



MEMORANDUM

TO: Ocean Protection Council

FROM: Valerie Termini, Ocean Protection Council

DATE: September 10-11, 2008

RE: Concurrence with OPC priority scientific research projects selected for 2009 Sea Grant awards

ATTACHMENTS: 1 – [February 2008 Staff Recommendation](#)
2 – [Letters of support](#)

REQUESTED ACTION:

Staff recommends the council approve the following resolution:

“The Ocean Protection Council (OPC) concurs that the scientific research projects selected for funding from the University of California Sea Grant and University of Southern California Sea Grant Programs are consistent with OPC priorities for Sea Grant projects and meet the grant conditions approved by the council on February 29, 2008.”

BACKGROUND:

At its February 29, 2008 public meeting, the council 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 (attachment 1). 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 for each of the Sea Grant programs; University of California (UC) Sea Grant and University of Southern California (USC) Sea Grant.

RECOMMENDED PROJECTS:

University of California:

As detailed in the February 2008 staff recommendation, the approach to this year’s funding for UC Sea Grant was focused on supporting a single research and outreach initiative to address one priority issue area. To improve coordination between scientists and resource managers, the approach this year focused on assembling a team of researchers from diverse scientific backgrounds, who together will examine all facets of an issue, including how state managers can apply their findings to improve decision making.

Pursuant to the council's authorization in late February 2008, the UC Sea Grant program released a request for proposals (RFP) soliciting preliminary proposals. The RFP required the multidisciplinary teams to focus on a single issue and discuss how they would synthesize the current state of the knowledge for that research topic into a series of policy papers; produce applied tools or products (such as useful indicators or predictive models); and disseminate their results to policy makers and other interested communities. The priority topics available to initiative teams were:

- Climate change and ocean acidification
- Harmful algal blooms (HABs)
- Invasive species
- Water quality
- Wave and tidal energy development

Nine preliminary research proposals were received. The Resources Agency Sea Grant Advisory Panel (RASGAP) reviewed all proposals for their relevance to state needs and the Sea Grant technical review committees reviewed the proposals for scientific validity. Three projects were selected to submit full proposals. The selected research teams were provided extensive comments from the reviewers; OPC staff and the OPC Science Advisor also provided guidance for improvements and modifications. Each final proposal was again reviewed by both RASGAP and technical reviewers, including outside peer-reviewers who submitted extensive written comments on each of the research proposals.

Preferred Project

The staff recommends funding the project titled, *Ocean Acidification Exacerbated by Coastal Upwelling: Monitoring of CO₂ and O₂ on the California Shelf and Effects on Red Sea Urchins, Abalone, and Oysters*. This recommendation is based on RASGAP and Sea Grant rankings and deliberation among the Sea Grant staff, OPC staff, and the OPC Science Advisor. Climate change and ocean acidification are critical issues that will impact the ongoing productivity of the waters off the California coast and internationally. Council staff and the OPC Science Advisor were involved in each step of the review process to provide review panel members with guidance on OPC priorities, previously funded projects, and the OPC's strategic plan.

Project Description

Ocean Acidification Exacerbated by Coastal Upwelling: Monitoring of CO₂ and O₂ on the California Shelf and Effects on Red Sea Urchins, Abalone, and Oysters

- V. J. Fabry, California State University San Marcos (lead PI)
- A. G. Dickson, University of California San Diego
- J. Abell, Humboldt State University
- G. Hofmann, University of California Santa Barbara
- R. A. Feely, NOAA/Pacific Marine Environmental Laboratory
- C. L. Sabine, NOAA/Pacific Marine Environmental Laboratory
- F. Chavez, Monterey Bay Aquarium Research Institute
- D. Aseltine-Neilson, California Department of Fish and Game

During upwelling events along the California coast, acidic water due to increased CO₂ levels is brought onto the shelf and into the surface ocean. Little is known about how intermittent exposure to higher CO₂ concentrations might impact the development of larval, juvenile, and

adult stages of calcifying organisms or finfish that populate the near-shore environments. Research shows that changes in carbon concentrations may cause significant changes in overall calcification rates for many marine species including corals, coccolithophores, foraminifera, and pteropods. These later organisms are a significant food source for many important marine species, including local juvenile salmon. Similar decreases in calcification rates would be expected for edible mussels, clams, and oysters.

Comprehensive field studies of organisms and their response to sporadic increases in CO₂ along the western North American coast are currently lacking. Therefore, the investigators will implement an ocean acidity observing network to measure CO₂ concentrations over time. They will also conduct studies of the physiologic responses of red sea urchins (*Strongylocentrotus franciscanus*), red abalone (*Haliotis rufescens*), and oysters (*Ostrea chancefully*) to elevated CO₂ levels and reduced O₂ levels that are typical of seasonally upwelled waters. The three-year project will provide information that can be used in predictive models to gauge the impacts of ocean acidification on commercially and ecologically important calcifying organisms of the California coastal ocean. In the future, this information may be used by the Department of Fish and Game to set catch limits for these species that account for the potentially detrimental effects of high CO₂ concentrations or to limit fishing effort during times when the populations are effected by upwelling events.

