



# Summary of Conference on Ocean Literacy

Aquarium of the Pacific - Long Beach, California

*June 7-9, 2006*

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## EXECUTIVE SUMMARY

As part of the national Conference on Ocean Literacy (CoOL), the Aquarium of the Pacific hosted a simultaneous event in Long Beach, California. The California conference brought together 119 participants representing academia, aquariums, museums, science centers, media, federal and state government officials and staff, industry, non-profit organizations, foundations, and other stakeholders with an interest in environmental literacy. Attendees discussed the essential principles of ocean literacy; suggested strategies for achieving ocean literacy; and outlined the current challenges and opportunities facing the nation and California for educating school children and the general public to make informed and responsible decisions about the ocean and its resources.

After watching satellite broadcasts of the national conference, the participants convened in smaller groups for panel discussions and “brainstorming.” The conference added a regional perspective to the topics of the national conference, focusing on raising Californians’ awareness and understanding of how the ocean affects them and how they affect the ocean no matter where they live.

There are many challenges and opportunities involved in achieving a goal of an ocean literate citizenry. Insufficient funding, lack of direct interaction with the ocean by many of the public, over-tasked teachers, and underdeveloped ocean science curricula are just a few of the examples of challenges for the ocean literacy movement. Conference participants worked together to transform these challenges into opportunities by developing practical recommendations on how to expand ocean awareness for the general public, K-12 students, and teachers. Participants suggested immediate and on-going recommendations, some of which are highlighted below:

- ***Form strategic partnerships and collaborations with important and relevant organizations.*** Work with groups such as the California Ocean Communicators Alliance, Southern California Wetlands Recovery Project, National Marine Educators Association (NMEA), Southwest Marine and Aquatic Educators Association (SWMEA), Centers for Ocean Sciences Education Excellence (COSEE), California Ocean Protection Council, and non-profit organizations with a commitment to free-choice learning. Partnerships between formal and informal education entities should be strengthened.
- ***Convey consistent messages about the ocean.*** Use a common list of ocean literacy resources to develop and deliver unified messages about the ocean to link non-profit organizations, elected officials, and the voting population.
- ***Influence the Education and Environment Initiative (EEI) program.*** Become informed about and work with the State of California’s EEI program to ensure ocean literacy is highlighted in that effort.
- ***Increase interest in science, technology, engineering, and math (STEM).*** Use environmental literacy to inspire students to improve their educational performance in STEM fields and lead them to pursue related careers.

- ***Become a storyteller.*** Make the ocean more personal and create a sense of excitement by telling stories about marine animals, biodiversity, shifting baselines, and climate change so as to create a better understanding of the individual's role in nature.
- ***Inform the public about the economic benefits the ocean provides to the State of California.*** Californians love their beaches. Beach stories should be used as a starting point with the final chapter stressing that the state has the largest ocean economy of any state in the nation. In the year 2000, industries along the California coast generated \$43 billion and provided 408,000 jobs.
- ***Rate performance of state and local governments.*** Conference participants should unite once a year to create a report card to rate the state and local government's ecosystem management performance as a protector of the ocean's vast ecosystem and a funder for its protection and restoration of watersheds.
- ***Engage the media.*** Increase coverage of environmental literacy and its messages by tailoring the stories to fit media requirements. The media is not a public relations agent of any movement but is always looking for relevant and exciting items.
- ***Incorporate overfishing into ocean literacy programs.*** Fish are one of our most important marine resources and overfishing is one of ocean management's greatest challenges.
- ***Connect inland communities to the ocean.*** Develop explicit messages for inland communities to instill a sense of relationship to and interdependence on the ocean.
- ***Give children and adults hands-on experiences*** by taking them to affected sites as part of formal and informal education programs. These experiences will give them opportunities to see the deterioration as well as the positive aspects of their environment. Encourage all to learn how to live in harmony with nature.

It has been pointed out nationally and in many sectors that California is playing a leadership role in ocean governance and management. Governor Arnold Schwarzenegger's response to the U.S. Commission on Ocean Policy was among the most creative and assertive in the nation. The legislature's education and environmental initiatives have become an important model for the nation, and California's universities are leading the effort to support such initiatives throughout the state. The formation of California's Ocean Policy Council with appropriation of necessary funding and the recent designation of a series of marine protected areas along the central coast are other examples of leadership.

The ocean literacy movement is evolving and needs many partnerships and political influence to achieve tangible results. This was very evident as this conference progressed. Implementing the above recommendations is a key component toward cementing California's leadership in the environmental literacy movement. Conference participants and others can create opportunities to increase the public's—from pre-schoolers to grays—knowledge about and understanding of the state of the ocean and its needs. As a result of concentrated, collaborative, well-funded efforts people will become connected to the ocean as never before and steward this resource for the generations to come.

## INTRODUCTION

The average American does not understand the most basic principals of ocean and coastal ecosystems and management. And the gap between science and the public is increasing. Because of the need for improved education about our ocean planet and because our ocean is in crisis, ocean literacy must become a national and state priority.

The June 7-9, 2006 national Conference on Ocean Literacy (CoOL) was extended beyond Washington, D.C. through five regional conferences hosted by aquariums across the country. Aquariums were selected as sites because of their relevance to ocean-focused informal education. The potential to reach a combined audience of more than 30 million visitors was also a factor.

The two-and-half-day California CoOL was the largest regional conference, bringing together 119 people to discuss the Essential Principles of Ocean Literacy, the current challenges, and the opportunities facing the nation and California. Participating organizations included academia, aquariums, museums, science centers, industry, non-profits, foundations, media, federal and state government agencies, and other stakeholders—all with an interest in environmental literacy. Strategies were developed on how to prioritize ocean literacy and awareness through formal and informal education efforts and next steps necessary for concrete actions to result from the conference.

