

**California Ocean and Coastal  
Information, Research, and Outreach Needs Workshop**

**Final Summary Report**

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## **Executive Summary**

The *California Ocean and Coastal Information, Research, and Outreach Needs Workshop* was held on November 18-19, 2004 at Long Marine Laboratory, University of California, Santa Cruz, to identify the information and research priorities essential to improving the management of California's ocean and coastal resources. The California Resources Agency, California Sea Grant College Program, University of California Marine Council, and California Ocean Science Trust jointly hosted this workshop and over 60 members and affiliates from their organizations, as well as others, attended.

The results of this workshop are intended to guide the development of the California Ocean and Coastal Information, Research, and Outreach Strategy called for in Governor Arnold Schwarzenegger's ocean action plan titled *Protecting Our Ocean: California's Action Strategy*. The results from the workshop will also aid in the development of strategic plans for the California Sea Grant College Program, University of California Marine Council, and the California Ocean Science Trust.

The workshop was organized into work groups on five topic areas whose findings are summarized below. The work groups identified priority information, research, and outreach needs for their topic area considering cross-cutting issues including socio-economics, governance, and ocean observations; then, they selected a top recommendation out of their deliberations.

- *Coastal Natural Hazards; Beach and Coastline Issues*. Priority information and research needs identified by this work group were: Sediment Changes and Impacts; Coastal Hazard Identification, Forecasting, and Impacts; Social and Economic Information Analysis; Legal and Public Policy Analysis; and Coastal Hazard Response Strategies. Their top recommendation was the creation of a communication system to connect the information needs of state agency staff and managers with the expertise of marine scientists in academia. They recommended that the California Resources Agency, California Sea Grant College Program, University of California Marine Council, and the California Ocean Science Trust lead this effort.
- *Invasive Species; Endangered Species*. This work group identified a four-step approach to prioritize information and research needs. The four steps are: Prevention of new introductions, Detection of new invaders, Eradication of unwanted invaders, and Control of established species. Their top recommendation was the need to form a California Center for Invasive Species.
- *Ecosystem Health; Habitat Restoration and Management*. This work group identified three priority information and research needs within the coastal ecosystem context: Sufficient understanding of structure and function of nearshore ecosystems; Identification of critical habitats in need of protection and restoration (and strategies needed to carry out their protection and restoration); and Improved understanding of the "Human Dimension" in the management and stewardship of California's ocean and coastal ecosystems. Their top recommendation was the development of a "Living Observation System" to quantify how critical coastal ecosystems are responding to natural and human drivers.
- *Fisheries Management; Marine Protected Area; Aquaculture*. The top information and research priorities identified by this work group are: Improving single species management by gathering more information on mortality, discards, abundance, life history, and age structure; Implementing ecosystem-based management by expanding monitoring of existing MPAs; Establishing a collaborative research initiative that would improve communication, collaboration, and conflict

resolution to achieve the priorities identified by this group; and Developing a pilot project to implement ecosystem-based management that also incorporates social and economic reforms to improve overall sustainability.

- *Coastal Pollution; Water and Sediment Quality.* Priority information and research needs identified by this group were: Determining the impacts of non-point source and storm water pollution, Developing baseline health indicators, Identifying sources of pollutants, Assessing risks for emerging contaminants, Developing sediment management strategies and eco-toxicology, Gathering socioeconomic data, and Evaluating effectiveness of non-point source and storm water pollution control technologies. This group's top recommendation was that a web-based information clearinghouse be created for all seven priority issues.

Four central themes emerged from the work group and plenary sessions at the workshop. These key themes are: i). Need for improved coordination and collaboration between existing coastal and ocean organizations; ii). Need to open lines of communication between researchers in academia and decision makers to develop the necessary scientific data and to better apply science to management; iii). Need to manage all aspects of coastal and ocean resources and processes based on an interdisciplinary "ecosystem" approach; and iv). Need for funding and support for existing and new coastal and ocean monitoring systems.

The workshop organizers are developing immediate and long-term plans to carry out the recommendations from this workshop. The California Ocean Protection Council will use the workshop results as a starting place to develop a California Ocean and Coastal Information, Research, and Outreach Strategy by the end of 2005. The workshop findings will help guide California Sea Grant's strategic planning process, influence their future calls for proposals, and help them develop new collaborations. The University of California Marine Council is seeking to improve communication between research and management communities by connecting managers with University scientists with relevant expertise. The workshop validated the strategic roles and priorities being considered in California Ocean Science Trust's Action Plan.

Development of the California Ocean and Coastal Information, Research, and Outreach Strategy will aid the long-term realization and implementation of these information and research priorities. The Strategy will be designed to unify ocean and coastal organizations in California to meet the common goals identified in this workshop.

## **Introduction**

On November 18-19, 2004, a special workshop was convened at Long Marine Laboratory, University of California, Santa Cruz, to address California's information, research, and outreach needs for ocean and coastal management and outreach purposes. This *California Ocean and Coastal Information, Research, and Research Needs Workshop* was organized and hosted by the following organizations:

California Resources Agency  
California Sea Grant College Program  
University of California Marine Council  
California Ocean Science Trust

Members and affiliates of the four host organizations were invited to this 2-day workshop, and over 60 participants from academia, governmental and non-governmental organizations, and industry attended (Appendix I). The specific objectives of the workshop were to:

- Identify information and research priorities which are essential to improving the management and stewardship of California's ocean and coastal resources;
- Identify approaches to more efficiently transmit and apply this information to management through education and outreach programs;
- Identify opportunities for collaboration and partnering among workshop participants, their affiliated organizations, and other stakeholders; and
- Identify the next steps in establishing new collaborations and improving and/or expanding existing collaborations to achieve identified research, outreach, and management priorities.

