand human-use patterns that may influence resource stability and sustainability

In late February 2007, the two Sea Grant programs each released a request for proposals (RFP) which included the council's Priorities and Guidelines for Sea Grant Research Proposals (Exhibit 2). A total of 120 preliminary proposals were received: California Sea Grant received 103 and USC Sea Grant received 17. All preliminary proposals were reviewed by the Resources Agency Sea Grant Advisory Panel (RASGAP) and the Sea Grant programs' technical review committees for scientific validity.

Council staff and the OPC Science Advisor were involved in each step of the review process to provide reviewers with guidance on council priorities, previously funded projects and the council's strategic plan. The final list of projects that are recommended for funding were selected after considering the RASGAP and Sea Grant rankings and deliberation among the Sea Grant staff, OPC staff and the OPC Science Advisor.

The Sea Grant programs require an annual progress report for each project, from which summaries will be generated for the council. Projects are for either two or three years.

Recommended Projects

Council funds are proposed to be distributed as follows: California Sea Grant would be awarded \$800,000 and USC Sea Grant would be awarded \$200,000. The projects selected for funding through both programs are summarized in Table 1 and discussed below.

California Sea Grant Program

Three projects are recommended for funding through the California Sea Grant Program. All three examine climate change impacts to California's marine ecosystems, but each focuses on different species and their roles within the food web. All three make good use of historical data sets, as well as new measurements, to examine long-term trends in marine population dynamics. In addition, these projects address elements of the council's strategic plan relating to sustainable fisheries, Marine Life Management Act (MLMA) implementation and fisheries data collection.

- **Examining Links between Changing Food Webs and Climate Change:** In recent years, rock fish, forage fish and seabirds have all experienced low reproductive success in California. These declines may be due to a collapse of krill, a major food source. Krill declines may be a result of changing oceanographic conditions and climate. Other organisms appear to have switched feeding patterns: California sea lions are traveling much further offshore to feed and blue whales (that also feed on krill) are less abundant in the region. Mismatches in predator-prey relationships

(i.e., prey not being available or being available at a different time of year) can have severe impacts on marine food webs, ecosystem structure, and fisheries. This research team will investigate climate-induced changes in the marine food webs around the Farallon Islands and will examine how trophic interactions that regulate the productivity of top predators are changing due to global climate change. The investigators hope to produce a novel, mechanistic understanding of the seasonal cycle in northern California marine ecosystem dynamics, and how it has changed, or is changing, over time. Greater understanding of these interactions can ultimately lead to the application of climate-based considerations in resource management decisions, such as informing fishery management plan development.

- **Jumbo Squid Impacts on the California Current Ecosystem:** The research team will study the jumbo squid (*Dosidicus gigas*) and its potential role within the California Current ecosystem. The jumbo squid is a migratory species along the West Coast, but following the 1997 El Niño, it has become an unusually persistent resident off Monterey. As a predator, the jumbo squid consumes large quantities of mesopelagic organisms, competing directly for an important food source for many seabirds, marine mammals, and commercially important fish. This squid also directly feeds on commercially and ecologically valuable species, and has been linked with reduction in hake populations in both California and Peru. The adult jumbo squid is a food source for sharks, large fish and marine mammals. Juvenile squid are eaten by many pelagic fish and sea birds. All of these features indicate that *Dosidicus* is ecologically very important because it serves as both predator and prey and likely plays a major role in structuring the pelagic ecosystem throughout its range. Despite the obvious ecological importance of jumbo squid, surprisingly little is known about the overall ecology of this organism. The study will result in a better understanding of the jumbo squid's role in the ecosystem and its impact on commercially important resources. It will also provide the groundwork needed to model the jumbo squid population, which will become important if a commercial or recreational squid fishery develops, as it has in other regions.
- **Nudibranchs (Sea Slugs) as Indicators of Climate Change:** Within the rocky intertidal zone along the Pacific coast, the geographic range for "southern" invertebrate species has been expanding northward. Their abundance in Monterey Bay has increased over the last 70 years. At the same time, "northern" species are becoming less abundant. Because long-term ecological datasets rarely extend back more than a few decades, it is difficult to attribute these types of ecosystem changes to anthropogenic climate warming. Confounding the issue are shorter climate shifts, such as the Pacific Decadal Oscillation and El Niño events. The researchers will compare new surveys with historical, quantitative surveys of rocky shore nudibranch mollusks, to distinguish between the impacts of long-term, anthropogenic climate change and those of (1) natural interannual and decadal variation and (2) local anthropogenic impacts on nearshore waters. These are the same researchers who conducted similar assessments in the 1970s; this project is an opportunity to bring the world's experts on nudibranchs together again to reassess the current status of these prevalent intertidal organisms.

USC Sea Grant Program

The two projects recommended for funding through the USC Sea Grant Program focus primarily on assessing the impact of anthropogenic changes on coastal and ocean ecosystems. In particular they examine habitat/species relationships, identify sources of ocean pollution and possibly develop indicators and metrics for adaptive management.

- **Tools to Identify Impacts of Endocrine Disrupting Pollutants in Fish:** Previous research has shown that endocrine-disrupting chemicals in the marine environment have caused physiological disruption, such as changes to reproduction, growth and survival in a variety of different species

within the Southern California Bight, including flatfish, surfperch and sculpin. However, most studies to date that have monitored these types of impacts to fish have used a single or limited set of biomarkers (e.g., measurement of hormone level). The researchers will develop more powerful diagnostic tools using a protein expression profile, or “fingerprint,” that will allow a relevant assessment of environmental effects in marine organisms. This information will help lead to better identification of pollutants and their impacts on marine species and ecosystems, which in turn can help state resource managers and regulators reduce the sources of contamination.

- **Understanding the Impacts of Invasive Seaweeds in Southern California:** In urban Southern California, coastal ecosystems are being altered by the combined impacts of urbanization, climate change and human visitation. These cumulative impacts pose severe challenges to coastal managers. The researchers have identified ecologically significant changes in the distributions and abundances of invertebrate and seaweed populations over the last 25 years, particularly on rocky shores near urban centers. In recent years, increases in the abundances of non-indigenous species (NIS) of seaweeds have also been recorded and these seaweeds have become essential components of these new areas. The current research will improve understanding of the roles of NIS on Southern California ecosystems. Understanding the interaction between NIS and native herbivores can lead to the development of better predictive models and contribute to more effective management by shedding light on ecosystem responses to NIS invasions.

Next Steps

Upon council concurrence with the selected projects, staff will release funds to the two Sea Grant programs to allow them to begin funding the projects. Sea Grant will administer the grants on behalf of the council and provide annual progress reports to council staff. The OPC Science Advisor will coordinate with grant recipients to improve the translation of their research results to products that are useful to resource managers and policy makers.