### **Challenges and Opportunities**

Californians are concerned about the quality of the ocean environment as evidenced by the results of the *Public Policy Institute of California Statewide Survey: Californians and the Environment (February 2006)*. This survey showed how important marine and coastal issues are to the public and, that a majority of Californians surveyed feel marine protection should be a priority and in the state budget.

To create ocean literate Californians several challenges need to be addressed. California has the longest coastline of any state in the nation; yet, many have never visited the beach or did so years ago. And those who have interacted with the coast do not fully comprehend the diversity, complexity, and beauty that lies beneath the surface. Lack of understanding of science is another challenge. With over-burdened teachers combined with strict science curricula standards, the education community has difficulty not only in including ocean science concepts in the classroom, but also in translating the messages in ways that will encourage students to pursue ocean science related careers. These challenges transformed into opportunities can result in practical recommendations on expanding ocean awareness for the general public, K-12 students, and teachers.

### **Conference Overview**

A plenary welcome and overview of the conference's commitments and objectives started each day. Then the participants watched the national presentations via satellite. Panel discussions based on the topics of the national conference sessions followed. Moderators facilitated interactions between panel members and the audience on

opportunities, challenges, and recommendations for increasing ocean literacy at the regional level.

### **Day One: June 7, 2006**

Tom Turney, the Aquarium's Marine Conservation Research Institute (MCR) Chair, opened the conference with references to concerns noted in the U.S. Commission on Ocean Policy (USCOP) and the Pew Oceans Commission reports. He observed that while the actions at the national level have been under-whelming, the work that California has done has been motivating. If effective ocean policy reform is to be realized, a public groundswell must occur. An informed and educated public can motivate legislators to act.

Russ Moll, Director of California Sea Grant, gave a brief history of ocean literacy highlighting some key organizations involved at the national and state level. He noted that the objective of the conference should be what it will take to make ocean literacy a higher priority in California and the nation. The outcomes of the conference are to further the goals of the USCOP report, produce a report to be included in that of the national conference, facilitate new partnerships promoting ocean literacy, and continue to move California to the forefront of national ocean literacy.

A panel presentation and participants discussion on *The Link to Economic Vitality*—the value of ocean literacy to the state's economy—followed a viewing of the national conference panel.

Mark Massara, Director of Sierra Club Coastal Programs, presented coastal issues that the Sierra Club is addressing at the day one luncheon. Terry Tamminen, Special Assistant to the Governor of California, talked about the Californian perspective of an ocean literate society at the evening reception.

### **Day Two: June 8, 2006**

Chris Andrews, Associate Executive Director of the California Academy of Sciences and Director of the Steinhart Aquarium, opened day two by highlighting some of the key messages resulting from the discussions at day one: form strategic alliances, reach new audiences, send simple messages, and start implementation now. The California and the World Ocean '06 Conference (September 17-20, 2006) can be the next meeting ground to continue this dialogue and collectively share our passion for the ocean.

The topics of this day panel discussions were:

- *Formal Education: Creating Ocean Literate Students*—Getting ocean literacy into California's Education and the Environment Initiative (EEI) program;
- *Informal Education: Creating an Ocean Literate Society*—Engaging the California public in ocean literacy through venues such as aquariums, museums, and science centers;
- *Formal and Informal Education Together*: Creating an ocean literate student body and society;
- *Behind the Lens: A Media Perspective on Ocean Literacy*—using local media to create greater public ocean awareness;

- *Building an Innovative Workforce through Diversity*—California’s diverse demographics present an opportunity for the state to create “the” national model.

Andrea Lewis, Assistant Secretary for Quality Programs and Effectiveness Initiatives at the Cal/EPA, was the luncheon speaker. She spoke about the status of California’s EEI program and how all participants can provide input into the process.

Senator Alan Lowenthal closed the day by sharing ways in which Californians have changed their views on the value of a healthy environment. The results of legislation passed include reduced diesel emissions at the ports, financial incentives for purchasing or leasing electric vehicles, and programs and funding to clean up the Los Angeles River and California’s beaches and coastline.

**Day Three: June 9, 2006**

Jerry Schubel, President of the Aquarium of the Pacific, gave a brief recap of the highlights of the national conference where he participated in the informal education session. Schubel said that industry, government, informal and formal education, and media have to work together across communities on an on-going basis and not just at meetings. There is a need for a national ocean agency to guide these organizations. That agency should be NOAA. The ocean literacy movement has the power to start making changes. It has to start now.

A panel discussion on *A Watershed Perspective from the Mountains to the Sea* focused on using California watersheds as examples of developing regional literacy programs.

**PANEL DISCUSSIONS**

**Ocean Literacy: The Link to Economic Vitality**

The value of ocean literacy to the state’s economy highlighted the economic benefits and challenges in four key ocean sectors: beach use, marine transportation, recreational, fishing, and commercial fishing. Panelists were asked to discuss trends, factors, and repercussions. Panel members were:

- Moderator: Steve Aceti, Executive Director, CalCoast
- James Fawcett, Director, Marine Science & Policy Outreach, USC Sea Grant Program
- Linwood Pendleton, Associate Professor, UCLA Environmental Science and Engineering Program
- Cindy Thomson, Economics Team Leader, Southwest Fisheries Science Center, NOAA

**Challenges and Opportunities:**

Californians love their beaches, but they rarely view them as economic assets and know little about the economic contribution made by the diverse group of ocean-dependent industries along the California coastline such as tourism, ports, and commercial and recreational fishing. In the year 2000, California maritime industries generated \$43

billion economic impact and provided 408,000 jobs making California the largest ocean economy of the nation. Yet the coastline is in need of more investment and protection than ever. Beaches are eroding but local governments cannot afford to keep them replenished. Fish populations are declining, and better fisheries management is needed. And though humans have an impact on the environment, there are no studies linking the economic change with ecological change and vice versa.