Governor Arnold Schwarzenegger's ocean action plan, *Protecting Our Ocean: California's Action Strategy*, released in October 2004 called for this workshop to aid the development of a statewide Ocean and Coastal Information, Research, and Outreach Strategy. In addition, the results of this workshop will aid in the development and/or revision of the strategic plans and science priorities for the California Sea Grant College Program, the University of California Marine Council, and the California Ocean Science Trust. This information will also be useful in informing the research priorities and agendas for other participants from academia, governmental and non-governmental organizations, and industry and help California's ocean and coastal community work together to identify common goals. This summary report concludes with a synopsis of necessary next steps that emerged from the workshop and how each host organization will work to achieve the priorities identified in the workshop.

## **Workshop Format**

The workshop was structured to identify targeted information, research, and outreach priorities that will lead to improved management and stewardship of California's ocean and coastal resources (Appendix II). Prior to the workshop, participants were asked to select, and were subsequently assigned to, one of five work groups covering the topics of:

- Coastal Natural Hazards; Beach and Coastline Issues
- Invasive Species; Endangered Species
- Ecosystem Health; Habitat Restoration and Management
- Fisheries Management; Marine Protected Areas; Aquaculture
- Coastal Pollution; Water and Sediment Quality

In addition to considering the relationships and overlaps between all topic areas, each work group also considered a series of important cross-cutting issues including socio-economics, governance, and ocean observations.

On Day One, the work groups were asked to identify for their topic area the priority information and research needs to better support sound ocean management, and then report these priorities to the larger group. The first day concluded with a plenary discussion on how to improve communication between the research community and decision makers (Appendix III).

On Day Two, the work groups assessed the availability, accessibility, and usability of information in their topic area, identified information gaps, and identified potential collaborations to close these gaps. At the end of the second day, each participant made a brief comment regarding the workshop's utility to them and suggested next steps (Appendix IV).

A computer voting system called Option Finder was employed to record the participant's opinions on a variety of issues. Each participant was given a voting unit. The computer system received all votes and produced a bar graph showing the distribution of votes on the overhead screen. Option Finder was used to identify, among other things, the demographics of the group, opinions on how to best apply science to management, ranking of priorities from each work group, and successes/challenges of the workshop format.

Interesting Option Finder results included:

- 78% of participants thought that establishing science advisory groups for decision-making bodies would be the most effective channel for bridging the gap between the scientific community and decision-makers.
- 54% voted that targeted (problem-focused) university positions/groups with scientific credibility and accountability to the stakeholders would be the most effective way to produce science that would meet the needs of decision makers. 28% voted that opening research funding to free market consultants and private institutes would be the best option.
- 78% of participants "agreed" or "mostly agreed" that lack of cooperation and collaboration between California ocean-related organizations hindered the application of science to management. However, 90% of participants voted that their organization and other organizations were "very cooperative" or "cooperative" in this regard. This disconnect between willingness to collaborate and lack of cooperation suggests that efforts, such as this workshop, to

bring together different organizations to collaborate on issues would be greatly beneficial in improving the application of science to management.

- 71% thought that the overall value of this workshop was “very good” or “good.”
- 47% voted that they would improve this type of workshop by including additional participants. This result demonstrates the need to solicit public comment on the findings of this workshop.
- 61% voted that they would “definitely” be willing to continue working on these topics as a group.

## **Work Group Reports**

The work group reports consist of a summary of the group’s findings and an outline of priority information and research needs identified by the group. Additional findings vary among the work groups. During the workshop, each group recorded their discussion on flip-charts. The key flip-chart sheets for each group, including the availability, accessibility, and usability of information for identified priorities and suggested collaborations, have been included in this report as an electronic appendix (Appendix V), which can be found at the following URL: <http://resources.ca.gov/ocean/workshop.html>

### **Coastal Natural Hazards; Beach and Coastline Issues**

#### *Summary*

The coast of California is facing a dilemma of increasing magnitude as more people migrate to coastal counties and cities. Coastal erosion is a natural process and has been going on since coastlines were first formed; however, the rate of erosion is changing in response to both rising sea level and two decades of damaging El Niño events. Dams, reservoirs, and sand mining as well as large coastal engineering structures have affected both sand delivery to the coast and sand transport along the shoreline. The State of California and the federal government are working with a variety of stakeholders to develop a more comprehensive statewide strategy for dealing with these issues. The Coastal Hazards work group identified five priority information and research needs: Sediment Changes and Impacts; Coastal Hazard Identification, Forecasting, and Impacts; Social and Economic Information Analysis; Legal and Public Policy Analysis; and Coastal Hazard Response Strategies.

