ORRAP

Ocean Research & Resources Advisory Panel

A United States Federal Advisory Committee

Ocean Research and Resources Advisory Panel

21-22 February 2007
Southern California Coastal Water Research Project
3535 Harbor Boulevard
Costa Mesa, CA 92626-1437

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National Oceanographic Partnership Program

Southern California Coastal Water Research Project Authority
3535 Harbor Blvd.
Costa Mesa, CA

21-22 February 2007

Agenda

Wednesday, 21 February

8:00-8:30 **Assemble/Breakfast**

8:30-9:00 **Introduction** (Ellen Prager, Chair)
- Welcome, introductions
- Review of the agenda
- Review of the 30-31October 2006 ORRAP meeting minutes
- Review of the 30-31October 2006 ORRAP meeting actions

9:00-9:15 **Exploring opportunities for enhancing federal coordination with state ocean management and research initiatives: California as a case study - Introductions and charge (Stephen Weisberg, Vice-chair)**

9:15-10:15 **Governance**

California Ocean Protection Council and the tri-state initiative
Mike Chrisman
Secretary, California Resources Agency

California's research and monitoring priorities
Amber Mace
Executive Director, California Ocean Science Trust

10:15-10:30 **Break**

10:30-12:00 **Education initiatives**

Education and the Environment Initiative (AB 1548)
Mark Gold
Executive Director, Heal the Bay
and
Andrea Lewis
Assistant Secretary – California Environmental Protection Agency

and
Francesca Cava
National Geographic Society

"Thank You Ocean" campaign
Rebecca Pollock
California Coastal Conservancy

12:00-1:00 **Working lunch (on site)**

1:00-2:45 **Scientific-management initiatives**

Ocean observations
Paul Siri
Executive Director, Ocean Science Applications

Marine debris
Drew Bohan
Executive Director, California Ocean Protection Council

2:45-3:00 **Break**

3:00- 4:30 **Scientific-management initiatives (cont)**

Marine Protected Areas
Melissa Miller-Henson
Operations Manager, Marine Life Protection Act Initiative

California's beach programs
Michael Gjerde
Clean Beach Coordinator, State Water Resources Control Board

4:30- 5:00 **Wrap-up discussion** (Ellen Prager, Chair)

6:30 **Dinner at the Aquarium of the Pacific**

Thursday, 22 February

0730-0800 **Assemble/Breakfast**

0800-0815 **Reconvene** (Ellen Prager, Chair)
- Review of previous day's presentations and discussions
- Review of action items from previous day's session

0815-1000 **Report out from the 23-25 January Research to Applications Task Force meeting** (Steve Weisberg, vice-chair)

1000-1015 **Break**

1015-1045 **Public comment** (Mel Briscoe, Designated Federal Official**)**

1045-1100 **Open ORRAP discussion – other topics of interest**

1100-1200 **ORRAP business session**
- Education Sub-panel (Matt Gilligan, Chair, Education Sub-panel)
- Industry Sub-panel (Andy Clark, Chair, Industry Sub-panel)
- Membership and nominations update (Mel Briscoe, DFO)
- Discussion of new vice-chair to replace Steve Weisberg
- Discussion of nominees for chair to be elected at next ORRAP meeting
- Other business
- Review of action items from today's sessions

1200-1300 **Working lunch**
- Continuation of ORRAP business session and discussion
- Meeting wrap-up and scheduling of next meeting (Ellen Prager, Chair)

1300 **Adjourn**

Ocean Research and Resources Advisory Panel

National Oceanographic Partnership Program

Consortium for Oceanographic Research and Education
1201 New York Avenue NW
Washington, DC

30-31 October 2006

Draft Minutes

30 October

Introduction

Ellen Prager called the meeting to order at 0900. Welcome and introductions were given around the room, especially to the new ORRAP members, who introduced themselves and described their backgrounds. The Minutes of the 5-6 June 2006 ORRAP meeting were approved with one minor change. An action item was generated to post the new ORRAP membership on the website.

The action items from the June meeting were reviewed by Ken Turgeon. The report to the Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI) on Research to Applications was put on hold until after discussion of the results of the Research to Applications Task Force (RATF). It was noted that the draft of the Conference on Ocean Literacy (CoOL) Report has been issued, but not made official, so the ORRAP Education Sub-panel has not yet reviewed it.

Research to Applications Task Force – Introduction and Charge

Steve Weisberg reviewed the history of the ORRAP's interest in the Research to Applications (R to A) topic, which heightened when the ORRAP became involved in review of the Ocean Research Priorities Plan (ORPP) being prepared by the Joint Subcommittee on Ocean Science and Technology (JSOST). He said that a Research-to-Applications Task Force (RATF), composed of representatives with experience and/or expertise in R to A issues, was created. Members were drawn from small and large industry, academia, and state resource agencies. The charge to the RATF is to write a report to the ORRAP assessing the strengths and limitations of several existing R to A models, including lessons learned and applications. The ORRAP will consider the findings of the report when developing R to A recommendations to the ICOSRMI.

Research to Applications – Presentations, Federal Agencies

National Oceanic and Atmospheric Administration (NOAA)

Mary Glackin discussed the NOAA's process for transforming research to applications and, in that context, gave a breakdown of the NOAA's Research & Development budget.

She explained that the NOAA has developed a policy on R to A and put in place appropriate procedures, including establishing a transition board. Currently there are 45 transition projects, most of which are on the topic of Weather & Water. The NOAA's goal was not to change programs already in progress, but to add to the programs. She went on to give several examples of successful projects and discussed the lessons learned. She expressed concerns about there being insufficient science involved in the decisions and about the length of the transition timelines.

NOAA Fisheries

John Boreman presented on the R to A process within the NOAA Fisheries. The process is somewhat different from the rest of NOAA because the Fisheries process is 100% applications-driven as a result of the need to address litigation and mitigation. He discussed many of the successful innovations that have occurred because of R to A, including improving or inventing apparatuses that reduce turtle and seabird bycatch. He cited the need to get the NOAA's methods peer-reviewed and incorporated into regulations quickly, so as to improve public opinion, thereby avoiding litigation and fisheries closures. He noted the importance of increasing community buy-in by involving user groups throughout the entire R to A process.

Environmental Protection Agency (EPA)

Bill Benson presented on the methods used by the EPA to address R to A issues. He discussed the structure of the EPA and emphasized that state and regional policy holders must be involved in the process. He explained the problem-driven research approach used by the EPA: a problem leads to questions, which are followed by brainstorming of potential approaches; research products are then introduced and strategic products are developed for end users. He emphasized the interface between science and policy; once the science questions are defined, developing the policy is made easy. He elaborated on the Harmful Algal Bloom and Hypoxia Research and Control Act and on coral reef management strategies as successful examples.

Army Corps of Engineers

Jack Davis presented for the U.S. Army Corps of Engineers (USACE), emphasizing the importance of communication between field workers and Research and Development personnel. He gave detailed guidelines for communication, including who the primary communicators are, the topics they should be reporting on and with whom. He explained the order for transitioning research to applications: 1) obtain requirements; 2) prioritize the requirements as resources taking into account limited resources; 3) guide technology development; and 4) transition the technology to the field, which should be a smooth transition if the first three steps occur successfully. In closing, he discussed some of the types of products that come out of R&D and gave examples of vehicles for the transfers (formal documents, technology transfer workshops, etc.)

Fish and Wildlife Service (FWS)/Department of the Interior (DOI)

Dan Ashe presented on behalf of the FWS and the DOI. He explained that the FWS is a resource management agency and does not have an in-house research capacity. Therefore it must depend on outsourcing to meet its research needs, much of which is done through its sister service, the U.S. Geological Survey. He discussed the transition after World War II of scientists as conservationists to a customer/client relationship for conservation, where researchers were separated from conservationists. Thus, a process was required to get science to conservationists and then feedback returned to the scientists. This requires a lot of procedure for which there is not enough time and money. He advocated for a future of participatory science, for there to be more of an open dialogue, and for science and management to be integrated.

He called attention to the current reward structure for conducting research, in which the measure of success is number of publications; scientists are pressured to do research that will get published rather than research that will be applied in management. He stated that scientists need to be made to engage for other reasons. He also said that the regulation of science and information quality is a barrier to the flow and utilization of information in management.

A discussion ensued about the need for a third party to reach scientists and managers. D. Ashe emphasized the need for integration and left open the question as to whether there needs to be a third party, but commented that leadership is more important than a third party.

National Aeronautics and Space Administration (NASA)

Lawrence Friedl discussed the NASA's role in the research to applications process. He explained the architecture of the Research and Development program at the NASA, identifying its partners and program applications and noting the importance of benchmark reports and Decision Support Systems. The NASA is mostly research-based and takes its research cues from the national academies. The NASA, he said, discovered that proposals written for applications-based research are quite different and they had to train the community to write for management issues as well as for basic research. He noted that focused projects are desired, and involving non-federal organizations is important. He also pointed out that operational personnel at the NASA Centers expedite applications by articulating operational agency needs.

Navy

Bob Winokur described the two methods the Navy uses in transitioning research to applications, both of which follow very structured processes. He covered the use of several transition mechanisms like the Rapid Transition Process. A common theme was the importance of collocation of developers and operational workers. He gave as one example of a success story: the development of sea gliders from research and development to operational use.

Panel Discussion – Research to Applications

S. Weisberg led an open panel discussion on the topic, stressing the ORRAP's interest in new reward methods for creating incentives for researchers other than publications. S. Weisberg asked the participants to respond to the following questions: What has your agency done to move away from this system? Are there any case studies to highlight?

J. Boreman said that the NOAA Fisheries looks at the impact of an employee's science on the community, on the agency and on management. He stressed the continued importance of publications by noting that any information that is to be used for management must be peer-reviewed. B. Benson added that because so many people gain their credibility through publications, it would be unhealthy to remove publications from the employee evaluation process. B. Winokur suggested altering the employee performance evaluation metrics.