The ocean is filled with an abundance of resources ranging from oil and minerals to food and medical cures that offer exciting opportunities for the future. California provides significant recreational opportunities at its beaches with an estimated 64% of Californians going to the beach each year. By rising to the challenge and addressing the many activities that degrade the ocean and the coast, California can protect the marine environment while creating jobs, increasing revenues, expanding trade, increasing tourism and recreation opportunities, and ensuring sustainability of coastal resources.

### **Recommendations:**

- ***Inform the public about the economic benefits the ocean provides to the State of California.*** Beach stories should be used as a starting point for stressing that the state has the largest ocean economy of any state in the nation.
- ***Determine consistent economic data*** that must be collected and how to fund the collection; analyze data in terms of its relationship to environmental change, and inform appropriate decision makers for action and the public for understanding
- ***Incorporate overfishing into ocean literacy programs.*** Fish are one of our most important marine resources providing great economic impact. Overfishing is the greatest challenge that ocean resource managers face.

### **Behind the Lens: A Media Perspective on Ocean Literacy**

A panel of three media experts, representing print, radio, and television, discussed how the ocean literacy community can increase coverage of their stories in local media to generate greater public awareness about pressing issues. The panelists included:

- Moderator: Paul Rogers, Natural Resources & Environment Writer, San Jose Mercury News
- Lori Kelman, Reporter, KFWB (radio)
- Stephanie Medina Rodriguez, Director of Public Affairs, KCBS and KCAL (TV)

### **Challenges and Opportunities:**

The media and scientific communities need to build partnerships to assist one another in informing the public about the state of the ocean. There are many challenges. It is more difficult to visualize the ocean and its marine life than the more familiar terrestrial national parks and animals. There are few reporters specializing in ocean topics.

Panelists were interested in ocean issues, but stories need to fit their organization's criteria. The scientific and education communities need to tailor their story ideas so that they are newsworthy and interesting to the audiences of each media outlet they are targeting. The media and the public are attracted to ocean items that are immediate and



relevant; affect a large number of people; connect to national, breaking news, trends, or economic competitiveness; and have a “wow” factor. The ocean literacy community can also capitalize on California’s diverse population by working with ethnic media to present stories that impact the particular local ethnic communities they serve.

### **Recommendations:**

- ***Engage the media.*** Increase media coverage by knowing the media outlet you are contacting and tailoring stories to fit its individual requirements and audience interests. The media is not a public relations agent of any movement.
- Partner with organizations to ***develop PSAs***; example, Heal the Bay’s program.
- ***Be creative when releasing the news*** to make it relevant. Example, have a press conference about pollution at the beach, show community involvement by including local families in the event.
- ***Follow ten tips recommended by panelists for getting into newspapers:***
  1. Meet reporters, set up a business relationship, contact “specialists.”
  2. Give reporters your best phone numbers for a quick response on deadline.
  3. Find out how the reporter wants to be contacted (e-mail/fax/phone).
  4. Find out how far in advance the reporter wants to be contacted.
  5. Develop relevance for the general public—why should people care, for example, why should my grandmother care?
  6. Make it appealing to a wider audience. Use plain language.
  7. Make it geographically relevant to your market.
  8. Use history to illustrate your examples.
  9. Have good high resolution digital photos, video, written material, audio.
  10. Play up the human angle. Tell the story through someone experiencing the event. Create a “wow” factor.

### **Formal Education: Creating Ocean Literate Students**

K-12 and university level formal educators spoke on the challenges, opportunities, and their experiences in getting ocean literacy into classrooms. The panelists included:

- Moderator: Linda Duguay, Director, Wrigley Institute for Environmental Studies and Director, Sea Grant Program
- Rita Bell, Manager of Education Programs, Monterey Bay Aquarium
- Dena Deck, Teacher, Stephen Foster Elementary School, Bellflower
- Dennis Kelly, Professor, Orange Coast College Marine Science Department
- Joy Kobashi, Magnet Coordinator, Orville Wright Math/Science/Aerospace Magnet School, Westchester

### **Challenges and Opportunities:**

Understanding the value of the ocean is necessary to become connected to and a steward of this precious resource. Although developing such understanding at a young age almost ensures the connection, many K-12 school curricula do not include ocean issues. Overburdened teachers on average teach for only three to five years. Teaching is standards and test assessment driven, focusing more on test results, and rarely allowing teachers to think outside of the box.

Several important partnerships between formal and informal education institutions are already in place and should be praised. However these pocket approaches need to be taken a step further to become more systemic so that all corners of the formal education field benefit.

Professional development and other encouragements for science teachers are needed. The pipeline for future science teachers is sparse. All students need to become and remain engaged about science. Opportunities are there through several existing supportive formal and informal educational programs such as field trips to aquariums and science centers, but they need to be publicized. One successful approach is peer to peer education allowing students to talk and share information about the ocean to other students. Simple unified messages should be sent to students, similar to messages used by Smokey the Bear. A first message could be to “reach the beach,” to raise support to ensure that every child in California gets to the beach. The goal is for children to be life long learners, thus creating the next generation of conservationists.

One of the most important future tools to support teachers in educating children about ocean literacy is the state’s EEI program. It creates a “model curriculum” to implement environmental principles and concepts developed by EEI that align with existing content standards. This approach is expected to bring an understanding of California’s environmental principles to every California student and set an example for the nation.