One overarching systematic issue emerged from this group’s discussions: Better connection of the information needs of state agency staff and managers with the expertise of marine scientists in academia is direly needed. This group recommended that the State of California should work with the University of California Marine Council and other academic consortiums to establish a system that more fully opens the lines of communication between academia and coastal management agencies. This system will allow two-way communication of management needs to academia and research findings to managers. Systems that improve communication between these groups should be a key consideration for California’s Ocean and Coastal Information, Research, and Outreach Strategy and the strategic plans of other organizations participating in this workshop.

#### *Outline of Priority Information and Research Needs*

- A. Sediment Changes and Impacts
  - Long term beach changes
  - Littoral cell sand budgets
  - Dredge material disposal/placement

- Watershed sediment supply including sand and gravel mining
- Transport and fate of sediments
- Effects of tectonics on sediment supply
- B. Coastal Hazard Identification, Forecasting, and Impacts
  - Geo Reference mapping
  - Update hazard mapping
  - Seismic (earthquake) hazards
  - Bluff/cliff erosion rates
  - Wave modeling and monitoring
  - Storm hazard warnings
  - El Niño effects
  - Climate change and coastal impacts
  - Post-storm water quality impacts
  - Hazard risk assessment
- C. Social and Economic Information Analysis
  - Demographic housing and economic values - trends along the coast
  - Assessing government investment along the shoreline
  - Bridge social/economic science and natural science
  - Determine values to end users
  - Dredge material use and disposal
  - Coastal resource evaluation – beach evaluation
  - Understanding public knowledge base
- D. Legal and Public Policy Analysis
  - Public trust – defining
  - Takings issues
  - Identify and assess state/federal/local policies
  - Assess effectiveness of mitigation strategies
  - Risk assessment
- E. Coastal Hazard Response Strategies
  - Hard protection
  - Beach restoration and nourishment
  - Retreat and relocation
  - Risk assessment
  - Cost/Benefit analysis

*See Appendix V (PDF pps. 26-36) for availability, accessibility, and usability of information for these identified priorities and collaborations needed.*

## **Invasive Species; Endangered Species**

### *Summary*

The overarching conclusion of the Invasive Species work group is that a four-step approach is needed to successfully combat the issue of unwanted aquatic invasive species. That approach consists of concerted and coordinated efforts that embrace *prevention* of new introductions, *detection* of new invaders, *eradication* of unwanted invaders, and *control* of established species. For each of these steps,



a blend of science, policy, and outreach is key to a successful outcome. The needs in science include a rapid yet thorough understanding of the biology and ecology of new invaders, developing effective yet safe prevention and control protocols, and assembling a cadre of readily available experts to quickly identify potential new invaders. The needs in policy include creation of well-reasoned policies that vastly reduce the risk of new invasions or the spread of current invaders in the coastal marine environment. The needs in outreach include a credible education program to inform many sectors of the public as to the potential damage from invasive species, what each person can do to prevent future invasions, and how to effectively work with maritime industries to stem the tide of more aquatic invasive species.

Imbedded in the four-step approach of prevention, detection, eradication and control are numerous activities that collectively lead to a more effective defense against aquatic invasive species. These activities range from supporting more research on potential new invaders, studying vectors of dispersal beyond ballast water, creating a coordinated state-wide education program, and to finishing the California invasive species action plan.

The Invasive Species work group set as the highest priority for action the formation of a California Center for Invasive Species. This long overdue center will fill a vital role in coordinating research, providing sage advice on new California invasive species policy, developing new outreach programs, and serving as an interface with national invasive species efforts. The first step in creating this new Center for Invasive Species is to bring together those organizations that have the capacity and vested interest. Two leading contenders to make this happen are the State of California and California Sea Grant. The State of California has statutory authority and could work to create a center that would coordinate invasive species issues state-wide. Under the current fiscal constraints, the State of California lacks the financial resources to create new centers. Because of this lack of state resources, for the center concept to flourish an organization such as California Sea Grant must step forward with a willingness to invest financial resources and engage skilled outreach personnel with expertise in aquatic invasive species. This work group recommended that the State of California and Sea Grant should begin the process of creating a new California Center for Invasive Species. Once formed, that Center could turn its attention to the principal tasks of prevention, detection, eradication, and control of invasive species as set forth by the Invasive Species Workgroup.

Please note: This work group chose to focus on invasive species only. They did not cover endangered species because they did not feel that they had the expertise to identify needs for this topic.

#### *Outline of Priority Information and Collaboration Needs*

- A. Expand *prevention* beyond ballast water
- B. Develop a state-wide *detection* protocol
- C. Develop a science-based *eradication* approach
- D. Support research and development to effectuate *control*
- E. Provide resources and coordinate management
- F. Develop a process for coordination and integration of information on invasive species

*Additional needs identified by Invasive Species work group**Information needs:*

- Independent testing program for antifouling strategies (different regions and vessels)
- Effects of climate change; climate modeling on a regional scale
- More economic analysis regarding costs of information gathering, activities, and groups
- School of coastal and marine affairs in California
- More information on basic biology and ecology
- Beneficial use of invasive species (create harvest incentives)
- Clearinghouse to collect and disseminate information; educational portal
- Utilize existing educator networks; develop consistent message
- Monitoring: mechanism to detect incipient invasions e.g. California Fish and Game; statewide detection protocol
- Need research on ecosystem management
- Effect of water delivery systems and their management
- Necessary information to expand prevention strategy beyond ballast water e.g. hull fouling, aquarium trade, aquaculture, live seafood trade