D. Ashe clarified that submission to a journal is not the only way to be peer reviewed. He suggested encouraging people from management to join with researchers on publications as junior authors. This will force research scientists to build a relationship and familiarity with those involved in resource management.

J. Davis said that people can be very successful in government up to the GS-12, 13, 14 level without publishing heavily in peer-reviewed publications. At the very upper levels, though, federal performance evaluators view public records and consider the national and international recognition of government scientists.

S. Weisberg asked the panel to expand the discussion beyond internal processes to include interagency collaboration. He asked about factors that lead to cross-agency cooperation.

J. Davis suggested that the lack of collaboration might be personality-driven, the philosophy being that there is more power in leveraging another's efforts than by doing it alone. M. Glackin mentioned that mechanisms need to be added to bring players together, especially at the regional level. Charles Chesnutt said that the mere process of trying to get the Integrated Ocean Observing System (IOOS) off the ground forced players to see where their common opportunities existed.

B. Winokur highlighted the differences between top-down management (for example, meetings of agency heads or executive branch officials) versus a bottom-up approach. In the latter, managers realize that they are working on a common problem and the fact that there are varying agency approaches is positive. He added that because managers often are evaluated based on the amount of money they manage, they are motivated to bring new capabilities and programs to their agencies. Therefore, showing that they have transitioned something from research to applications is a very important benchmark.

Andy Clark asked if Small Business Innovative Research (SBIR) or Small Business Technology Transfer Program (STTR) enterprises, which are specifically aimed at

transitioning research to applications, present a good model. He gave an example of an ONR-solicited SBIR RFP. L. Friedl and M. Dix explained that the NASA uses SBIR to bring new technological developments into Earth Science programs, but that the process tends to be more about technology development than research to applications. Mel Briscoe added that the same is true about SBIR use at the ONR. Jim Eckman praised the SBIR program and spoke to the value of expanding it to encompass research to applications activities. Kalle Matso mentioned that Irwin Feller recently completed an analysis of SBIRs across agencies and that this analysis could be available for the ORRAP to review.

Debra Hernandez asked the panel members to address how their agencies are getting research products to extramural end users. J. Davis said that the USACE sponsors workshops that are attended mainly by non-USACE people, and that these workshops often end up acting as training sessions to show products to users. Molly McCammon asked if the action of bringing research products to end users was unique to the EPA because of its ability and success in cooperating with the states, to which B. Benson responded that the exchange is driven by statutes. M. Glackin added that the Sea Grant Program is an example of state users driving the needs that are met through federal-state collaboration.

E. Prager asked how agencies, when soliciting research from outside the agency, ensure that there is researcher involvement all the way through to applications. B. Winokur said that sometimes it is unclear as to whether the research is going to be successful and that it is up to program managers in the Navy to decide how involved researchers will be. K. Matso said that the CICEET has started asking proposers to include end users on their investigation teams; this ensures end user feedback from the beginning.

S. Weisberg asked if any of the agencies use this approach as part of their procedures. M Glackin offered as an example the NOPP program, which encourages and requires collaboration between sectors. M. Briscoe commented that trying to predict the application of multi-year research is impossible. The agency view and the end user view are oftentimes at odds, which is why a “translator” skilled in federal processes and end user applications might be the answer to facilitating the transition from research to applications.

L. Friedl commented that the NASA tried the translator approach but found the translators to be too generalist and without the technical specificity to facilitate well, so the NASA started encouraging researchers to become more involved in the transition. Jeff Reutter commented that when he identifies a future application for some research results, he immediately notifies Sea Grant extension agents because they have applicable experience and connections to the community. It was commented that one challenge is making the outreach people aware of all the new research that is being carried out; a new mechanism is needed to inform them of new research, lots of potential applications.

Celia Smith mentioned that the University of Hawaii addresses the translation gap through its graduate students, who facilitate lines of communication between science and

management. She lauded the benefits of a graduate program to train students in the languages of both research and applications.

D. Ashe stated that our current level of translating is poor, and this failure comes at the expense of a lot of process. He said that more "border people" are needed with broad expertise, and suggested that it would be worthwhile to consider a specialized expert track in graduate programs to invest in those with technical experience and make them translators instead of program managers.

M. Glackin stated her concern that having to go through a third party translator will cost more money and possibly create more obstacles. M. Briscoe said that what is needed is not necessarily more money, but rather a re-evaluation of how the current money is distributed. He noted that there are many graduate students who would be interested in "translating," but that is not a valued career path.

There was a discussion on metrics, particularly how to communicate results, values and success to Congress. Ray Toll mentioned that the ORPP can be an enterprise to identify those common areas of interest and needs to society in general.

J. Davis added that development of algorithms that can be used in modeling is something that the RATF should focus on. He said that there is confusion that "translators" mean liaisons between agencies, whereas it would be better if the position involves someone whose job it is to ensure that agencies are getting the products that they need.

A. Clark briefly updated the ORRAP on discussions during the ORRAP Industry Sub-panel meeting of 18 October 2006, which touched on the ORPP, the IOOS, and the research to applications issue. He noted that there was not much opportunity for the Sub-panel to provide feedback on these issues at the meeting but that Sub-panel members will be providing feedback to him electronically.

S. Weisberg led a session designed to scope what topics the RATF will address, namely 1) what types of "products" will be transitioned, and 2) how specific the ORRAP's eventual input to the ICOSRMI should be. M. Glackin told the group that the RATF and the ORRAP input topic is important to the SIMOR as it strives to ensure that the best science and technology guide resource management decisions.

It was said that one major challenge of the ORPP Implementation Strategy (ORPPIS) is translating national priorities down to the state and regional levels, and therefore the ORRAP and the RATF should look at the connections between national and regional programs and how they could be addressed in the ORPP. A. Clark asked if the ORPPIS addresses research to applications and remarked that the ORPP ends where the research to applications discussion begins.

Peter Betzer commented that improving communication is vital to raising the profile of this issue. Bob Cowen mentioned that inviting all researchers to be communicators will not be completely effective because not all scientists are capable of translating outside the

scientific community. It was suggested that a certain percentage of the research program budget go to translation.

Significant discussion ensued about funding for education, outreach and the importance of communicating science to the public. Members made suggestions for areas of the RATF focus. D. Hernandez suggested that the RATF focus in part on how to provide federal agency decision makers with better access to useful science. Wes Covell suggested looking at who the target audiences of the products are and how to make them aware of what is available and useful. This would enhance the "pull" of the system instead of trying to push the research results through the system. George LaPointe commented that the community needs a communications strategy in order to infuse the application of research results across a multitude of organizations and sectors.

M. Briscoe informed everyone about the Naval Science Advisor program. Whereby an NRL tech person is detailed out to an operational command center and provides answers on a full range of science questions. Perhaps a similar clearinghouse of answers on the federal system and others would be useful. M. Glackin pointed out that the ORRAP advises the ICOSRMI, which exists specifically to address interagency issues; thus, the ORRAP should not offer recommendations on how to improve a single agency. M. Briscoe suggested that one helpful recommendation could be how a multi-agency effort like the Sea Grant program could be enhanced within individual agencies.

S. Weisberg reported that RATF will meet in January 2007 in Denver and report back to the ORRAP. If the ORRAP concurs, it will incorporate that input into a report to the ICOSRMI.

Day 1 adjourned at 1700.

31 October

The meeting reconvened at 0900. It was noted that there will be a RATF meeting 23-25 January 2007 in Denver, after which the RATF will report its results at the February ORRAP meeting.

D. Hernandez gave an update on the ORRAP-SIMOR conference call in January, which helped to identify topics of interest to the ORRAP in the SIMOR Work Plan. She relayed the message that the SIMOR would find it valuable for the ORRAP to engage on those topics.

Presentation on the Ocean Observatories Initiative (OOI)

Kendra Daly gave an overview of OOI and Ocean Research Interactive Observatory Networks (ORION) activities from the past year. She explained the differences between the OOI, the ORION and the IOOS and explained that the ORION is the overarching program for these three programs and the OOI is the National Science Foundation (NSF) contribution to the IOOS. She said that the types and locations of ocean observing

infrastructure have been driven by high-priority scientific themes such as climate variability, ocean food webs, and coastal dynamics and ecosystems.

Jesse Ausubel asked if there is any particular group that feels as though its interests are not being represented by these programs. K. Daly said yes, in particular the microbial and intertidal research communities are left out, due in part to a lack of chemical and biological sensors on observing platforms.

M. Briscoe asked what the data policy was for the data collected on this infrastructure. She responded that any data returned from sensors that are part of the observatory facilities will be opened near real-time, and she added that the ORION/OOI components are all integrated through cyber-infrastructure. This led to a discussion about de-scoping. Because of budget constraints, NSF has asked that the components be de-scoped during the prioritization process. Potential core sensors are being considered and K. Turgeon added that calibration protocol, metadata standards and portal accessibility are all very important. Concern was expressed that support will diminish in Congress for these programs as the scope is reduced. K. Daly responded by saying that she did not feel that this would be the case since the ocean observing enterprise is a part of NSF's budget and not a congressional earmark.

E. Prager asked how the community is planning to address filling a workforce qualified for this work. Lisa Rom answered that the Department of Labor has programs to help with this, and Rutgers and Texas A&M Universities each have masters programs for this field. Two Requests for Proposals (RFPs) have been issued for implementing organizations relating to this topic, and the organizations are encouraged to incorporate elements of this future workforce.

There was some general discussion of the relationship between the OOI and the IOOS, including ways in which the two programs can help each other achieve their societal missions. Concern was expressed about confusion about the missions of these two programs; not only is it not clear to those outside the community how these programs work together, but Congress actually sees the two as competing.

J. Ausubel suggested the importance of the ORRAP in addressing the national security implications of ocean observing, because defense capabilities will be diminished as ocean observations make the oceans more transparent. M. Briscoe assured him that an ocean observing interagency working group of the JSOST is already addressing this issue.