#### **Recommendations:**

- ***Influence the Education and Environment Initiative (EEI) program.*** Become informed about and work with the State of California’s EEI program to ensure ocean literacy is highlighted in that effort.
- ***Increase interest in science, technology, engineering, and math (STEM).*** Using ocean literacy to inspire students can improve their educational performance and may lead them to pursue ocean related careers.
- ***Encourage students to teach students*** about ocean literacy. Create mentor programs that allow students to become ambassadors of ocean education.
- Develop a ***website dedicated to assisting teachers*** that includes a list of local learning centers that have programs to include grade level standards.
- Support “***reach the beach***” efforts.
- ***Follow the model suggested by Kobashi*** to increase formal educators’ focus on ocean literacy. **OCEAN: O** – Taking advantage of **opportunities**. **C** – Building **connections** and generating cash (financial support). **E** – **Educating** our students in ocean literacy. **A** – Creating an **action plan** through science departments and grade level meetings. **N** – Do it **NOW**, while motivation is high.

#### **Informal Education: Creating an Ocean Literate Society**

A panel of informal educators and a very diverse audience discussed opportunities to engage the general public in ocean literacy through venues such as aquariums, museums, and science centers. The panelists included:

- Moderator: Bill Patzert, Research Oceanographer, Jet Propulsion Laboratory, NASA
- Linda Chilton, Aquarium Educator, Cabrillo Marine Aquarium

- Roberta Dean, Coordinator of Public Programs, MARE, Lawrence Hall of Science, University of California, Berkeley
- Kristin Evans, Education Manager, Birch Aquarium at Scripps Institution of Oceanography
- Elizabeth Keenan, Public Programs Manager, Aquarium of the Pacific

### **Challenges and Opportunities:**

Organizations concerned about ocean conservation have significantly increased over the years to the point that society is bombarded with so much information focused on different priorities that the messages become diluted. The challenge and greatest opportunities now are to unite and align these organizations' efforts, resources, and missions in an effective way to meet the call for an ocean literate public by sending out simple, unified messages. In so doing the informal education community can become more organized, productive, and influential in reaching the target audience.

### **Recommendations:**

As a BHAG (big hairy audacious goal) for informal education and ocean literacy, the panel and audience identified measurable outcomes to be pursued in the next 12 months:

- ***Form partnership with the California Ocean Communicators Alliance*** to establish a resource connection among ocean advocates. The Ocean Communicators Alliance is a network of professionals, guided by a task force of representatives from NOAA and various state agencies.
- ***Pass on the messages and recommendations of this panel discussion*** to at least one colleague who could not attend the conference.
- ***Distribute a list of attendees of the conference***, including their contact information, to all participants so that the groups may network and work together in the future.
- ***Place a stronger emphasis on the voting population.*** California is a "green" state and environmental issues do influence the public to pressure legislative action.
- ***Take advantage of informal science center members.*** They are a captive audience to which unified messages from all organizations should be sent.
- ***Connect with the California Ocean Protection Council (COPC)*** to influence governmental policies, use it as a powerful tool to draw interest to our messages, and as a funding source. COPC was mandated by California's Ocean Action Plan to coordinate and improve the protection and management of California's ocean and coastal resources.
- ***Form a large internet community*** to simplify intra-organizational communication and reduce duplication of efforts.
- ***"Grade" the ocean community and the local and state government*** on the effectiveness of environmental efforts pursued.

### **Formal and Informal Education Together: Creating Ocean Literate Students and Society**

One recommendation from both the formal and informal education panels stressed the need for strategic alliances between the two. The participants from both education panels met in a joint session to highlight ways to strengthen partnerships between these entities.

### **Challenges and Opportunities:**

Formal and informal education programs have similar objectives yet operate independently instead of together to leverage each sector's strengths and maximize impacts. COSEE serves as one model of co-joined formal and informal education working to expand ocean programs as a platform for developing ocean literacy strategies.

### **Recommendations:**

- ***Form strategic partnerships and collaborations with relevant organizations.*** Partnerships between formal and informal education entities should be strengthened.
- ***Convey consistent messages about the ocean.*** Use a common list of ocean literacy resources to develop and deliver unified messages to link non-profit organizations, elected officials, and the voting population to the ocean.
- ***Become a storyteller.*** Make the ocean more personal and create a sense of excitement by telling stories about marine animals, biodiversity, shifting baselines, and climate change so as to create a better understanding of the individual's role in nature.
- ***Encourage a "blue hour" of ocean learning*** similar to the National Wildlife Federation's "green hour" designed to promote outside play and learning.

## **Ocean Literacy and Education: Building an Innovative Workforce through Diversity**

The nation needs to create strategies and investments to increase participation by under-represented groups from pre-K to postdoctoral and beyond. California's diverse demographics present an opportunity for the state to create "the" national model.

Panelists included:

- Moderator: John Yochelson, President, Building Engineering & Science Talent
- Kim Armstrong, Program Manager, Boeing
- Simona Bartl, Director, Teacher Enhancement Program, Moss Landing Marine Laboratories

### **Challenges and Opportunities:**

In general, student populations in public schools and universities do not regard ocean or other STEM fields as viable career options. While interested in science subjects, they tend toward careers producing the highest income. Elementary, junior high, and high school students who have strong math and science skills often see themselves as future doctors, not scientists. Part of the challenge is a result of the lack of time teachers have to talk about career paths and to outreach to younger students about engineering and science careers. Interventions at key stages of a child's education should be taken to continue the initial exposure to science through outreach. There is a need to build a larger, diverse, and more effective coalition to set an example for the younger generation.