*Management needs:*

- Streamline federal and state grant application and reporting processes
- Consistency of management strategies at various scales e.g. statewide eradication approach
- Investment in statewide management framework (only west coast state without a framework)
- Rapid response plans
- Education of general public
- Better coordination among agencies (currently very poor)
- Include stakeholders from beginning; maintain regional presence of agencies to facilitate stakeholder involvement
- National Center for Invasive Species (clearinghouse, peer review of work); make California the leader (preemptive strategy)
- Endangered species; coastal observatories; marine protected areas
- “Call to Arms”: invasive species affect native and endangered species
- Develop regional and international relationships e.g. focus on regional traffic

*See Appendix V (PDF pps. 37-47) for availability, accessibility, and usability of information for these identified priorities; collaborations needed; and more information on information and management needs .*

**Ecosystem Health; Habitat Restoration and Management***Summary*

The Ecosystem Health work group first defined the scope of its work as setting priorities for an “integrated coastal ecosystem approach to understanding and managing information” related to ecosystem health and habitat restoration. The work group identified four key questions:

- What are the current status, trends, and responses of coastal ecosystems to multiple drivers (e.g. human and natural systems)?
- What do we know about these ecosystems (current assessments)?
- What do we need to know about them?
- What can and should we do i.e. what are our options for taking action?

In this coastal ecosystem context, the Ecosystem Health group identified three priority research and information needs: Sufficient understanding of structure and function of *Nearshore ecosystems*; Identification of *Critical habitats* in need of protection and restoration (and strategies needed to carry out their protection and restoration); and Improved understanding of the “*Human Dimension*” in the management and stewardship of California’s coastal and ocean ecosystems.

This group’s top recommendation for immediate funding was the development of a “Living Observation System” to quantify how critical coastal ecosystems are responding to natural and human drivers. They suggested that the four workshop host organizations collaborate on this effort.

#### *Outline of Priority Information and Research Needs*

##### A. Nearshore ecosystems:

- Sufficient understanding of their structure and function,
- How these ecosystems are responding to multiple drivers, and
- How these ecosystems will respond to multiple drivers (i.e. ability to predict responses)

##### B. Critical habitats:

- Identify those in need of protection/restoration
- Identify protection/restoration goals for these habitats
- Develop scientifically rigorous understanding of how to protect/restore these habitats
- Conduct assessment/evaluation of protection/restoration measures for these habitats

##### C. Improved Understanding of the “Human Dimension”, specifically:

- Causes of behavior resulting in interactions with and impacts on the environment
- How policy constrains ability to pursue these priorities

*See Appendix V (PDF pps. 48-60) for availability, accessibility, and usability of information for these identified priorities and collaborations needed.*

## **Fisheries Management; Marine Protected Areas; Aquaculture**

### *Summary*

More research on fisheries management, marine protected areas (MPAs), and aquaculture is needed to reverse the declines in California fisheries, preserve marine biodiversity, and promote sustainable and efficient aquaculture practices. This work group decided to focus mostly on fisheries management and aquaculture since there is an existing process to determining research needs for MPAs—the MLPA Initiative; however, they agreed that MPAs are an area of tremendous research need. The group identified five research priorities for this topic area: Improving single species management; Implementing ecosystem-based fisheries management and MPAs; Gathering socio-economic

information; Developing sustainable aquaculture; and Improving communication, collaboration, and conflict resolution.

Out of these deliberations, the Fisheries work group recommended four projects for immediate funding. These top priorities are:

- Improving single species management by gathering more information on mortality, discards, abundance, life history, and age structure;
- Implementing ecosystem-based management by expanding monitoring of existing MPAs;
- Establishing a collaborative research initiative that would improve communication, collaboration, and conflict resolution to achieve the priorities identified by this group; and
- Developing a *pilot project* to implement ecosystem-based management that also incorporates social and economic reforms to improve overall sustainability

The steps to developing the *pilot project* are:

- Identify a fishery ripe for reform (e.g. in some financial trouble, poor conservation performance, etc. but with potential for recovery).
- Develop a short list of small-scale pilot fishery reform projects based on dedicating access privileges in a way that is appropriate for that fishery/community. For urchins, it would probably be TURFs; for nearshore, it might be ITQs. The specific reform would be chosen based on criteria specifying improved financial and conservation performance.
- Support the pilot project with financing from a Revolving Loan Fund to provide low-interest loans to fishing industry groups whose proposals meet stringent financial and conservation criteria.
- Recover the loan with assessments on value or landings, replenish financing corpus, reinvest in next priority fishery; thereby demonstrating that financing for fishery reform can be sustainable.