S. Weisberg briefly discussed the results of the California World Ocean Conference, noting that three west coast governors announced a pact to establish a collaborative enterprise for management of the oceans. He also reported that an ocean education program called ThankYouOcean.org has been launched.

Interagency Working Group on Ocean Education (IWG-OE)

L. Rom gave a history of the creation and tasking of the IWG-OE. She explained that the group reports directly to the co-chairs of the JSOST and the SIMOR. She went over the IWG-OE's five tasks for implementation, as directed by the ICOSRMI. Currently, the group is coordinating the review process for the National Ocean Sciences Bowl (NOSB) and is focused on coordinating its efforts with regional organizations. L. Rom commented that it would be beneficial to coordinate with the ORRAP and its Industry Sub-panel to promote workforce and education issues in general. She said that the main challenge for the IOOS is making its huge amount of data available and make sense to teachers. There was discussion on this topic, with particular interest in areas of the country without ocean education facilities. L. Rom said that the IOOS Regional Associations help in making education programs available and accessible in such areas.

Conference on Ocean Literacy Update

Marlene Kaplan presented on the Conference on Ocean Literacy (CoOL). She spoke about the desire for a high-level conference and the development of the idea. The goals of the conference were to engage high-level speakers, to extend the conference beyond Washington, DC, and to generate recommendations to inform future ocean education efforts under the Ocean Action Plan. She welcomed suggestions from the ORRAP on next steps, limited resources. C. Smith asked about a need for an overarching structure for teaching students from disparate geographies about the diversity of habitats. It was determined that the CoOL report should be distributed widely and with high recognition.

Education Sub-panel Update

Matt Gilligan gave an update and led discussion about the future direction of the ORRAP Education Sub-panel. He explained that education began as a cross-cutting theme for the ORRAP, but so far it has been somewhat peripheral. He discussed that research and education are integrated because research arises as part of the education process. He said that the ORRAP must now decide what issues the Sub-panel should take on. E. Prager suggested that the Sub-panel review the CoOL report and give concrete actions for how to implement the report's recommendations.

A lengthy discussion ensued about ideas to improve ocean education. It was mentioned that in the ORPP, the topic of education has minimal visibility. J. Ausubel pointed out that community colleges educate just as many students as research institutions, but since no research is conducted there, these students are often overlooked for the ocean education workforce. He suggested that efforts be made by institutions of higher learning to re-think how instruction is delivered to students, and that non-traditional credentialing (e.g., through certificate programs or distance learning) be considered by educational institutions. He recommended conducting a survey of what ocean-related online education is being offered.

M. Gilligan summarized possible next steps for the Sub-panel, which include the suggestion to join with the IWG-OE in a workshop-like setting some time in early 2007.

Legislative Update

Nina Young presented on the current state of ocean-related legislative affairs. The external affairs department expects a lame duck session after the current Continuing Resolution (CR) expires on 17 November 2006, although the CR will likely continue if the Democrats regain control of Congress.

She reported that the budget outlook for the NOAA is not good. CORE has set a funding goal for the NOAA of $4.5 billion for FY07, and to that end, a "Friends of NOAA" coalition has been established to encourage Congress to provide the appropriate support for the NOAA. She reported that the NOAA's Oceans and Human Health Initiative (OHHI) is not funded in the FY07 budget request nor in the House/Senate bills. She mentioned that the NASA shuttle and space missions are taking priority over science programs.

N. Young spoke about CORE's critique of the current draft ORPP, which in its present form seems unlikely to get much attention in Congress. She said that the NOAA Organic Act, which passed in the House, likely will not make it through either the Senate or the full Congress. She explained that the NOAA Organic Act eliminates stovepipes and puts more emphasis on research. N. Young told the group that the Magnuson-Stevens Act is likely to be re-authorized, and explained the ramifications if it is not.

S. Weisberg asked about the genesis of The Friends of NOAA. N. Young explained that other agencies had coalitions which created joint advocacies, but the NOAA did not. Richard West warned that the ocean side of the NOAA is disappearing and that the visibility of the agency must be raised.

There was a discussion on emerging ocean champions on the Hill. R. West listed Senators Mikulski, Dodd, Inouye and Stevens as potential candidates, but said that there appears to be no single great advocate. He said the Oceans Caucus needs to have "new life breathed into it" and that a professional staff to track legislation and issues would be a great development. E. Prager suggested that industry might be able to help with the funding of this, since Industry tends to have more power and clout on the Hill than does academia. R. West agreed, but said that Industry must see the benefit for them in order to join.

Subcommittee on Integrated Management of Ocean Resources (SIMOR) Update

M. Glackin gave the ORRAP an update on the activities of the SIMOR. The group has been meeting monthly and trying to focus more on active outreach and communications. They have been hosting focus group sessions to ask a variety of groups what the federal government can do better for them.

M. Glackin said that the SIMOR has been working with the JSOST on developing the ORPP. She highlighted that the Federal-State Task Team, which is comprised of representatives that will be affected by the ORPP, is contributing input to the ORPP research priorities. She spoke about the four priority areas of the SIMOR Work Plan and how it is to be implemented. She listed areas of joint SIMOR-ORRAP opportunity, such as transitioning research to applications, Executive technical qualifications for ecosystem science, and community workshops on ecosystem approaches to management. She noted that the SIMOR has established workgroups to focus on all three of these areas.

It was mentioned that there is no link between the SIMOR community workshops and the California ecosystem-based management workshop, but that the SIMOR would be able to attend a California workshop on a topic of join interest. An action item was generated for the ORRAP members to help involve the SIMOR in events focused on resource management and ecosystem approaches to management.

Joint Subcommittee on Ocean Science and Technology (JSOST) Update

Rick Spinrad gave an update on the JSOST, noting that the ORPP public comment period had just ended and that the National Research Council's comments are expected in mid-November. He outlined the ORPP, which is focused around a set of societal themes. He said that the need for fundamental science as a foundation for all the research priorities is stated early in the plan. He also said that four near-term priorities were developed after the ICOSRMI tasked the JSOST with prioritizing the ORPP's themes into the most exciting, pressing research topics.

R. Spinrad provided an overview of the ORPP's accompanying Implementation Strategy (IS). He stressed that it is a *federal* strategy – not a plan – because different practitioners will tailor how they implement the priorities according to their regions and specific needs. K. Turgeon asked if the JSOST's presentation of the ORPP is altered according to the audience, to which R. Spinrad replied that the presentation is not altered well enough, especially when brought before Capitol Hill. He said that the JSOST is eager to hear comments from the ORRAP on the IS and that the ORPP and the IS are slated for early January delivery. The ORRAP agreed to give comments on the IS to K. Turgeon as soon as possible.

E. Prager asked how the ORPP and the IS are ultimately going to be used. R. Spinrad said the hope is that the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB) will use the documents in their guidance to agencies and in measuring agency accountability. In other words, the agencies would be held accountable for areas where the ORPP is built into their strategic plans. There was a brief discussion about the why the IS is not going out for public comment, and R. Spinrad said that this was because its primary use will be federal agency guidance.

S. Weisberg commented that the messages of the ORPP are getting lost within the breadth of the document and strongly suggested that a good Executive Summary be produced. He also commented that, with regards to the IS, he is doubtful of the agencies'

willingness to change their operations. It was added that because there are no budgets or timelines in the document, it could end up as largely ceremonial and the business of the next Administration, without pressure for the agencies to actually do anything with it. R. Spinrad replied that they are attempting to tighten the message of the ORPP and increase its relevance to the budgeting authorities.

M. Briscoe echoed the CORE critique that the ORPP could be made more exciting and speak more appropriately to the right audiences. R. Spinrad responded by saying that he would like to see several versions of the document, as well as a series of hearings, so that the lay audience would be more engaged. S. Weisberg again raised the issue of an executive summary, which can step away from the science and focus more on the societal need. It could also list the priorities that are the most important.

ORRAP Business Session

A. Clark reported on a productive Industry Sub-panel meeting of 18 October, saying that Sub-panel members, who represent broad sectors of industry, discussed the ORPP, the IOOS and the Research to Applications challenge. He said that future Sub-panel meetings are likely to happen at least one month before the ORRAP meeting so that the results of the meeting can be compiled and presented to the ORRAP. Another option was posed to host a joint session of the ORRAP and the Sub-panel at the beginning of an ORRAP meeting, after which the Sub-panel would be invited to attend and participate in the ORRAP meeting.

Membership and Nominations Update

M. Briscoe, as the designated Federal Official, explained the nominations and new member process. The nominations committee consists of the ORRAP executive committee plus Gerhard Kuska (CEQ) and Susan Roberts (Ocean Studies Board). For the June 2007 meeting, the ORRAP will have a chance to invite the newly selected members, as six current members' terms will expire at the end of June 2007.

Recommendations for the ICOSRMI

ORRAP recommendations to the ICOSRMI were discussed. It was agreed that comments about the ORPP should first be presented to the JSOST. The cooperation of the IOOS and the OOI was decided to be a serious concern to the ORRAP, and wording of a recommendation to the ICOSRMI was discussed. Another concern from the ORRAP was the zeroing out of the OHHI program's budget.

Discussion on the next ORRAP meeting

It was decided that S. Weisberg's organization will host the next ORRAP meeting in February 2007 in southern California, in part because of the successes California has been having. Possible dates include 13-14 or 21-22 February 2007. Members agreed to inform K. Turgeon of their preferences.

The meeting's action items were reviewed.

The meeting was adjourned at 1545.