The ocean science field workforce predominantly consists of Caucasian males. Caucasian females are slowly making their way into the sciences, but there is a gap between master and Ph.D. levels. Opportunities to create a more diverse workforce include the advancement of women in sciences as a model for people of color. Graduate level

diversity in oceanography comes primarily from foreign students, which in turn are quite low in numbers. Creating outreach and mentoring opportunities between accomplished women and different ethnicities in the sciences will help fill the talent pipeline.

### **Recommendations:**

- As a profession, create a *branding strategy for ocean and marine sciences* akin to the brand associated with engineering, aerospace, and other hard sciences.
- *Promote programs like RISE* (Recruitment in Science and Engineering—local to the Monterey Bay region) to other communities in the state. Identify similar programs already in place and collaborate to track progress.
- Have science centers, aquariums, research facilities with schools and universities *connect marine related organizations to students* who are interested in internships or careers in ocean sciences.
- *Find model programs* like that of Boeing: “Career Exploration Preparedness” designed for children who would not ordinarily look into science careers.
- *Focus on the teachers*. Teachers impact large numbers of children.

### **California Approaches—Ocean Literacy: A Watershed Perspective from the Mountains to the Sea**

On day three participants met to discuss regional approaches to ocean literacy by integrating watershed and ocean literacy programs. The Sacramento and Joaquin Rivers, Los Angeles and San Gabriel Rivers, and Compton Creek watersheds were examples.

Panelists were:

- Moderator: Mike Connor, Executive Director, San Francisco Estuary Institute
- Jerry Schubel, President, Aquarium of the Pacific
- Nancy Steele, Executive Director, Los Angeles & San Gabriel Rivers Watershed Council

### **Challenges and Opportunities:**

While the watersheds discussed vary geographically, the challenges faced are similar. These watersheds are now either heavily populated or heavily developed farmlands. An extreme case is the Los Angeles River, the most channelized river in the US. How should watershed stories be communicated to the general public so that they have a sense of personal responsibility and take ownership of their actions?

The Sacramento and San Joaquin Delta is the largest source of freshwater in California supplying an estimated 23 million people. Much of the Delta consists of reclaimed marsh that is subsiding. If better watershed management and mitigation are not implemented, the water supply is at risk from natural disasters and there will be a continued decline of freshwater fish populations. Opportunities to manage water exports include appropriate timing of exports to minimize impacts and water conservation. Restoration of habitat to improve fish populations is also a priority.

The Los Angeles River was once the sole source of freshwater for the Los Angeles Basin, but as a result of increasing population it was transformed into a concrete channel to

reduce the impact of floods. There are opportunities to bring portions of the river back to life. Setting the entire river free again is both highly unlikely and dangerous, however, projects are underway to integrate nature back into the river and establish places where the public can reconnect with the river.

An opportunity to manage watersheds on a smaller scale is demonstrated by the success of the Compton Creek Watershed Management Plan. While a few Compton residents were influenced by their neighborhood connection to the Los Angeles River and the ocean, most were motivated to improve the area after understanding the economic impact the pollution had on their neighborhood.

With effective outreach to residents, stakeholders, and community organizations in a language easily understood, there is a tremendous opportunity to create a more informed ocean literate public that supports and manages their watershed for future generations.

### **Recommendations:**

- ***Connect inland communities to the ocean.*** Inland watersheds provide different challenges than coastal habitats. Develop explicit messages for inland communities to instill a sense of relationship with and interdependence on the ocean and their community.
- ***Use common language.*** Communicate messages using terminology and subject matters that the public is familiar with and cares about while working over the long-run to incorporate scientific terms to create a more ocean literate public.
- Use formal and informal education programs to take children and adults to affected sites to ***give them a hands-on experience*** of the deterioration as well as the positive aspects of human impact on their environment. Encourage them to learn how to live in harmony with nature.
- ***Partner with commercial corporations.*** Corporations often have funds dedicated entirely to public service campaigns on billboards. Take advantage of these funds and use the billboards to display focused watershed messages that relate to larger national messages.
- ***Use watershed messages to pave the way for ocean literacy messages.*** The notion of watershed conservation allows a person to identify directly with their geographic area and therefore view it as protecting their home. Use that theme to then connect the people to the ocean.

## **CONCLUSION**

Many sessions mentioned the need to start taking action today. Participants shared common objectives and recognized the urgent need to increase ocean awareness. They committed to continuing partnerships and dialogues through groups such as the Ocean Communicators Alliance, formal and informal education partnerships such as COSEE, email networks, and other efforts.

## SPEAKER BIOGRAPHIES

**Steve Aceti** helped create, and is now the Executive Director of, the California Coastal Coalition (known as "CalCoast"), headquartered in Encinitas, CA. CalCoast is an advocacy group comprised of 35 coastal cities, 5 counties, regional planning agencies and interest groups committed to beach restoration, wetlands recovery, watershed management and improved water quality. Mr. Aceti is a participant in the "Coastal Sediment Management Workgroup" and a member of the Public Advisory Committee of the Southern California Wetlands Recovery Project. He also serves as a director of the American Shore and Beach Preservation Association and co-chairs that organization's Legislative Committee.

**Dr. Christopher Andrews** is the Associate Executive Director of the California Academy of Sciences, and Director of the Steinhart Aquarium. Previously Dr. Andrews was the Executive Director of the South Carolina Aquarium where he demonstrated the ability to steer an aquarium from the planning phase into a financially viable facility that maintains excellence in programming, customer service, and community involvement. Before he joined the South Carolina Aquarium, Dr. Andrews served as the Director of Husbandry and Operations, and later as the Senior Director of Biological Programs, at the National Aquarium in Baltimore. He also worked as a curator at the London Zoo, where he was involved in the design process for a new aquarium. Dr. Andrews has varied field work experience in Europe, freshwater and coastal US habitats, Caribbean, Africa, Costa Rica, and Amazonia.

