Capitol Hill Oceans Week 2003

Summary Report

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Introduction

Capitol Hill Oceans Week 2003, a two-day, bi-partisan symposium designed to highlight ocean issues, was held on Capitol Hill June 11-12, 2003. The event brought together a wide-range of stakeholders to discuss issues relevant to ocean exploration and marine managed areas. Speakers included Members of Congress, representatives of the Executive Branch, other government entities, industry, academia, and nonprofit organizations.

Each day of the symposium consisted of four different panel discussions, which included an introduction of the topic by a Member of Congress. The first day, titled ***Exploring Our Oceans***, focused on the exploration of our oceans, the final frontier of our planet. Key topics included breakthroughs in medicines created from marine-derived products; energy issues related to the ocean; the development, use and future of ocean observing systems; and the international perspective on ocean exploration. The second day, ***Managing Our Marine Areas***, included panel discussions on real life examples of successful marine area management; restoration efforts related to key habitats; the variety of ways the public can enjoy and help preserve marine areas; and the challenges of dealing with invasive species. As part of their presentations, panelists were asked to summarize the challenges related to the topic at hand, as well as make recommendations for the future. This summary report captures those challenges and recommendations.

In addition, renowned members of the ocean community gave keynote speeches during the event, including Admiral James D. Watkins, USN (Ret.), Chairman, U.S. Commission on Ocean Policy; Jean-Michel Cousteau, NMSF Trustee and President of Ocean Futures Society; Dr. Sylvia Earle, NMSF Trustee and National Geographic Explorer-in-Residence; and James L. Connaughton, Chair, Council on Environmental Quality.

The National Marine Sanctuary would like to thank the following Members of Congress for their participation in Capitol Hill Oceans Week: Tom Allen (ME), Lois Capps (CA), Sam Farr (CA), Wayne Gilchrest (MD), Jim Greenwood (PA), Bart Stupak (MI), W.J. “Billy” Tauzin (LA), and Curt Weldon (PA).

Capitol Hill Oceans Week ‘03 brought together experts from the ocean realm to share ideas and viewpoints on critical ocean issues. This exchange would not have been possible without the support of the Capitol Hill Oceans Week sponsors: ***Presenting Sponsor*****:** Bell South; ***Gold Sponsor***: Cruise Industry Charitable Foundation; ***Silver Sponsors***: AT&T, National Fish and Wildlife Foundation, and National Geographic Society; and ***Benefactors***: American Petroleum Institute, Booz Allen Hamilton, Consortium for Oceanographic Research and Education, Corporate Wetlands Restoration Partnership/Coastal America, Mote Scientific Foundation, The Curtis and Edith Munson Foundation, Mystic Aquarium and Institute for Exploration, National Marine Manufacturers Association, National Ocean Industries Association, and Sea Grant Association.

Capitol Hill Oceans Week was coordinated by the National Marine Sanctuary Foundation in partnership with members of the Senate Commerce, Science and Transportation Committee, the House Resources Committee, the House Science Committee, and the House Oceans Caucus. Federal partners included the U.S. Department of the Interior’s Minerals Management Service; the Office of Water at the U.S. Environmental Protection Agency; and several U.S. Department of Commerce’s National Oceanic and Atmospheric Administration offices, including NOAA’s Habitat Restoration Center, the Office of Ocean Exploration and the National Marine Sanctuary Program.

This summary is intended to give a brief overview of the panelists’ presentations and recommendations. To view these presentations, as well as the four keynote speeches, visit the National Marine Sanctuary Foundation’s web site at www.nmsfocean.org.

Day One
Exploring Our Oceans

"We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time."

T.S. Eliot (1888-1965)

Capitol Hill Oceans Week

2003

Exploring Our Oceans: Drugs from the Deep

Why It Matters

The ecosystem of the ocean is highly diverse and provides a wealth of resources that have potential for the creation of medical products. More than half of the pharmaceuticals that are used in the United States have been derived from natural sources. Marine organisms, such as the numerous classes of colonial invertebrates and the microbial populations associated with them, offer a plethora of new biological and chemical diversity yet to be fully evaluated for medicinal purposes. In addition, ocean organisms allow the study of the evolutionary relationship between species – particularly between lower life forms and human beings. However, experts estimate that 95 percent of the ocean realm has yet to be explored. Further exploration of the ocean and its resources could have significant benefits for human health and the treatment of disease.

Panel Overview

From discovery to development, panelists traced the path of exploration that has led to the creation of cutting-edge drugs and potentially life-saving treatments derived from marine products, as well as the potential yield from future exploration.

Moderator: Captain Craig McLean, Director, NOAA Office of Ocean Exploration
Panelists: Dr. Shirley Pomponi, Vice President, Harbor Branch Oceanographic Institution
Dr. Guy Carter, Assistant Vice President, Chemical and Screening Sciences, Wyeth Research
Dr. Ken Olden, Director, National Institute of Environmental Health Sciences
Dr. Paul Sandifer, Senior Scientist, NOAA National Centers for Coastal Ocean Science

Challenges

- Funding for drug discovery is scarce. Much of today's drug discovery is focused on cancer because the National Cancer Institute provides much of the support for cancer research. Other disease areas, like infectious diseases, cardiovascular and neurodegenerative diseases have received insufficient funding for research to continue.

- There is much that remains to be discovered about the resources to be found in the deep sea. The majority of exploration has taken place in shallower waters, however, an earnest effort to go deeper must happen. This is very costly and there is little technology to support such exploration.