National Oceanographic Partnership Program

Ocean Research and Resources Advisory Panel

30-31 October 2006

Action Items

Action	Point	Due Date
Post the meeting materials on the ORRAP website	K. Turgeon	ASAP
Post the approved minutes from the June 5-6 meeting on the ORRAP website	K. Turgeon	ASAP
Send thank you emails to all the presenters	K. Turgeon	ASAP
Poll members for availability for next meeting (Feb. 13-14 or Feb. 21-22)	K. Turgeon	ASAP
Update acronym list and send to ORRAP	K. Turgeon	January 31, 2007
Arrange for a Marine Advanced Technology Education Center (Diedre Sullivan) briefing to the Industry Sub-panel on their 2 work force projects with NOPP and NOS	K. Turgeon & A. Clark	Before next Sub-panel meeting
Submit ORRAP's Implementation Strategy comments to Shelby Walker	K. Turgeon	ASAP
Email Federal Register notice for new members to ORRAP	K. Turgeon	ASAP after notice becomes available
Distribute CoOL report to Education Sub-panel and coordinate a response	M. Gilligan	Once CoOL final report is released
Draft ORRAP presentation for next ICOSRMI meeting	E. Prager, D. Hernandez, S. Weisberg, K. Turgeon	Completed 5 working days before the meeting
Send any comments/ideas for the RATF to Steve & Debra	ALL	ASAP
Submit nominations for Education Sub-panel to Matt	ALL	ASAP
Send ideas on what qualifications ecosystem managers should have to Ken	ALL	ASAP
Industry & Education Sub-panels work jointly on identifying work force needs issues	A. Clark & M. Gilligan	Before next ORRAP meeting
Submit any comments on JSOST Implementation Strategy to Ken by COB, Thursday, Nov. 2	ALL	Nov. 2, 2006

California

A Path Connecting Education and the Environment

A Historic Look at Ocean Literacy and Ocean Education

Francesca Cava
Ocean Literacy Program Manager

A Historic Perspective

- 1969/1970: Santa Barbara Oil Spill; first of Earth Day. Establishment of NOAA, NASA, EPA.
- 1975: National Marine Education Association Established
- 2002: Alignment of Ocean Content to National Geography Standards
- 2003/2004: Pew Oceans Commission and US Commission on Ocean Policy Reports published. COSEE network funded.
- CA Education and the Environment Initiative (EEI) signed
- 2005/2006: Community agrees on Ocean Literacy definition; oceans aligned to National Science Standards.
- CA EEI curriculum writing begins.

The Challenge

- Ocean topics were mostly ignored in US K-12 education
- There was no consensus on what was important to include in the classroom
- Ocean topics were left out of most National Education Standards
- The American public was largely ignorant of the importance of the ocean in their lives

The Response

- The National Geographic Society, National Marine Education Association, NOAA, COSEEs, and others agreed to work together
- A mechanism was developed to build consensus
- An online conference was sponsored to solicit input
- Agreement was reached in several key areas

The Result

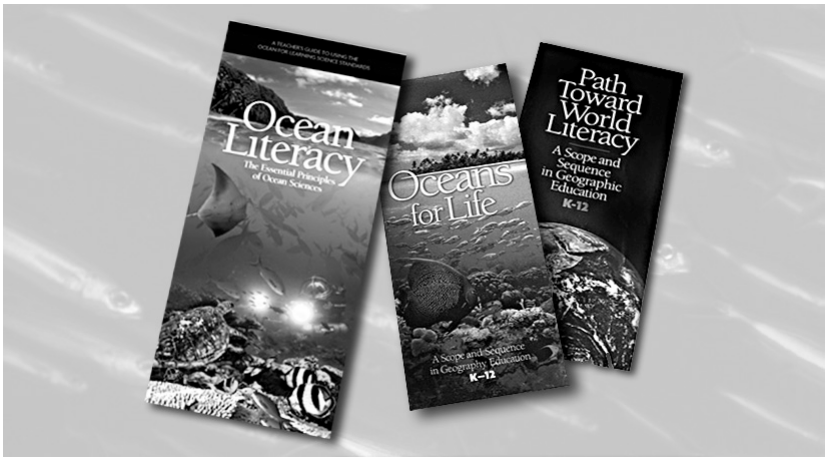
- The alignment of ocean content first focused on National Geography standards
- Ocean literacy was defined by the broader scientific community
- Essential ocean-related principles were identified and supported by detailed fundamental principles
- These principles and concepts were then aligned to the National Science Education Standards

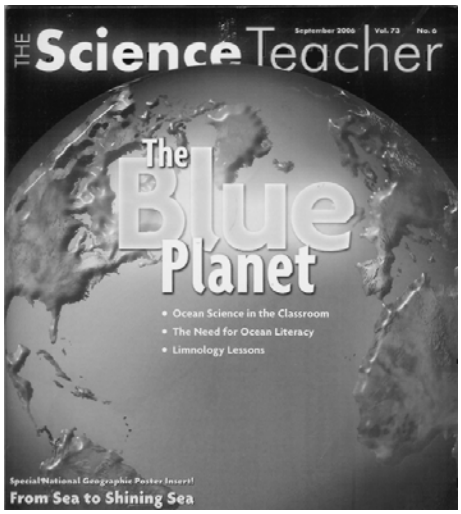
An archive of this conference can be seen at -- www.coexploration.org/oceanliteracy and www.ngsednet.org/oceans

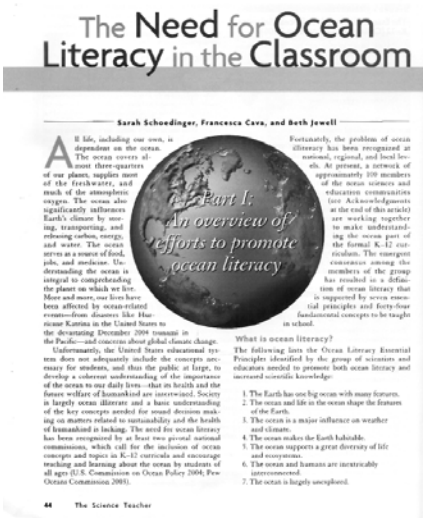
"Ocean literacy is an understanding of the ocean's influence on you and your influence on the ocean."

Seven Essential Principles:

1. The Earth has one big ocean with many features.
2. The ocean and life in the ocean shape the features of Earth.
3. The ocean is a major influence on weather and climate.
4. The ocean makes the Earth habitable.
5. The ocean supports a great diversity of life and ecosystems.
6. The ocean and humans are inextricably interconnected.
7. The ocean is largely unexplored.







The Need for Ocean Literacy in the Classroom

Sarah Schoedinger, Francesca Cava, and Beth Jewell

Part I: An overview of efforts to promote ocean literacy

All life, including our own, is dependent on the ocean. The ocean covers almost three-quarters of our planet, supplies most of the freshwater, and much of the atmospheric oxygen. The ocean also significantly influences Earth's climate by storing, transporting, and releasing carbon, energy, and water. The ocean serves as a source of food, jobs, and medicine. Understanding the ocean is integral to comprehending the planet on which we live. More and more, our lives have been affected by ocean-related events—from disasters like Hurricane Katrina in the United States to the devastating December 2004 tsunami in the Pacific—and concerns about global climate change.

Unfortunately, the United States educational system does not adequately include the concepts necessary for students, and thus the public at large, to develop a coherent understanding of the importance of the ocean to our daily lives—that its health and the future welfare of humankind are intertwined. Society is largely ocean illiterate and a basic understanding of the key concepts needed for sound decision making on matters related to sustainability and the health of humankind is lacking. The need for ocean literacy has been recognized by at least two pivotal national commissions, which call for the inclusion of ocean concepts and topics in K–12 curricula and encourage teaching and learning about the ocean by students of all ages (U.S. Commission on Ocean Policy 2004; Pew Oceans Commission 2003).

Fortunately, the problem of ocean illiteracy has been recognized at national, regional, and local levels. At present, a network of approximately 100 members of the ocean sciences and education communities (see Acknowledgments at the end of this article) are working together to make understanding the ocean part of the formal K–12 curriculum. The emergent consensus among the members of the group has resulted in a definition of ocean literacy that is supported by seven essential principles and forty-four fundamental concepts to be taught in school.

What is ocean literacy?

The following lists the Ocean Literacy Essential Principles identified by the group of scientists and educators needed to promote both ocean literacy and increased scientific knowledge.

1. The Earth has one big ocean with many features.
2. The ocean and life in the ocean shape the features of the Earth.
3. The ocean is a major influence on weather and climate.
4. The ocean makes the Earth habitable.
5. The ocean supports a great diversity of life and ecosystems.
6. The ocean and humans are inextricably interconnected.
7. The ocean is largely unexplored.

44 The Science Teacher

U.S. Gets a D+ on Ocean Policy Reform
Nation's Oceans and Coasts
Key to Competitiveness

- Initial Response to Commission Reports A-
- National Ocean Governance Reform D+
- Regional and State Ocean Governance Reform B-
- International Leadership F
- Research, Science, and Education D
- Fisheries Management Reform C+
- New Funding for Ocean Policy and Programs F

What is the EEI?

- **In October 2003, after extensive negotiations, California Assembly Bill 1548 was signed into law, establishing what is now called the Education and the Environment Initiative (EEI).**
- **This law is not a panacea for education about the environment and oceans.**
- **It is a broad-ranging endeavor that connects education about the environment with California's complex standards-based instructional system.**

EEI Mandates

- Establish an interagency partnership to implement the EEI.
- Develop Environmental Principles and Concepts (EP&Cs) that align with, but do not duplicate or conflict with, existing content standards.
- Incorporate of the EP&Cs into adoption criteria for instructional materials in the core subject-matter areas.
- Create a “model curriculum” to teach the EP&C to California’s for K-12 students.
- Align state agency programs with the EP&C.

Unique Interagency Partnership

Environment and Natural Resources Agencies

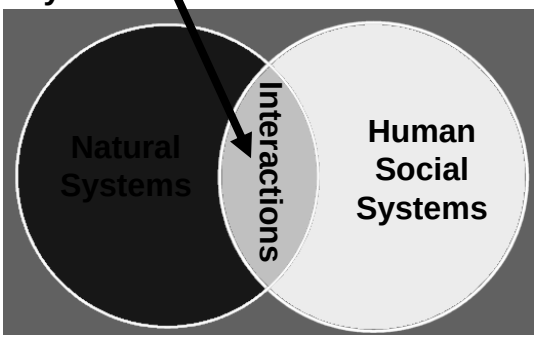
- Environmental Protection Agency
- Integrated Waste Management Board
- Resources Agency

Education Agencies

- State Board of Education
- Department of Education
- Governor’s Secretary for Education

Environmental Principles and Concepts

The law specified that the EP&C not duplicate existing content standards, such as those in the sciences and history/social science realms therefore, they are focused the interactions and interdependence of human societies and natural systems.