#### *Outline of Priority Information and Research Needs*

- A. Improve Single Species Management
  - Gather information on mortality, discards, abundance, life history, and age structure
  - Know the oceanographic context
  - Approaches: risk assessment, managing uncertainty
- B. Ecosystem-Based Fisheries Management and MPA Design
  - More monitoring of MPAs
  - More realistic management approaches
  - Habitat/Species relationships
  - Better models
  - Ocean/Climate effects
  - Habitat mapping
- C. Gather Socio-Economic Information for MPAs and Fisheries
  - Use patterns
  - Impact models
  - Decision support tools
- D. Research on Sustainable Aquaculture
  - Reduce ecological footprint

- Improve biological efficiency
  - Reduce energy use
  - Improve economic incentives for sustainable practices
- E. Improve Communication, Collaboration, and Conflict Resolution
- Collaborative research initiative
  - Better mechanism for science advice
  - Improve institutional coordination
  - Training in conflict resolution

*See Appendix V (PDF pps. 8-20) for availability, accessibility, and usability of information for these identified priorities and collaborations needed.*

## **Coastal Pollution; Water and Sediment Quality**

### *Summary*

Additional information, research, and outreach efforts are necessary to address critical concerns faced by the State of California regarding coastal pollution and sediment quality. The State of California, the federal government, and others have made major advancements in addressing the impacts of point source pollution over the past 20 years and new approaches are ongoing to address non-point source pollution. However, concerns regarding pollution of water and sediment in coastal watersheds and nearshore waters along California's shores continue. Ecosystems can be impacted through disease, toxicity, or other forms of contamination. This work group identified seven research priorities: Determining the impacts of non-point source and storm water pollution, Developing baseline health indicators, Identifying sources of pollutants, Assessing risks for emerging contaminants, Developing sediment management strategies and ecotoxicology, Gathering socioeconomic data, and Evaluating effectiveness of non-point source and storm water pollution control technologies.

This group's main recommendation was that a web-based information clearinghouse be created for all seven priority issues. In addition, this group emphasized that collaboration is essential to achieving these priorities. They identified the appropriate groups to collaborate on different issues (see below) and recommended that the four workshop host organizations develop and implement a communication strategy to connect these potential collaborators.

### *Outline of Priority Information and Research Needs*

- A. Non-point Source and Storm Water Impacts: various habitats, species, communities, ecosystems, aerial deposition
- B. Baseline Coastal Health Indicators
  - Which indicators? Standardization is needed
  - Reference versus impacted
  - Human health: fishing, swimming
- C. Source Identification of Pollutants (more is known in some places than others)
  - Background levels
  - Anthropogenic activities
  - Legacy pollutants
- D. Risk Assessment for Emerging Contaminants
  - Setting thresholds/standards

- E. Sediment Management Strategies and Ecotoxicology
  - Restoration, dredging, remediation
- F. Socioeconomic Data: ecosystems, resource use, etc.
- G. Stormwater and non-point source remediation, control technologies, mitigation

*Best Collaborations to Address Each Priority*

A. Lead Agencies—Water Boards

- State Water Resources Control Board (SWRCB)
- Regional Water Quality Control Board (RWQCB)
- United States Geological Survey (USGS)
- National Marine Sanctuary Program (NMSP)
- Non-governmental organizations (NGOs)
- San Francisco Estuary Institute (SFEI)
- Southern California Coastal Water Research Project (SCCWRP)
- Dischargers
- State Coastal Conservancy (SCC)
- Cal State
- University of California, Davis (UCD)
- California Sea Grant
- U.S. Environmental Protection Agency (EPA)
- National Oceanic and Atmospheric Administration (NOAA)

B. Lead Agencies—Water boards, EPA, Office of Environmental Health Hazard Assessment (OEHHA)

- SWRCB, RWQCB, USGS, NMSP, NGOs, SFEI, SCCWRP, Dischargers, SCC, Cal State, UCD, Sea Grant, EPA, NOAA

C. Lead organizations—Sea Grant and SCCWRP (driven by academics)

- Sea Grant
- University of California Marine Council
- Ocean Science Trust

D. Lead agencies—OEHHA, EPA (driven by academics)

E. Lead organization—Water boards, EPA

- SWRCB, RWQCB, USGS, NMSP, NGOs, SFEI, SCCWRP, Dischargers, SCC, Cal State, UCD, Sea Grant, EPA, NOAA, Ports, Army Core of Engineers (ACOE)

F. Lead organization—Academia

G. Lead agencies—Water boards

- Local government

*See Appendix V (PDF pps. 21-25) for availability, accessibility, and usability of information for these identified priorities and collaborations needed.*

## **Next Steps**

This workshop has provided invaluable advice to the California Resources Agency, California Sea Grant, University of California Marine Council, and Ocean Science Trust. Information, research, and outreach needs were identified and vetted by more than 60 workshop participants coming from many sectors of the coastal marine community. Expert facilitation in small group settings provided ample opportunity for identifying and discussing key priorities under the five general topic headings.

A clear message emerged from both work group and plenary discussions at the workshop on what is needed to improve ocean and coastal management in California. This message had four central themes:

- Need for improved coordination and collaboration between existing coastal and ocean organizations;
- Need to better open lines of communication between academic scientists, state agency staff, and decision makers to develop the necessary scientific data and to better apply science to management;
- Need to manage all aspects of coastal and ocean resources and processes based on an interdisciplinary “ecosystem” approach;
- Need for funding and support for existing and new coastal and ocean monitoring systems

The identification of these needs at the workshop has aided the host organizations in determining their next steps. Each host organization has summarized these next steps for their organization below.