The outreach component of the research project is another unique aspect of this year's research initiative. The research team will communicate directly with the fishing community to disseminate their results and it will also explore partnerships with California public aquaria to display the real-time ocean data in the context of exhibits on ocean acidification. The research team also plans to hold a stakeholder meeting in the 3rd year of the project where the team can present new data about ocean acidification to a wide audience including regulators and the commercial fishing community.

Letters of support for this project are included as attachment 3.

The University of Southern California:

Funding for the USC program was directed at individual proposals, following the same mechanism that has been used in past years. Proposals were required to illustrate a strong connection to management by specifying outreach mechanisms to integrate results with state management needs.

In late February 2008, USC Sea Grant released an RFP specifying urban water quality as the single overarching priority; more detailed priorities required that projects: (1) provide a better understanding of scientifically-based pollutant standards; (2) improve water quality indicators; or (3) examine TMDLs, watershed functioning, or pollutant origin and dynamics.

Eight pre-proposals were submitted and five projects were chosen for a full proposal review. The review process for these proposals was the same as with UC Sea Grant, with each being reviewed by RASGAP and technical reviewers.

Preferred Projects

The staff recommends funding the projects titled, *Environmental Endocrine Disruption in Urban Ocean Fish Mechanisms, Causes, Wider Impacts* and *The Copper Problem in California's Marinas*.

These recommendations are based on RASGAP and Sea Grant rankings and deliberation among the Sea Grant staff, OPC staff, and the OPC Science Advisor. Both projects address pollutant origin and dynamics in Southern California. Council staff and the OPC Science Advisor were involved in each step of the review process to provide review panel members with guidance on OPC priorities, previously funded projects, and the OPC's strategic plan.

Project Descriptions

1) Environmental Endocrine Disruption in Urban Ocean Fish Mechanisms, Causes, Wider Impacts

J. Moffett, University of Southern California

The recommended project will characterize a newly recognized form of environmental endocrine disruption – a process characterized by synthetic chemicals from the marine environment absorbing into fish and other organisms, mimicking or blocking the normal function of hormones and disrupting normal biological functions. This new type of endocrine disruption has not been widely reported in the literature, yet it appears to be relatively common in California urban ocean settings and it has significant potential to reduce the fitness and survival of fish, including several indigenous fish species (e.g., English sole, hornyhead turbot, California scorpionfish, shiner perch, and others).

Populations of fish near the Orange County Sanitation District outfall and Newport Harbor (both areas where this type of endocrine disruption is known to occur) will be compared with two control sites. These data will be used to determine the underlying mechanisms (i.e. molecular, physiological) of this endocrine disrupted condition and the contaminants that may be causing the endocrine disruption. The investigator will also examine the nature of the relationships between endocrine disruption and secondary impacts on physiological performance (i.e. growth, defense) to measure larger ecosystem impacts. Identifying the causative chemicals and their sources will allow managers implement methods to control or eliminate these pollutants and their discharges into the marine environment.

2) The Copper Problem in California's Marinas

K. Kelly, Cal State Long Beach

J. Kalman, Cabrillo Marine Aquarium

J. Armstrong, Orange County Sanitation District

The California state agencies have determined that copper poses a serious threat to water quality in marinas in the state. The main source is boat antifouling paints, yet no alternatives to copper have been identified that do not have their own potential side effects. While many of these paints have been banned for use in California, it appears further steps will be needed to reduce copper contamination. Previous research has shown that copper concentrations are much higher in salt water marinas than in fresh water marinas, signifying that the mechanisms for copper leaching from antifouling paints is fundamentally different in salt versus fresh water. Also, copper toxicity

to marine organisms differs between saltwater marinas, indicating that copper toxicity may be mitigated by interaction with different organic matter. The investigators will test these two assumptions through a series of experiments.

Because few water or sediment quality studies exist for Northern Californian marinas, the survey results will provide regulators and scientists with much-needed data and help them gain a better understanding of copper behavior in marina basins. It will also give them new tools to develop accurate site-specific management criteria based on specific water chemistries. Furthermore, understanding the relationship between salinity and copper fluxes from antifouling paints could help manufacturers design more effective, environmentally safe alternatives.

CONSISTENCY WITH THE OPC 5-YEAR STRATEGIC PLAN, COPA, AND FUNDING PRIORITIES

All three projects are consistent with the OPC 5-year strategic plan, California Ocean Protection Act, and the OPC Funding Priorities as described in February 2008 staff rec.

NEXT STEPS

Upon council concurrence with the recommended projects, staff will release funds to the two Sea Grant programs to allow the programs to begin funding the projects. The two Sea Grant programs will administer the grants on behalf of the OPC and provide annual reports to OPC staff on the progress of the research projects. 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. Project deliverables and data will become available at the conclusion of the funded projects.