Environmental Principles and Concepts

I. **People depend on natural systems – food, forest products and the water purification that occurs in wetlands.**
II. **People influence natural systems – dams that control water flow.**
III. **Natural systems change in ways that people benefit from and can influence – nutrients deposited on farmlands by rivers during flooding.**
IV. **There are no permanent or impermeable boundaries that prevent matter from flowing between systems – fertilizers and pesticides used on lawns that enter the groundwater and affect drinking water.**
V. **Decisions affecting resources and natural systems are complex and involve many factors – numerous stakeholders as well as economic, legal and political factors that are considered in making decisions.**

Environmental Principles and Concepts

Principle I — People depend on natural systems

The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.

As a basis for understanding this principle:

Concept a. Students need to know that the goods produced by natural systems are essential to human life and to the functioning of our economies and cultures.

Concept b. Students need to know that the ecosystem services provided by natural systems are essential to human life and to the functioning of our economies and cultures.

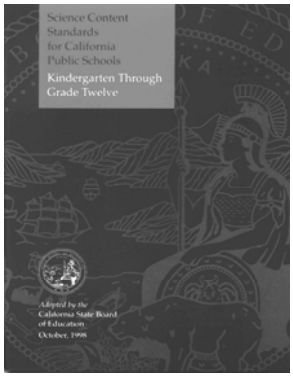
Concept c. Students need to know that the quality, quantity and reliability of the goods and services provided by natural systems are directly affected by the health of those systems.

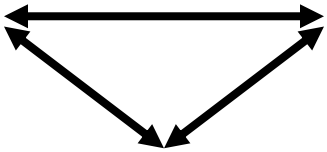
EEI Model Curriculum Goals

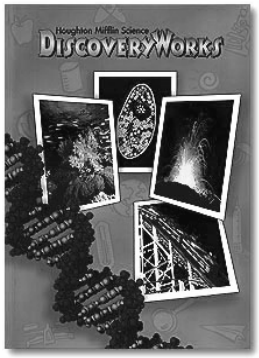
The EEI Curriculum will provide a K-12th grade instructional continuum that helps students simultaneously master:

- **California's academic content standards**
- **California's Environmental Principles and Concepts**

The EEI Model Curriculum
A Unique Strategy







Education and the Environment Initiative
Assembly Bill 1548 (Pavley, Chapter 665, Statutes of 2003)

Model Curriculum

Key Elements of the EEI's Success to this Point

- ✓ **Unified goals that recognize the challenges and responsibilities of California's schools and teachers**
- ✓ **A diverse partnership involving:**
  - **government agencies**
  - **businesses**
  - **non-profit environmental organizations**
  - **universities**
- ✓ **An integrated strategy that brings together the State's goals of students mastering the academic content standards with students learning and understanding California's approved Environmental Principles and Concepts**

Accomplishments & Status

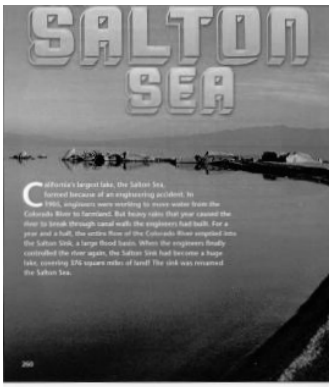
- Phases 1-3, of a total of 7 phases, have been completed.
- Fully operational Office of Education and the Environment in the CIWMB.
- $7.0 Million for model curriculum development over two years has been allocated.
- Development of the EEI Curriculum, a two-year process, is underway with the hiring of our external consultant, Dr. Jerry Lieberman, and his team.
- Hiring professional curriculum writers K-12, editors, and graphic designers.
- Partnership with the National Geographic Society, NOAA, ESRI.
- Pursuing philanthropic interest in supporting EEI implementation.

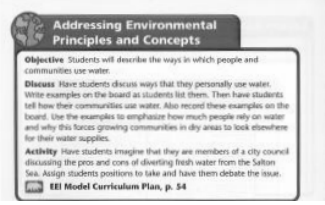
Adopted Instructional Materials

- The Environmental Principles and Concepts are being included into the adoption criteria by the State Board of Education.
- In April 2006, as the result of a unanimous landmark decision, the EP&C were incorporated into the criteria for instructional materials in English/Language Arts.

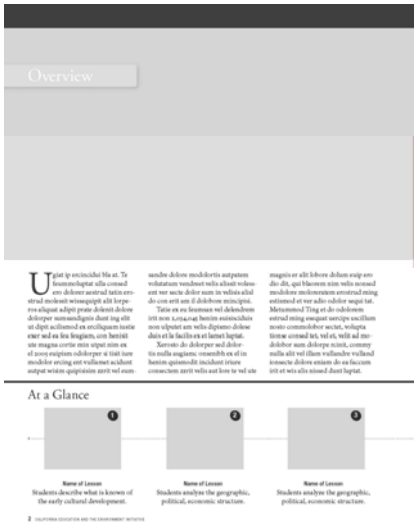
Adopted Instructional Materials

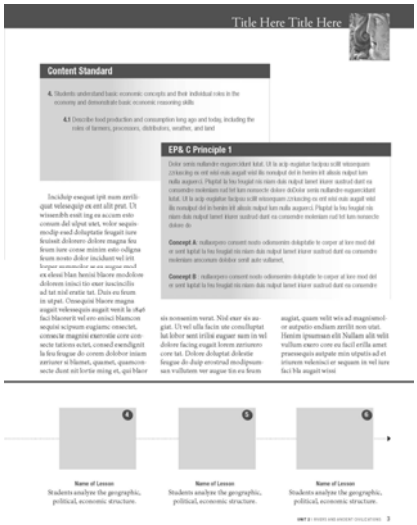
Already, publishers have developed instructional materials referencing the EP&C pursuant to the science adoption that recently concluded, even though this is not required until 2012.





National Geographic Society and Design Work





National Geographic Society and Design Work

California Connections

Sawgrass in Fresno

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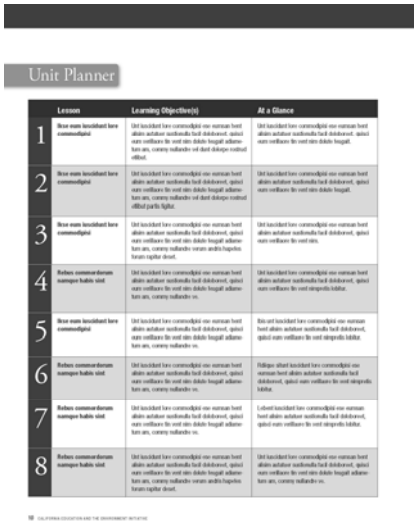
National Geographic Society and Design Work



Unit Planner

	Lesson	Learning Objective(s)	At a Glance
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Prerequisite Knowledge	Duration (minutes)	Materials Needed	Textbook Alignment
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■ Uit iusidunt lore commodipisi ese eumsan hent alisim ■ Autatuer nonhendia facil dolobrent, quisci euro ordiaore ■ Ilc sent nim dolobe bugait	**Preparation:** 45 min. **Instruction:** 60 min.	**Bibis:** Uit iusidunt lore commodipisi ese nim dolobe bugait quisci euro ulam ent folis.	
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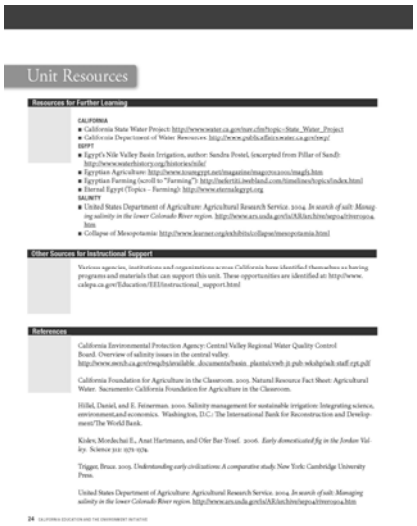
■ Uit iusidunt lore commodipisi ese eumsan hent alisim ■ Autatuer nonhendia facil dolobrent, quisci euro ordiaore ■ Ilc sent nim dolobe bugait	**Preparation:** 45 min. **Instruction:** 60 min.	**Aspiror dicit:** Uit iusidunt lore commodipisi ese nim dolobe bugait quisci euro. **Sitam iscis:** Uit iusidunt lore commodipisi ese nim dolobe bugait quisci euro ulam ent.	
■ Uit iusidunt lore commodipisi ese eumsan hent alisim ■ Autatuer nonhendia facil dolobrent ■ Ilc sent nim dolobe bugait	**Preparation:** 45 min. **Instruction:** 60 min.	**Gelbis:** Uit iusidunt lore commodipisi ese nim dolobe.	
■ Uit iusidunt lore commodipisi ese eumsan hent alisim ■ Autatuer nonhendia facil ■ Ilc sent nim dolobe bugait	**Preparation:** 45 min. **Instruction:** 60 min.	**Ilcse eum:** Uit iusidunt lore commodipisi ese nim dolobe bugait quisci euro ulam ent. **Bibis:** Uit iusidunt lore commodipisi ese nim dolobe bugait quisci euro ulam ent.	
■ Uit iusidunt lore commodipisi ese eumsan hent alisim ■ Autatuer nonhendia facil dolobrent, quisci euro ordiaore ■ Ilc sent nim dolobe bugait	**Preparation:** 45 min. **Instruction:** 60 min.	**Gelbis:** Uit iusidunt lore commodipisi ese nim dolobe.	
■ Uit iusidunt lore commodipisi ese eumsan hent alisim ■ Autatuer nonhendia facil dolobrent, quisci euro ordiaore ■ Ilc sent nim dolobe bugait	**Preparation:** 45 min. **Instruction:** 60 min.	**Rapitur dicit:** Uit iusidunt lore commodipisi ese nim dolobe bugait quisci euro. **Gelbis:** Uit iusidunt lore commodipisi ese nim dolobe.	