#### *California Resources Agency*

Governor Arnold Schwarzenegger’s ocean action plan, *Protecting Our Ocean: California’s Action Strategy*, requires the development of a strategic approach to ocean and coastal information, research and outreach. This workshop has been the first step in a process to develop a coordinated approach to California ocean and coastal management needs that will effectively harness resources at all levels of government, academia, industry, and non-governmental organizations. The development of the California Ocean and Coastal Information, Research, and Outreach Strategy will be guided by the California Ocean Protection Council, which will hold their first meeting on March 21, 2005. Collaborations enhanced with, and recommended by, this workshop will be critical for California to achieve a comprehensive ocean and coastal research program.

It is anticipated that the development of the Strategy will include the following steps:

- The results of this workshop will be presented at the first meeting of the California Ocean Protection Council on March 21, 2005 accompanied by a work program for developing the Strategy.
- The Council will take comments on the workshop results and work program and will direct its staff regarding its development.
- The Draft Strategy will then be developed and released. The Council will receive public comment on the Draft Strategy.
- The goal will be to produce the Final Information, Research, and Outreach Strategy to be approved by the Council by the end of 2005.

#### *California Sea Grant College Program*

A principal motivation for California Sea Grant to jointly organize and host this workshop was to aid the development of our new five-year strategic plan. That plan will better serve the needs of California Sea Grant and the State of California through a high degree of coordination with like-minded organizations and broad-based stakeholder input. The workshop provided an ideal and unprecedented opportunity to begin the California Sea Grant strategic planning process by working with numerous organizations and engaging numerous stakeholders in a single setting. The workshop’s five topic headings are extremely

relevant to the future research and outreach plans of California Sea Grant and through the workshop findings will serve to shape the program for the next five years.

California Sea Grant will proceed from the workshop along several fronts.

- First, the Sea Grant strategic planning process will continue over the course of the next twelve months. Employing topics and priorities identified at the workshop, strategic planning will move to a series of focus group meetings to continue to engage stakeholders on the strategic direction of the program. Workshop results will serve as the point of departure for each of the focus group meetings. Some of the participants in the workshop will be asked to join focus group meetings to serve as a cross reference in the California Sea Grant strategic planning process.
- Second, the workshop identified many information, research and outreach priorities that are of an immediate nature. California Sea Grant can adjust its next call for proposals to include some of the immediate needs as a priority for 2006 research support. In a similar fashion, California Sea Grant Extension personnel can adjust their programs to accommodate some of these immediate needs.
- Third, many of the research and outreach priorities identified at the workshop beg for natural collaborations, either among organizations or among individuals. California Sea Grant will place an emphasis on fostering those collaborations, both on a one-time/short-term basis and on an enduring/long-term basis. Some of these collaborations will be little more than an agreement to share information while others will involve considerable investment of program resources.

#### *University of California Marine Council*

The University of California Marine Council (UCMC) represents approximately 600 marine scientists, both faculty and researchers, spread across eight UC campuses. Their expertise includes coastal processes, hazards, resources, aquaculture, fisheries, marine protected areas, nearshore ecosystems and their health, and coastal water and sediment quality. These scientists represent a significant resource to the state of California as it begins to look at the coast and ocean in a comprehensive way. The specific expertise that UCMC can offer are: Identification of priority areas for research, Providing an easily accessible directory of marine science expertise within the University system, Recommendations on how we can fill the information gaps, Development of appropriate responses and policies, and Outreach and information transmission and application strategies.

UCMC can serve as the link to connect University marine scientists with the State agencies having coastal and ocean responsibilities. These connections can be relatively easily established and can provide important benefits to both groups in identifying and resolving state coastal and ocean problems and issues. Agency staff can work directly with UCMC to identify those scientists who have the capability to address and resolve the questions the agencies need to resolve. Through a streamlined and focused solicitation process, responses can rapidly be developed, scope and budgets negotiated and agreed upon, contracts signed and work initiated. This expedited process is of significant value to the scientists in that far less waiting time is involved before funding is approved than is required for virtually any federal granting agencies. This agency/university partnership would be of great benefit to the agencies because the research can be carried out by scientists who are at the cutting edge of their disciplines and at far less cost than charged by typical consulting firms. As projects are successfully completed and the mutual benefits are realized, the partnerships and synergies between the state agencies and university scientists will be recognized as an effective and efficient mechanism for approaching and resolving the many coastal and ocean issues California faces.



*California Ocean Science Trust*

This workshop validated the following strategic roles and priorities being considered in California Ocean Science Trust's (CalOST) Three Year Action Plan:

1. Advisory/Liaison Role:

- The workshop identified an integrated ocean observance system as a critical information need. CalOST is pursuing the possibility of serving as an advisory and user group liaison to the research institutions involved in the Ocean Observation System and potentially to the State Coastal Conservancy in their implementation of the surface monitoring program.
- In addition, CalOST will seek to function as one of the advisory groups to the California Ocean Protection Council.

2. Facilitation Role:

- The recognition at the workshop of the benefits of transitioning from single species management towards an ecosystem approach has prompted CalOST and Sea Grant to collaborate in creating one or more pilot projects to promote the adoption of ecosystem management for living marine resource management in California.
- Workshop participants verified the need for additional facilitation in coastal water quality management.

3. Funding:

- Several opportunities were identified during workshop discussions for “bridge” or one-time project funding. Given the current limited financial resources of CalOST, only smaller start-up or seed funding projects would be appropriate for CalOST. Funding the revitalization of the California Ocean and Coastal Environmental Access Network (CalOCEAN) would provide a significant boost in promoting coastal and ocean information and research sharing.