**Dr. Kim Armstrong** is Boeing's enterprise engineering curriculum leader and Program Manager for the Engineering Leadership Program. Dr. Armstrong works in the Engineering Learning, Training & Development organization, located in Long Beach, CA. Dr. Armstrong's career at Boeing has focused on designing, developing, and implementing cost-effective engineering, manufacturing, leadership, and information systems training programs. She is the lead for enterprise engineering training/curriculum, CBT/WBT design and development, and the focal for e-Testing and Test/Evaluation writing. Outside of Boeing, Kim spends a great deal of time in the local community. Dr. Armstrong teaches in the Professional Studies Department at CSULB. She also serves on several boards for local non-profit organizations including the Port of Long Beach Port Ambassadors, the Long

Beach Youth Council and volunteers as a veterinary assistant at the Aquarium of the Pacific.

**Dr. Simona Bartl** is the director of the Teacher Enhancement Program (TEP) developed at the Moss Landing Marine Laboratories (MLML), which is host to a graduate program in marine science for a consortium of seven campuses in the California State University System. Dr. Bartl is an adjunct professor at MLML with research interests in comparative immunology, molecular biology and science education. She was on the faculty at the University of North Carolina at Wilmington and taught a variety of undergraduate and graduate level biology courses. Since coming to MLML in 1998, Dr. Bartl has been working with K-12 teachers. She provides STEM content in the context of current scientific research and is particularly committed to creating opportunities in the field of marine science and technology for traditionally underrepresented groups.

**Rita Bell** is Manager of Education Programs at Monterey Bay Aquarium where she provides vision and direction for aquarium programs that serve the needs of classroom teachers, students, teens and local communities. With community members and leaders, Ms. Bell identifies opportunities for joint programs and projects that will address local environmental and educational needs and will promote ongoing ocean conservation efforts and actions. Currently, Ms. Bell serves as past-president of National Marine Educators Association (NMEA) and a member of NMEA's Ocean Literacy Committee. She has been involved with Center for Informal Learning and Schools (CILS) since 2002.

**Linda Chilton** has been the Education Specialist at Cabrillo Marine Aquarium for the last 15 years. Ms. Chilton coordinates public education workshops, in depth school workshops, educator workshops, Sea Ranger volunteer naturalists, and afterschool programming. She helps to implement field monitoring projects along the rocky shore, saltmarsh, beach and at the pier and co-coordinates CMA's annual Earth Day Celebration and Coastal Clean-up Day. Ms. Chilton has a Masters in Special Education and strives to make ocean education more accessible for all audiences.

**Dr. Mike Connor** is the Executive Director of the San Francisco Estuary Institute, a non-profit environmental science institute funded through grants, contracts, and discharge fees. Its mission is to foster development of the scientific understanding necessary to enhance and protect the San Francisco Estuary, through monitoring, research, and communication. Dr. Connor's education and experience have been focused on improving the scientific basis of environmental policy formulation. He has led environmental programs for organizations in the private (Program Manager, Battelle Ocean Sciences), public (Director of Environmental Quality, Massachusetts Water Resources Authority), and non-profit (Vice President, New England Aquarium) sectors.

**Roberta Dean** is Coordinator of Public Programs at Marine Activities Resources and Education (MARE), Lawrence Hall of Science at University of California, Berkeley. Ms. Dean is one of the founders of MARE and co-author of MARE's K-8 marine science curriculum. As a former developer and director of Project Ocean and Executive Director of the Sonoma Sea School, Ms. Dean has been providing professional development and leadership for teachers for over 20 years. Formerly a classroom teacher, Ms. Dean has credentials in Early Childhood Education, K-12 Education, as a resource specialist, and as a teacher of both the learning and severely handicapped.

**Dena Deck** teaches fourth grade at Stephen Foster Elementary School in Bellflower Unified School District. Because of her enthusiasm for marine science, she involves herself in many related educational opportunities in the community. She teaches at an after school marine science class, provides training for Los Angeles County teachers at many different forums, has been actively volunteering at Carillo Marine Aquarium. Ms. Deck actively pursues education and science research with many organizations such as NOAA Teacher at Sea and Channel Islands Marine Sanctuary. She also donates her time locally as a member of the Rancho Los Cerritos Master Plan Advisory Committee and co-authored their 1998 study guide for teachers and students.

**Dr. Linda Duguay** is the Director of the University of Southern California (USC) Sea Grant Program. The USC program focuses on the unique problems and solutions associated with the "Urban Ocean." Dr. Duguay also serves as Deputy Director of the USC Wrigley Institute for Environmental Studies and as Executive Director of the Tyler Prize for Excellence

in Environmental Achievement, one of the first prizes devoted to recognizing the outstanding contributions of individuals or groups in advancing scientific knowledge and understanding of environmental problems. She also served as Chair of the Environmental Studies Program at USC from 2000 to 2002 and is an Associate Research Professor in the Marine Biology Section of the Biology Department in the College of Letters Arts and Sciences

**Kristin Evans** is the Education Manager for the Birch Aquarium at Scripps Institution of Oceanography, overseeing coordination of programs, staff, and operations for the Education Department. Ms. Evans has been working in the informal science education field for over 12 years, coordinating education programs for institutions such as, the Sacramento Zoo and the Los Angeles Zoo & Botanical Garden. During her "terrestrial days", Ms. Evans participated in and acted as Education Advisor for several AZA Species Survival Plan and Taxonomic Advisory Group programs, helping to develop, organize, and implement their educational missions. Currently, Ms. Evans is serving as President of the South West Marine Educators Association (SWMEA).