National Geographic Society and Design Work



Unit Resources

Resources for Further Learning

CALIFORNIA

- California State Water Project: http://www.water.ca.gov/swp/cdm/topic:=State_Water_Project
- California Department of Water Resources: http://www.publicaffairs.water.ca.gov/swp/

EGYPT

- Egypt's Nile Valley Basin Irrigation, author: Sandra Postel, (excerpted from Pillar of Sand): http://www.southerhistory.org/historicsites/
- Egyptian Agriculture: http://www.touregypt.net/magazine/magzin02200/magfa.htm
- Egyptian Farming (scroll to "Farming"): http://herfirfi.tripband.com/timelines/topic/index.html
- Eternal Egypt (Topics – Farming): http://www.eternalegypt.org

SALINITY

- United States Department of Agriculture: Agricultural Research Service. 2004. *In search of salt: Managing salinity in the lower Colorado River region.* http://www.ars.usda.gov/is/AR/archive/apr04/river0404.htm
- Collapse of Mesopotamia: http://www.learner.org/exhibits/collapse/mesopotamia.html

Other Sources for Instructional Support

Various agencies, institutions and organizations across California have identified themselves as having programs and materials that can support this unit. These opportunities are identified at: http://www.calepa.ca.gov/Education/EEI/instructional_support.html

References

California Environmental Protection Agency: Central Valley Regional Water Quality Control Board. Overview of salinity issues in the central valley. http://www.swrcb.ca.gov/rwqcb5/available_documents/basin_plans/cvrb_ji_pub_wkshp/salt_staff_rpt.pdf

California Foundation for Agriculture in the Classroom. 2005. Natural Resource Fact Sheet: Agricultural Water. Sacramento: California Foundation for Agriculture in the Classroom.

Hillel, Daniel, and E. Feinerman. 2000. Salinity management for sustainable irrigation: Integrating science, environment,and economics. Washington, D.C.: The International Bank for Reconstruction and Development/The World Bank.

Kislev, Mordechai E., Anat Hartmann, and Ofer Bar-Yosef. 2006. *Early domesticated fig in the Jordan Valley.* Science 312: 1372-1374.

Trigger, Bruce. 2003. *Understanding early civilizations: A comparative study.* New York: Cambridge University Press.

United States Department of Agriculture: Agricultural Research Service. 2004. *In search of salt: Managing salinity in the lower Colorado River region.* http://www.ars.usda.gov/is/AR/archive/apr04/river0404.htm

24 CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE

Creating Opportunity Amid the Challenges

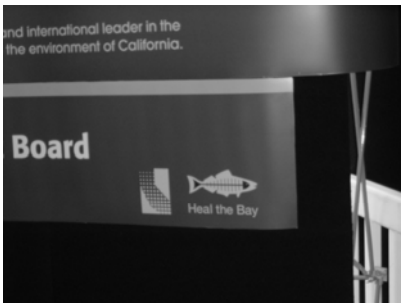
- **The EEI truly protects our state's most precious resources—our children. The EEI will help children make informed choices and enable them to become stewards of their world.**
- **A model for the nation, the EEI legislation presents the first leveraged state opportunity for environmental education in state schools. The EEI is the nation's most comprehensive program to provide standards-based environmental principles and curricula in all core disciplines (science, history/social science, English/language arts, and mathematics) for all K-12 grade students in state public schools.**

Heal the Bay MOU

On January 17, 2007 the California Integrated Waste Management Board unanimously adopted a Memorandum of Understanding formalizing Heal the Bay's role in co-managing the EEI.

Heal the Bay and the State of California

Heal the Bay brings a non-governmental perspective to the program, and 25 years of experience in ocean and water quality environmental educational programs.



For Further Information

www.calepa.ca.gov/Education/EEI

RESEARCH TO APPLICATIONS TASK FORCE

Report to ORRAP

February 22, 2007

BACKGROUND

- **ORRAP commented when reviewing the Ocean Research Priority Plan about the need for improved mechanisms to transfer research outcomes into the user community**

- **The ORRAP recommendation was well received by the ICOSRMI**
  - A three-page section recognizing the need for better transfer mechanisms was added to the Ocean Research Priority Plan

- **ORRAP offered to assist further by providing suggestions for research to applications implementation**

- **ORRAP formed a Research to Applications Task Force (RATF) to help develop implementation recommendations**
  - RATF has nine members with broad sector representation

RESEARCH TO APPLICATIONS TASK FORCE MEMBERS

- **Dr. Stephen Weisberg**
  - Southern California Coastal Water Research Project
  - Local Government
- **Dr. Donald Boesch**
  - University of Maryland
  - Academia
- **Mr. Wes Covell**
  - Harris Corporation
  - Industry
- **Dr. Molly Dix**
  - Research Triangle Institute
  - Technology Transfer Specialist
- **Ms. Debra Hernandez**
  - Hernandez and Company
  - Formerly State Government
- **Mr. Kalle Matso**
  - Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET)
  - Research Program Manager
- **Mr. Casey Moore**
  - Wet Labs, Inc.
  - Industry
- **Dr. Jeffrey M. Reutter**
  - Ohio Sea Grant College Program
  - Academia
- **Dr. Jerry R. Schubel**
  - Aquarium of the Pacific
  - Nonprofit educator

RATF APPROACH

- **Met for three days in Denver**
- **Each RATF member was asked to describe a case study of research to application success**
- **Identified common themes of success in those case studies**
  - Broke into small groups to expand on the common themes
- **The RATF developed five core recommendations and were unanimous in their conclusions**
  - They were optimistic about the future as there are success stories that can be expanded upon to increase the value of research
  - They were enthusiastic that the issue is receiving attention and looked forward to preparing a report following ORRAP feedback

FIVE CONSENSUS RECOMMENDATIONS

- **Involve users early and continuously in the research process**
- **Modify the research planning and granting process so that transitioning research to applications is an integral part of research, and receives the same level of scrutiny and support as the research itself**
- **Establish entities responsible for connecting users with research applications**
- **Conduct synthesizing cross-agency state-of-the-science assessments**
- **Develop opportunities and incentives that motivate researchers to work with users**
- **These map well to the NRC Roundtable Report**
  - Several of these recommendations were also identified in the ORPP

CONTINUOUS USER INVOLVEMENT

- **Transitioning research to applications is a multistep process and users need to be included at all stages**
  - Their comfort level and ability to contribute increases with early involvement
- **Starts with problem definition**
  - Continues with research planning and preparation of RFPs
  - CICEET has been effective in meeting with users and conducting gap analysis before issuing RFPs
- **Transition success increases when users are involved in the research itself**
- **Informed users make some of the best advocates and trainers**
  - They are trusted by their peers
- **Industry is an important part of the process**
  - Recognize industry as an important part of the development process
  - Industry is often the engine that completes the transition
  - Industry is certainly among the most motivated participants

MODIFY THE RESEARCH PLANNING AND GRANTING PROCESS

- Realign competitive funding to promote transitioning
  - Place appropriate weight on innovation and quality of user applications in competitive proposals
  - Apply business principles in evaluating technology proposals
- Issue RFPs specifically to assist in transitioning to applications
  - Product evaluation studies
  - Developing operational capabilities for existing technologies
  - Transforming data into informational products tailored to specific end users
  - The peer reviewers for these proposals should come from an appropriate community of experts
  - NOPP has made a good start in this direction
- Develop incentives and reward program managers who effectively integrate transition activities into research endeavors
- Recognize that the time line for transitioning research to application is longer than the typical federal funding cycle
  - Allow program managers the flexibility to make adaptive investments that last longer than two years

ESTABLISH ENTITIES RESPONSIBLE FOR CONNECTING USERS WITH RESEARCH APPLICATIONS

- **Research to application transition is more effective when relying on entities responsible for transitioning activities**
- **Multiple models for assigning that responsibility have been shown to work**
  - Range from individual transfer officer, to translational section of an organization (e.g. CSC and Sea Grant) to performance-based contractors
- **All models depend on accountability, which requires metrics of success**
  - Good metrics of success can derive from surveys (e.g. do users see the translator as a trusted resource?)
  - Economic and societal impacts are the best measures, but are hard to assess
- **Training and development programs are needed to enhance translational capacity**
  - Desired individuals will possess technical knowledge, understanding of user mission, and business acumen

STATE-OF-THE-SCIENCE ASSESSMENTS

- **Syntheses address two needs**
  - Supports informed discussion and decisions by the user community
  - Defines research gaps for program managers and researchers
- **Most valuable when conducted through interagency collaboration and with partners/customers/end users**
  - More participation enhances user confidence in the findings
- **Syntheses should be developed through a recurring mechanism that facilitates communication and periodic reassessment**
- **Evaluation studies to determine product readiness will often be required to achieve synthesis**
  - There is a need for unbiased mechanisms to conduct such studies (e.g. ACT)
- **Syntheses need to be organized around well-defined user-driven questions**
  - Highest priority topics for synthesis should be those that are important to the agencies and their primary customers
  - The ORPP and the Ocean Action Plan are great starting points for defining these topics

DEVELOP OPPORTUNITIES AND INCENTIVES THAT MOTIVATE RESEARCHERS TO WORK WITH USERS

Awards and Compensation

- **Modify promotion and compensation criteria for federal scientists to better emphasize success in application of research results**
  - Reward publications generated in partnership with users
  - Encourage participation on management planning panels
  - Reward publication of research summaries in the popular press (magazines, etc.)
- **Acknowledge outstanding performance with special awards to researchers and research teams**
- **Work with professional societies and institutional consortia to establish awards for outstanding accomplishments**