### **Concluding Remarks from Organizers**

This workshop is an important first step in developing an Ocean and Coastal Research and Outreach Strategy for the State of California as called for in Governor Arnold Schwarzenegger's ocean action plan titled *Protecting our Ocean: California's Action Strategy*. The joint organization of this workshop will also aid the parallel development of strategic plans and research priorities for the State of California, the California Sea Grant College Program, the University of California Marine Council, and the Ocean Science Trust. The comprehensive analysis from a broad array of viewpoints and perspectives in the workshop will be invaluable in developing new and innovative approaches to California's coastal and ocean needs and challenges. We are grateful to all participants for taking time out of their schedules to participate in this 2-day workshop. We hope this meeting inspired new collaborations between participants and enhanced existing ones, and we encourage continued involvement from all stakeholders in the development and implementation of our strategic plans.

## APPENDIX I

## WORKSHOP PARTICIPANTS

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**\* Work Groups**

1. Fisheries Management, Marine Protected Areas, and Aquaculture
2. Ecosystem Health, Habitat Restoration and Management
3. Coastal Pollution, Water and Sediment Quality
4. Invasive Species and Endangered Species
5. Coastal Natural Hazards, Beach and Coastline Issues

## APPENDIX II

### WORKSHOP AGENDA

#### **November 18, 2004**

- 10:00 am WELCOME - Gary Griggs
- 10:05 am INTRODUCTIONS  
 Overview of the workshop – Brian Baird  
 Introduction of host organizations  
     UC Marine Council – Gary Griggs  
     CA Ocean Science Trust – Justin Malan  
     CA Sea Grant – Russ Moll  
 Introduction of workshop facilitator  
 Introduction of participants
- 10:30 am WORKSHOP AGENDA & EXPECTED OUTCOMES  
 Review of workshop agenda  
 Expected outcome  
 Introduction to Option Finder
- 11:00 am WORK GROUP ASSIGNMENTS  
*First Task: Identify information needs for coastal/ocean management*
- 12:30 pm LUNCH (work groups may elect to work through lunch)
- WORK GROUP REPORTING SESSIONS:**
- 1:30 pm Coastal Natural Hazards, Beaches & Coastline Issues
- 2:15 pm Invasive Species and Endangered Species
- 3:00 pm BREAK
- 3:30 pm Ecosystem Health, Habitat Restoration and Management
- 4:15 pm Fisheries Management, Marine Protected Areas, and Aquaculture
- 5:00 pm BREAK
- 5:15 pm Coastal Pollution, Water and Sediment Quality
- 6:00 pm DINNER
- 7:00 pm GROUP DISCUSSION: INFORMATION TRANSMISSION AND UTILIZATION
- 8:00 pm CONCLUSION OF DAY ONE  
 Presentation of the overall ranking of priorities  
 Goals and tasks for day two

**November 19, 2004**

- 8:30 am WELCOME, RECAP, REPRIORITIZE, AND CHARGE FOR SECOND DAY
- 9:00 am WORKGROUP ASSIGNMENTS FOR SECOND DAY  
*Part One: Information Assessment for Identified Priorities*
- 10:00 am BREAK
- 10:15 am WORKGROUP ASSIGNMENTS FOR SECOND DAY (CONTINUED)  
*Part Two: Develop Action Plan*
- 12:00 pm LUNCH (work groups may elect to work through lunch)
- WORK GROUP REPORTING SESSIONS:**
- 12:30 pm Fisheries Management Report Out
- 12:50 pm Ecosystem Health Report Out
- 1:10 pm Coastal Pollution Report Out
- 1:30 pm BREAK
- 1:45 pm Invasive Species Report Out
- 2:05 pm Coastal Hazards Report Out
- 2:25 pm GENERAL REFLECTION AND RECOMMENDATIONS ON NEXT STEPS
- 2:45 pm CLOSING AND EVALUATION

## APPENDIX III

### IMPROVING COMMUNICATION BETWEEN RESEARCH COMMUNITY AND DECISION MAKERS

The first day of the workshop concluded with a plenary discussion on how to improve communication between the research community and decision makers.

#### **Questions posed:**

- Identify the information that needs to be communicated (What?)
  - Differentiate information needs (e.g. raw data vs. executive summary) and therefore, delivery vehicles and timeframes (appropriate to need)
- Identify target audiences i.e. major groups that need each type of information (Who?)
  - Identify opinion leaders for target audiences
- What are innovative ideas and strategies for communicating between these audiences (How?)
  - What communication strategies and methods have been effective?
- Survey of communication tools: web, email, print (mass media, direct mail), radio, TV, meetings
  - Match audiences with communication tools to best reach them
- Feedback on usefulness of communication strategies and methods. What is the best way to measure change in knowledge, attitude, and behavior?

#### **Discussion:**

##### **Impediments/barriers to effective communication between these audiences:**

- No incentive system (reward) for academics sharing information with decision makers in timely fashion (and vice-versa?)
- Different languages and mindsets (e.g. long-term vs. short-term priorities); lack of training in understanding and communicating priorities to different audiences (in useful forms)
- Regulatory agencies receive studies by environmental engineering firms and academics is left out
- Regulators looking for university assistance: lack of responsiveness; too long (or no) response time; inefficiency of UC administration and system

##### **Ideas for more effective communication between these audiences:**

- Develop incentive system for academics to share information with decision makers
  - For example, industry funds research and pays scientists to consult and sit on their boards
  - Public service needs to be rewarded in academia (currently is *pro bono*) e.g. part of academic workload (get credit for)
  - Change mindset and system
  - Can NSF grants be used to support academics doing public service?