**Dr. James Fawcett** is the Marine Transportation/ Seaport Specialist with the University of Southern California (USC) Sea Grant. He serves as a link between campus researchers, the marine transportation industry, and the public on matters of seaport operations and management, movement of marine cargo, and the environmental and economic consequences of this industry for both Southern California and the nation. Dr. Fawcett also is a lecturer with the School of Policy, Planning, and Development at USC. Dr. Fawcett's previous experience includes a position as a port manager for the Los Angeles County Department of Beaches and Harbors and adjunct faculty member for over a decade with the College of Business at California State Polytechnic University, Pomona.

**Elizabeth Keenan** is the Public Programs Manager at the Aquarium of the Pacific in Long Beach, CA where she started as an Education Specialist five years ago. Her current duties include assisting in the operations of the Education Department with particular focus on programs for the public. She currently serves on the board of both the Southwest Marine



Educators Association as well as the National Marine Educators Association. Prior to working at the Aquarium, Elizabeth worked for an on-line educational technology company and was a high school biology teacher in Lake Elsinore, CA.

**Dennis Kelly** has been a professor at Orange Coast College Marine Science Department since 1974. Since 1977 he has been the director of an on-going research project on coastal dolphins. He is also the director of the Orange Coast College Public Aquarium. He is the Department Chairman of the Marine Science Department and he periodically teaches classes in oceanography, marine mammals, marine biology, aquarium science, aquaculture, coastal oceanography, island ecology, gray whale ecology, and intertidal ecology. Most recently Mr. Kelly has been a leader in the establishment of Wheeler Station, Rabbit Island, British Columbia, Canada.

**Lori Kelman** has been a reporter at KFWB since 2002 and has been in on-air Radio/TV for 30 years in Los Angeles, New York City, and Boston. She began her career as a morning news anchor and side-kick personality on the top-rated music radio stations in Boston. Ms. Kelman has also done nationally syndicated consumer reporting, feature reporting, and voice-overs and has spent many of her off-air hours over the years teaching broadcast news to those eager to enter the business.

**Joy Kobashi** served the Los Angeles Unified School District for 16 years as a science teacher, counselor, administrator, and is currently the magnet Coordinator at Orville Wright Math/Science/Aerospace Magnet in Westchester, CA. Ms. Kobashi has taught science methods and teacher education courses at California State University, Dominguez Hill. In 2004, she was selected as a "Teacher of the Year" by the Westchester/LAX/Marina Del Rey Chamber of Commerce and in June, 2006, she will be receiving a scholarship from Delta Kappa Gamma, a sorority with an education focus. Ms. Kobashi is currently working on her doctoral dissertation, "How Public Aquaria Enhance Science Education" at University of Southern California, which she plans to finish this June.

**Andrea Lewis** is the California Environmental Protection Agency's (Cal/EPA) Assistant Secretary for Quality Programs & Effectiveness Initiatives. In this role, Ms. Lewis is responsible for the agency's initiatives related to organizational improvement, performance measure, intra-agency programs, and

children's environmental education. Prior to joining Cal/EPA, Ms. Lewis managed the Quality and Training Services Program of the California State Teachers' Retirement System from 1989 to 1994 and developed its quality improvement program from concept to implementation. Ms. Lewis' managerial experience began in the California Attorney General's Office in 1986 as Manager of Legal Support Services, overseeing approximately 500 secretarial and clerical staff in four legal offices in the State of California.

**Senator Alan Lowenthal** was elected to represent the 27th District of California State Senate in November 2004 following six years in the California State Assembly. Senator Lowenthal is strongly committed to environmental protection and has had legislation signed into law to reduce diesel emissions at the ports, established a grant program to provide financial incentives for purchasing or leasing electric vehicles, and required ports to cover open petroleum coke piles. He has been a vocal leader in a drive to clean the Los Angeles River and exhibited strong leadership in the cleanup of California's beaches and coastline by securing funds to reduce pollution on area beaches. Senator Lowenthal serves as Chair of the Senate Transportation and Housing Committee as well as the Chair of the Senate Transportation and Housing Sub-Committee on California Ports and Goods Movement.

**Mark A. Massara** is an environmental attorney specializing in coastal resource protection, development, pollution and beach access issues. Mr. Massara has been Director of Sierra Club's Coastal Programs for over ten years and works closely with legislators, the California Coastal Commission, environmental activists and grassroots organizations throughout the west coast to promote economic vitality through coastal protection and conservation efforts. Mr. Massara is also a founder and member of the Board of Directors of Vote the Coast an organization dedicated to supporting pro-coast political candidates. In addition, Mr. Massara has worked closely with Ken & Gabrielle Adelman on development of the California Coastal Records Project, an aerial/educational photography project of the entire California coastline. Prior to joining Sierra Club, Mr. Massara served as General Counsel of Surfrider Foundation, a nonprofit organization dedicated to coastal protection.

**Dr. Russ Moll** is Director of the California Sea Grant Program based at Scripps Institution of Oceanography at University of California, San Diego. California Sea Grant funds marine research at public and private universities throughout the state. Dr. Moll's previous positions include Director of the Michigan Sea Grant Program and Associate Program Director for the Biological Oceanography Program of the National Science Foundation in Washington, D.C. Dr. Moll has traveled, studied, and published extensively on the Great Lakes, nearshore marine environments, and temperate and tropical rivers during his 26-year career at the University of Michigan.