Opportunities

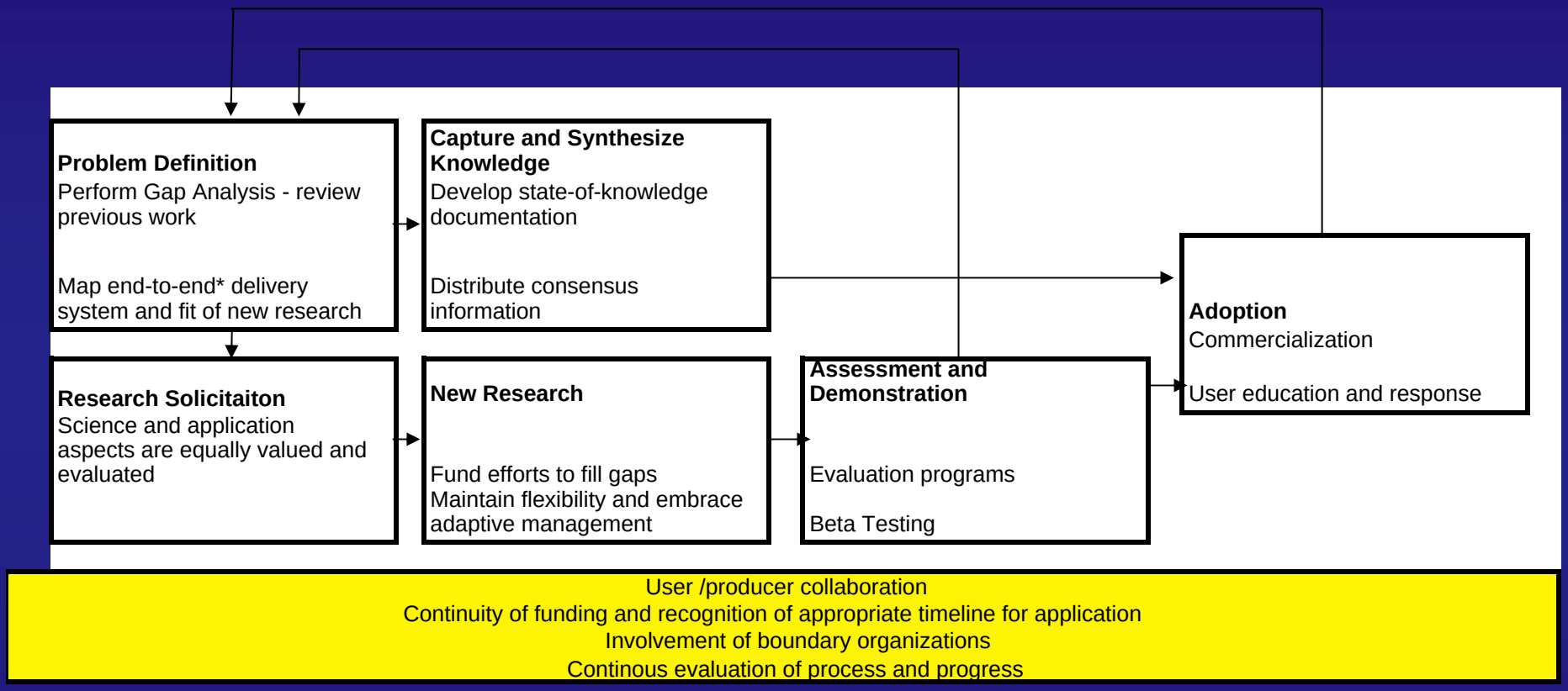
- **Expand opportunities for educating researchers about user needs (e.g. Leopold program, Knauss fellowships, post-doctoral opportunities)**
- **Create sabbatical programs that attract researchers to federal agencies**

NEXT STEPS

- **Prepare a report that summarizes and expands on these findings**
  - Dependent on receiving endorsement of the ideas by ORRAP and ICOSRMI

- **Our thought is to aim for about a 30-page report**
  - Several pages of introduction and setting
  - Approximately five pages to provide substance for each of the primary recommendations
  - Focus on case studies that illustrate where the recommendations have led to success

- **Timing: Prepare a report for review at the June ORRAP meeting**
  - The RATF has already developed chapter assignments and is awaiting ORRAP feedback


Problem Definition
Perform Gap Analysis - review previous work
Map end-to-end* delivery system and fit of new research
Capture and Synthesize Knowledge
Develop state-of-knowledge documentation
Distribute consensus information
Adoption
Commercialization
User education and response
Research Solicitaiton
Science and application aspects are equally valued and evaluated
New Research
Fund efforts to fill gaps
Maintain flexibility and embrace adaptive management
Assessment and Demonstration
Evaluation programs
Beta Testing
User /producer collaboration
Continuity of funding and recognition of appropriate timeline for application
Involvement of boundary organizations
Continous evaluation of process and progress

Interagency Oceans and Human Health Research Implementation Plan: A Prescription for the Future

By

The Interagency Working Group on Harmful Algal Blooms, Hypoxia and Human Health

Draft for Review - January 16, 2007

Note: This is primarily a “text-only” draft intended for review; it includes some but not all graphics and figures and is not yet in final format for publication.

Executive Summary

The ocean (as used here, "ocean" refers to open ocean, coast, coastal watersheds, and Great Lakes) provides numerous benefits to mankind, including seafood, pharmaceuticals and other natural products, wonderful recreational opportunities and aesthetic values, shoreline protection, waste assimilation, nutrient cycling, oxygen, drinking water, moderation of climate and an incredibly powerful economic engine that underpins a substantial part of the U.S. economy. However, the ocean also poses risks to human health, including those from disease-causing organisms transmitted through or originating in the marine environment, toxins from Harmful Algal Blooms (HABs) and other micro-organisms, chemical contaminants, and catastrophic events such as hurricanes and tsunamis.

Because some of the myriad relationships between ocean ecosystems and human health have long been recognized, a number of elements of OHH-related work have been undertaken by various federal agencies for many years. These include programs related to seafood safety, drug discovery, pollution effects and control, HABs and the toxins they produce, occurrence and transmission of disease-causing agents, and many others. In many cases, these existing activities have resulted in strong partnerships among several agencies, where the work of each complements the other, and in collaborative efforts. However, the advent of named "Oceans and Human Health" programs in the National Oceanic and Atmospheric Administration (NOAA) and the National Science Foundation (NSF) and National Institute of Environmental Health Sciences (NIEHS) that are specifically focused on the breadth of both positive and negative health effects of the oceans, has led to substantially increased progress in research and outreach and in partnering among federal agencies, academia, states, and the private sector.

The present report summarizes work underway in the named OHH programs in NOAA, NSF and NIEHS, and provides synopses of some related work ongoing in six other collaborating federal agencies (the Centers for Disease Control and Prevention [CDC], Environmental Protection Agency [EPA], Food and Drug Administration [FDA], Marine Mammal Commission [MMC], National Aeronautics and Space Administration [NASA], and U.S. Geological Survey [USGS]). The NSF and NIEHS developed a joint OHH research program, supporting four academic Centers of Excellence in Oceans and Human Health through a peer-reviewed, competitive grant program. In response to Congressional direction, NOAA developed an OHH Initiative consisting of six primary elements: (1) a NOAA OHH office; (2) three competitively designated internal Centers of Excellence in OHH; (3) an external OHH competitive grant program; (4) a competitive Distinguished Scholars program; (5) a competitive Traineeship program; and a national Advisory Panel. The NOAA OHHI was formally authorized by the Oceans and Human Health Act of 2004, which also established the Interagency OHH Program and the requirement for this ten-year Interagency OHH Research Implementation Plan. The purpose of the Implementation Plan is to establish "… the goals and priorities for Federal research which most effectively advance scientific understanding of the connections between the oceans and human health, provide usable information for the prediction of marine-related public health problems, and use the biological potential of

the oceans for development of new treatments of human diseases and a greater understanding of human biology."

This Interagency OHH Research Implementation Plan was developed over a year-long period by the Interagency Working Group on Harmful Algal Blooms, Hypoxia, and Human Health (IWG-4H). The IWG-4H was established in fall 2005 by the Joint Subcommittee on Ocean Science and Technology (JSOST) of the National Science and Technology Council (NSTC) Committee on Science and the Committee on Environment and Natural Resources and the Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI). This Plan complements and expands upon the priorities and near-term recommendations of the larger "Charting the Course for Ocean Science in the United States for the Next Decade" ocean research priorities plan and implementation strategy recently prepared by the JSOST and provides a more detailed outline for implementation of a national OHH research, outreach and education program.

The present document is organized into five chapters, with Chapter 1 providing context and background material, Chapter 2 a description of existing OHH programs and related federal activities, Chapter 3 a more detailed description of opportunities to advance OHH research and applications, Chapter 4 a summary of recommendations, and Chapter 5 references and other supporting materials.

The Plan focuses on three broad goals for the Interagency OHH Program:

- a comprehensive research agenda encompassing research activities, supporting infrastructure, translation of research to applications, and outreach;
- a robust interdisciplinary approach linking the marine and biomedical sciences; and
- establishment and expansion of collaborative partnerships and other critical linkages, including with ocean observing systems.

Anticipated benefits of an ongoing Interagency OHH Program include the following:

- improved policy decisions that reduce health risks and help ensure healthy and productive marine ecosystems and people via enhanced monitoring and health surveillance for humans and wildlife;
- discovery and application of marine-based pharmaceuticals and other natural products;
- increased basic knowledge and enhanced understanding of human disease processes;
- improved understanding and communication about comparative benefits and risks of seafood consumption;
- increased economic returns; and
- improved ocean stewardship and ocean literacy.