- More face-to-face communication would facilitate better understanding of each other's language, issues, questions, and answers; regular dialogue/updates between decision makers and scientists in group settings e.g. forums
  - For example, Pacific Fisheries Management Council has excellent process: directed science, broad based, constant feedback, clear goals and objectives
  - Set up ½ day issue-related forums in Sacramento where scientists can present their work
  - Integrate science advisory function into decision making organizations e.g. California Ocean Protection Council will need a science advisory group; regular (day-long) briefings on specific issues
  - Academics need to take advantage of opportunities to address and inform decision makers (e.g. regulatory bodies) on quarter-to-quarter basis; Get the word out (see impediment to this above); Currently being done by private engineering firms instead; No substitute for PhD panels in some decision making situations
- Need to “market” the information, including creation of “demand” for information (analogous to how personal computer market started and grew)
  - Create demand for scientific information by decision makers and public; have them communicate these information needs to the scientists; identify and get interest of “opinion leaders” and most effective communication channels, so that these leaders will come back for more information.
  - Look for and help create instances where decision makers are looking for scientific information and input e.g. Science Panel for Wetlands Commission
  - Identify and capitalize on “teachable moments” and target information to receptive ears (niche markets)
- Answer the “So what?” question for decision makers: Who cares? What difference will this information make?
  - Condense information: concise, informative; “What resources are impacted?”
- Pictures are better than words! Graphs are better than text.
- Academy is moving towards more interdisciplinary work and learning to communicate with decision makers across disciplines
- Need more professional communicators (communication experts) with range of expertise who can translate between audiences
- Need for better training:
  - Train decision makers to communicate management priorities in ways that scientists can understand
  - Train decision makers' staffs to facilitate communication between scientists and decision makers
  - Scientific training for appointees to decision making bodies e.g. adaptive management, language, cultural barriers
- Better measurement and evaluation of effectiveness of information transfer between these communities

#### **Other ideas for improving links between scientists and decision makers:**

- Link research to applications and broader impacts (e.g. user trends, manager applications, regulation needs); Who will need information and when?
  - One available avenue for education/outreach at universities is “Broader impacts,” a component of NSF grants (not just K-12 education); maybe there are ways to utilize this component as a major force.

- Progress is being made regarding research meeting needs of decision makers e.g. Marine Life Protection Act (MLPA) and research on rockfish
- Sea Grant is a good example
- Reverse is also true: researchers need to communicate critical ideas and concepts to decision makers e.g. adaptive management strategies, uncertainty of outcomes (help decision makers overcome fear of uncertainty!)
  - Research will drive activity of decision makers as well (takes a while)
- Critical to review and improve grant applications, contracting, and reporting processes in order to make progress on all of this
  - Create inter-agency dialogue to streamline and improve this process
  - Look at academic institutions' existing processes for keeping tabs on money
  - Look at current disincentives for applying for grants



## APPENDIX IV

### COMMENTS AND SUGGESTIONS FOR NEXT STEPS FROM WORKSHOP PARTICIPANTS

At the end of the second day of the workshop, each participant made a brief comment regarding the workshop's utility to them and suggested next steps.

#### Comments from Workshop Participants

##### **Benefits of workshop:**

- Lots of interaction and dialogue between participants
- Expanded scope of my world
- Useful to test ideas, engage us in strategic planning
- Broader perspectives gained
- Feasibility presented of doing something positive
- Diverse representation
- Group discussions valuable
- Important to identify problems
- Valuable discussions
- Quite useful in planning process for relative organizations and state
- Flying at "15,000 feet" instead of "30,000 feet"
- Terrific cross representation (like to see even more)
- Educational experience; exposed to wide range of opinions
- Great that everyone took time to be here; need more funding for this type of activity
- Lot of knowledge in the room
- Broad set of ideas, yet ability to focus down on opportunities for collaboration

##### **Possible improvements to this type of workshop:**

- Reframe some of questions
- More input from regulatory bodies e.g. water boards
- More diverse representation, other stakeholders e.g. NOAA fisheries folks
- Involve broader group of stakeholders

##### **Suggestions for next Steps:**

- Specific and clear direction on research
- More focused effort on research needs
- Convene smaller groups
- Make state ocean plan reflect what was discussed here
- Impressed by lack of funding for good ideas
- Research pieces need to be manageable chunks
- Figure out more concrete ways to use research in management
- Change how people do things; involve research partners, good ideas for solutions
- Continue this process and involve more people from recreational fishing community

- Focus on next steps to channel energy in this room
- Get involved in practical aspects of collaborative research at local level
- Tie what comes out of this workshop with existing plans and legislation
- Resulting product: integration and coordination with existing oceans plan
- Focus on priorities at individual level
- Use final ranking of priorities carefully
- Develop active policies to get fishermen involved in planning and policy making
- Figure out how to get state agencies funded to continue this work
- Take 5 “miracle questions/solutions” and come up with one