**Dr. Bill Patzert** has been a Research Oceanographer at the California Institute of Technology's Jet Propulsion Laboratory (JPL) for more than 20 years. Before joining JPL, Dr. Patzert was a member of the faculty at the University of California's Scripps Institution of Oceanography in La Jolla, CA. In recent years, he has focused on the application of NASA satellite data to improving our understanding of our planet's climate variability and important environmental problems ranging from developing El Nino and La Nina forecasts to monitoring the health of coral reefs. Dr. Patzert works with high school, undergraduate, and graduate students from all over the world.

**Dr. Linwood Pendleton** is an associate professor at UCLA Environmental Science and Engineering Program. Dr. Pendleton's current research focuses on the economics of environmental goods and services, especially those in the coastal zone. In addition, Dr. Pendleton is working with a consortium of environmental organizations in British Columbia to determine the economic and financial feasibility of environmentally sound alternatives to net pen salmon aquaculture. Dr. Pendleton previously worked as an assistant professor of Economics, International Relations, and Environmental Studies at the University of Southern California and as an assistant professor of Economics and Finance at the University of Wyoming.

**Stephanie Medina Rodriguez** is the Director of Public Affairs for KCBS and KCAL television stations in Los Angeles. She has more than 20 years professional experience in journalism and community relations, including as Public Affairs Director for KCAL9 in Los Angeles as well as News Assignment Manager, News Segment Producer, and Assignment Editor. In addition, she produced, for two seasons, Emmy nominated "Crosscheck", a public affairs program for KCAL.. She has also worked for KNBC

and KABC. She has been honored by a variety of organizations, including the California School Board Foundation and the Los Angeles Press Club. Ms. Medina Rodriguez is on the board of Heal the Bay as Vice President of Marketing, and has won an Emmy award for the production of the one-hour special H2O Heroes, an environmental program for children. She is a member of the National Association of Hispanic Journalists and California Chicano News Media Association.

**Paul Rogers** has been a Natural Resources and & Environment Writer for the San Jose Mercury News for the last 15 years. He was part of the Mercury News team that won a Pulitzer Prize for coverage of the Loma Prieta earthquake of 1990. He has been the paper's environment writer since 1995, covering a broad range of issues that affect marine and coastal issues, logging, energy, agriculture, air pollution, water policy, endangered species and state and national parks. Mr. Rogers also teaches graduate-level science writing at the University of California at Santa Cruz. He also has taught environmental journalism at UC-Berkeley's Graduate School of Journalism. Mr. Rogers is chairman of the board for the Institutes of Journalism and Natural Resources, a non-profit journalism education group based in Missoula, Montana.

**Dr. Jerry Schubel** has been President of the Aquarium of the Pacific since 2002, and also directs the Aquarium's Marine Conservation Research Institute. He has served on a number of National Research Council commissions, committees, and boards and chaired the Marine Board. He is past chair of the National Sea Grant Review Panel and has served on the National Science Foundation's Education and Human Resources Advisory Council, and US EPA's Science Advisory Board. Dr. Schubel is President Emeritus of the New England Aquarium, where he was President and CEO from 1994 to 2001. He has written extensively for both scientific journals and for general audiences, and is author/editor of six books and has more than 200 scientific papers to his credit. From 1974-1994 he was Dean and Director of the University at Stony Brook's Marine Sciences Research Center.

**Dr. Nancy Steele** is the Executive Director of the Los Angeles & San Gabriel Rivers Watershed Council, a California nonprofit corporation dedicated to working cooperatively

to solve problems in the dual watersheds of the Los Angeles and San Gabriel Rivers. In 1999, Dr. Steele, with others, founded the Altadena Foothills Conservancy dedicated to protecting the natural areas of the foothills of the San Gabriel Mountains. Her previous positions include manager of Retrofit Implementation at the California Air Resources Board. In her career with the State of California, Dr. Steele has enforced California's hazardous waste control laws, monitored environmental lead contamination, and written regulations to reduce the threat of childhood lead poisoning.

**Terry Tamminen** was appointed as the Secretary of the California Environmental Protection Agency by Governor Arnold Schwarzenegger in November 2003. In 1993, Mr. Tamminen founded the Santa Monica BayKeeper and served as its Executive Director for six years. He also co-founded Waterkeeper programs in San Diego, Orange County, Ventura, and Santa Barbara. Mr. Tamminen has served on numerous civic and charitable Boards and Commissions, including as Chair of the Public Advisory Committee to the Southern California Wetlands Recovery Project and on the Board of the Wishtoyo Foundation, a group that preserves natural resources through Chumash Indian traditional teachings.

**Cynthia Thomson** has worked at NOAA Fisheries' Southwest Fisheries Science Center for over 25 years. For the past ten years, she has been the Economics Team Leader at the SWFSC Santa Cruz

Laboratory. Her areas of expertise include fishery management, commercial and recreational fishery models, economic survey methods, non-market valuation, and salmon habitat restoration. She has served on the Pacific Fishery Management Council's Coastal Pelagic Species Management Team and is currently a member (and past chair) of the Council's Scientific and Statistical Committee.

**John Yochelson** is President of Building Engineering and Science Talent (BEST). The San Diego-based BEST has reported to Congress on the most effective K-12 and higher education programs for groups that are historically underrepresented in science, technology, engineering, and mathematics. Before his work at BEST, Mr. Yochelson was President of the Council on Competitiveness, a non-partisan forum of chief executives from the business, university and labor communities working to sustain U.S. economic leadership. He has also held positions as President of the Edmond de Rothschild Foundation and as a senior vice president at the Center for Strategic and International Studies (CSIS). He has been a consultant to the Joint Economic Committee of the US Congress and a collaborator of the late Jean Monnet. President Bush appointed Yochelson to the President's Export Council, and he also served as a member of the Department of State's Advisory Committee on International Investment.