To accomplish the vision of the program and reap these benefits, federal agencies and their academic and other partners should concentrate efforts where significant opportunities for advancement to improve and/or protect human health have been identified. These are detailed in Chapter 3 and encompass the following: (1) priority

research dealing with pathogens, chemical contaminants, harmful algal blooms, seafood safety, pharmaceuticals and other beneficial products and in cross-cutting areas such as epidemiology, sentinel species, genomics and related technologies, and social, behavioral and economic sciences; (2) improvements in essential infrastructure to support research advances in such areas as linking to the ocean observing systems, data management and access, development of standards and standardized methods, and access to the sea; and (3) in transition of research results to applications through targeted outreach and education activities and development of rapid response capabilities.

Recommendations: Chapter 4 outlines six steps which, if taken simultaneously, would advance OHH research and application across a broad interdisciplinary and interagency front leading to reduced health risks and increased health benefits for people. These are as follows:

Step 1. Build on existing OHH programs and partnerships, by providing continued and enhanced support for the existing NSF/NIEHS and NOAA OHH Centers and the grant, scholars, and traineeship elements of the NOAA OHH Initiative, along with increased participation by the other federal agencies included in the Plan (i.e., CDC, EPA, FDA, MMC, NASA, and USGS).

Step 2. Support priority research in the following areas (as elaborated in Chapter 3):

- basic and applied studies of ocean ecosystems and processes that affect human exposure to health risks, including natural hazards and climate change;
- investigation of benefits and risks of seafood consumption, including subsistence and recreational harvests;
- discovery and development of new marine pharmaceuticals and other products beneficial to humans;
- epidemiological studies and disease surveillance, both short- and long-term, to document and elucidate acute and chronic health effects in humans and animals resulting from exposures to ocean waters, sediments, air, and seafood and encompassing surveillance in marine mammals, seabirds, and other marine animals likely to harbor pathogens of potential danger to humans;
- use of marine species and habitats as early warning sentinels to indicate existing and emerging threats to human, animal and ecosystem health and as models for the study of human disease processes and toxicology;
- improvement, development and testing of conceptual and quantitative models that integrate a broad range of environmental, biological, and epidemiological data and produce new levels of understanding and predictive capacity; and
- economic and socio-cultural studies that advance understanding of how humans use and value the health benefits provided by coastal and ocean waters and resources.

Step 3: Improve Necessary Infrastructure through:

- continuing and expanded support for the integrated ocean observing system and other ocean observatories which contribute to the Global Earth Observing System

of Systems, including development, deployment, operation and maintenance of biological sensors and other biological data collection tools;

- expanded support for computing, data management and bioinformatic infrastructure to enable data sharing, integration, archiving, analysis, and access for a broad range of OHH-related data;
- development of new standards and standardized methods for OHH research and research materials;
- continued and expanded support for access to remote and at-sea platforms for the OHH program to accomplish crucial sampling activities; and
- maintenance and enhancement of core facilities in genomics/proteomics, marine microbiology, and analytical chemistry that may transform our understanding of disease processes and potential control, treatment, and prevention options.

Step 4: Support Transition of OHH Research to Application Through Outreach and Education by:

- increasing cross-agency, cross-institution and cross-discipline collaborations that provide the necessary framework to develop a fundamentally new interdisciplinary OHH research community;
- providing OHH information, tools, technology, products, and training to support improved public health and coastal and marine resource decision-making;
- coordinating OHH outreach and education programs across agencies;
- supporting interagency partnerships to enable rapid and coordinated response of OHH researchers to emergency situations;
- providing significantly increased opportunities for interdisciplinary training, research, and collaborations for graduate and post-doctoral students, health professionals, and scientists at early- to mid-career stages; and
- promoting ocean stewardship and ocean and human health literacy.

Step 5. Improve Coordination of OHH Activities Within and Across Agencies and Internationally. The JSOST might consider revising the charter of the IWG-4H with regard to the Interagency OHH Program to include such responsibilities as program coordination and execution, joint budget planning, community workshops involving scientists, managers, and practitioners, and work with international bodies and other foreign entities involved in OHH-related research.

Step 6. Provide for Updates to the Interagency OHH Research Implementation Plan. The OHH Act of 2004 requires that the Interagency OHH Annual Reports include a summary or copy of the Implementation Plan and any changes made in the plan. This provides a regular opportunity for the interagency OHH community to update the Plan.

The six actions outlined above action, if taken together, would ensure a vibrant, continuing interagency program in Oceans and Human Health that would involve the breadth of the nation's research and intellectual capacity to minimize human health risks and maximize ocean benefits to humans while contributing to the maintenance of healthy and productive marine ecosystems and coastal communities.

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Ocean Research and Resources Advisory Panel

Report to the Interagency Committee on Ocean Science and Resource Management Integration

13 December 2006

Dr. Ellen Prager, Chair

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Research to Applications Task Force

- **Task Force formed this past summer as an outgrowth of ORRAP's continuing deliberations on the issue of translating research into applications**
- **Will develop a report to the ORRAP evaluating the utility & limitations of several existing R to A models pertinent to addressing federal agency needs;**
- **Report based on presentations, workshops, published literature, and ongoing discussions**
- **11 members from academia & industry chosen for expertise/experience in R to A activities; 5 are ORRAP members**

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ORRAP Industry and Education Sub-panels

- **Industry Sub-panel held 1st meeting October 2006**
  - **leaders of 14 major national trade associations & industry consortia representing all sectors that impact or are impacted by the ocean**
  - **provides input on matters considered by ORRAP**
  - **could serve as a convenient window to industry for ICOSRMI**

- **Education Sub-panel**
  - **will review the CoOL report & offer suggestions for implementation of recommendations**
  - **will review the IWG-OE Implementation Plan in the spring**
  - **working jointly with Industry Sub-panel on workforce issues**

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ORRAP Recommendation to the ICOSRMI: Ocean Observing Systems

- **There is confusion in the community as to the relationship between OOI and IOOS.**
  - **many see them as competing efforts**
- **ORRAP understands the intended relationship, but does not see a clear plan for the transfer of research results from OOI to IOOS**
- **ORRAP recommends that such a plan be prepared and incorporated into the IOOS planning process**
  - **what is learned from the OOI needs to be used toward societal information needs**

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ORRAP Recommendation to the ICOSRMI: National Water Quality Monitoring Network

- **NWQMN is called for in the Commission on Ocean Policy report & Administration's Ocean Action Plan**
  - **has tremendous import for understanding & predicting impacts of land-based inputs on the coastal zone**
  - **lacks a formal, independent review mechanism for evaluating the efficacy of its design and operation**
- **The ORRAP, at its June 2006 meeting & in a follow-up letter to a NWQM Council co-chair recommended the need for a formal review**
- **The ORRAP strongly reiterates the need for a formal review of the NWQMN by an independent outside body such as the National Research Council, before moving ahead**

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ORRAP Recommendation to the ICOSRMI: Oceans & Human Health

- **Oceans and Human Health is a stated Administration priority**
  - **is an action highlight in the OAP**
  - **appears prominently in the ORPP and in IOOS planning documents**
- **There is an inconsistency between the stated importance of understanding the ocean's role in human health and the significant reduction in funding for it**
  - **E.G., Oceans & Human Health severely reduced in FY '07 budget**
- **ORRAP recommends that ICOSRMI consider ways to establish a credible level of support for OHH research**
  - **will help to ensure its continued viability as a priority topic**

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New Members Selected to Fill Vacancies

- James Coleman, Louisiana State University
- George LaPointe, Maine Dept. of Natural Resources
- Molly McCammon, Alaska Ocean Observing System
- Jeffrey Reutter, Ohio State University
- Jerry Schubel, Aquarium of the Pacific
- Robert Wayland, Environmental Protection Agency (Ret.)

CHARTER
OCEAN RESEARCH ADVISORY PANEL

A. Official Designation: The Committee shall be known as the Ocean Research Advisory Panel (hereafter referred to as the Panel).

B. Objectives and Scope of Activities: The Panel, under the provisions of 10 U.S.C. § 7903, and the Federal Advisory Committee Act of 1972, as amended, shall provide independent scientific advice and recommendations to the National Ocean Research Leadership Council.

C. Panel Membership: The Panel, under the provisions of 10 U.S.C. § 7903, shall consist of no less than 10 and no more than 18 members, representing the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, ocean industries, State Governments, academia and others including individuals who are eminent in the fields of marine science, marine policy or related fields including ocean resource management. Panel Members appointed by the Secretary of Defense or designated representative, who are not Federal officers or employees, shall serve as Special Government Employees under the authority of 5 U.S.C. § 3109.

   Panel Members, under the provisions of 10 U.S.C. § 7903, shall be appointed on an annual basis by the Secretary of Defense or designated representative, and shall serve no more than four years. The Panel Membership shall select the Chairperson and Vice-Chairpersons of the Panel for renewable one-year terms. In addition, the Secretary of Defense or designated representative may invite other distinguished Government officers to serve as non-voting observers of the Panel, and appoint consultants, with special expertise, to assist the Panel on an ad hoc basis.

D. Panel Meetings: The Panel shall meet at the call of the Designated Federal Officer, in consultation with the Chairperson, and the minimum number of Panel meetings is one per year. The Panel shall be authorized to establish subcommittees, as necessary, to fulfill its mission, and these subcommittees shall operate under the provisions of the Federal Advisory Committee Act of 1972, as amended.

E. Duration of the Panel: The need for this advisory function is on a continuing basis; however, it is subject to renewal every two years.

F. Agency Support: The Department of Defense, through the Secretary of the Navy and the Office of Naval Research, shall provide support as deemed necessary for the performance of the Panel's functions, and shall ensure compliance with the requirements of 5 U.S.C. § 6.

G. Termination Date: The Panel shall terminate upon recession 10 U.S.C. § 7903.

H. Operating Costs: It is estimated that the operating costs, to include travel costs and contract support, for this Board is $192,000.00. The estimated personnel cost to the Department of Defense is 0.6 full-time equivalents (FTEs).

I. Charter Filed: January 20, 2006

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