- The regulations of other countries that control U.S. scientists' access to, collection of, and export of their ocean resources are cumbersome and can take up to two years to process. Compliance with these regulations is only part of the problem. Reaching agreement over fair and equitable sharing of revenues that result from the commercialization of any marine derived product is a related challenge.

- Large-scale harvesting of natural products is neither ecologically or economically viable unless the product can be chemically synthesized.

- There is a lack of fundamental knowledge in terms of biology that is required to be able to isolate marine organisms.

- Drug discovery has stalled, in part due to the lack of adequate technologies, methods and screening procedures to identify some of these new drugs from marine organisms. At the same time, many life-threatening microorganisms are reemerging and they are resistant to the current antibiotics.

- Opportunities for coordination with federal, academic and other partners to begin to develop a targeted oceans and human health initiative are lacking.

Recommendations

- Pass Senate Bill #1218, the Oceans and Human Health Act, that was introduced by Senator Ernest Hollings and Senator Ted Stevens. The Act provides the legislative framework for a coordinated national and interdisciplinary endeavor to tap into the oceans' huge potential for contributions to new biological treatments and advances. In addition, the Act encourages a more formal linkage between ocean and biomedical research.

- Provide greater focus and more funding both at the federal level and from private industry to research and develop marine natural products as drugs. It costs about $800 million to develop a new pharmaceutical agent.

- Develop a new suite of tools and platforms that allow the exploration of habitats that are beyond the reach of current capabilities, including human-occupied submersible vehicles, remotely operated vehicles that are equipped properly, and the new class of autonomous underwater vehicles. Develop new sensors and probes that will enable in situ analysis of ocean organisms on the sea floor, thereby diminishing impact on the environment during collection.

- Expand marine and freshwater biomedical research centers to develop better monitoring systems to detect changes in the ocean's ecosystem so that changes can be anticipated and adverse outcomes can be prevented.

- Use chemical synthesis, controlled harvesting and aquaculture of marine organisms to ensure an adequate supply of drugs from marine derived products.

- Conduct more research focused on the fundamental aspects of microbiology to understand microbial ecology and physiology. In addition, more study should be done to understand the biological roles that novel secondary metabolites play in producing organisms.

- Establish a vibrant marine biotechnology program that fosters private sector development.

- Develop new techniques to measure parameters of particular relevance to ecological and human health. Use data collected with these techniques to conduct long-term continuous monitoring assessments of the parameters that demonstrate a significant importance to the health of humans and their environment.

Exploring Our Oceans: Energy

Why It Matters

Throughout modern times, the ocean has played an important role in energy production. Approximately 25 percent of the oil and natural gas produced and used in this country comes from the ocean. Geologists estimate that about 60 percent of the remaining undiscovered oil and gas in this country is underneath the Outer Continental Shelf. In addition, given that there is a finite amount of oil and gas resources, the ocean is a logical place to begin developing alternative energy sources, including wind and methane hydrates. As the population rises, energy demands will also continue to increase resulting in the need for both expanded capacity and greater efficiency in all methods of energy production.

Panel Overview

From renewable wind-derived energy to the latest technological advances in crude oil extraction and the search for methane hydrates, panelists discussed the importance of ocean exploration as it relates to current and future energy use. The Honorable W.J. "Billy" Tauzin (R-LA), Chair , House Energy and Commerce Committee, opened the session.

Moderator: Mr. Tom Fry, President, National Ocean Industries Association
Panelists: Dr. Walter Cruickshank, Deputy Director, U.S. Department of the Interior, Minerals Management Service
Mr. Dennis Duffy, Vice President of Environmental Affairs, Cape Wind Associates, Inc.
Mr. Art A. Kleiner, Hydrographer, C&C Technologies, Inc.
Dr. Frank R. Rack, Director, DOE Programs, Joint Oceanographic Institutions

Challenges

- As existing oil fields are depleted, the oil and gas industry has been forced to look in new areas, resulting in a move to deeper water and drilling to greater depths while facing immense technological, geological, and financial risks.

- As industry drills into new and deeper areas, it is confronted with new issues, including understanding new environments, knowing the impacts of exploring these areas for new energy sources, and regulating the activities that go forward.

- Public perception regarding oil and gas production may not reflect an understanding of the innovative tools and technologies used in the extraction and production process. Educational materials need to be created to help bridge this gap.

- Investors are hesitant to raise and commit substantial capital to a renewable wind market that is not yet fully developed.

- There have been a number of attempts to prohibit offshore renewable energy, disrupting the development of the new wind energy industry.

- The production tax credit is scheduled to expire at the end of 2003. This credit was introduced in the Energy Policy Act of 1992 as the primary Federal means of encouraging capital investment in renewable energy. If this credit expires, there will be little incentive to build facilities to harness and distribute renewable energy.

- Current ocean mapping technology is both expensive and limited. Current vehicles move slowly and are tethered to the surface, limiting the area that can be surveyed.

- A majority of hydrate deposits have been identified using geo-acoustics or seismic data. These models show where the hydrate should be located, however, they do not show

the nature of the hydrate or how it is distributed in the sediment.

- There is a lack of understanding of how to develop methane hydrates. In addition, as exploration of this resource continues, scientists have discovered new ecosystems that rely on methane hydrates for their survival. Before gas is produced from this resource there needs to be a better understanding of the nature of methane hydrates and the effect on the environment and sea floor stability if hydrates are extracted.

- There is a lack of understanding of the full resource potential of methane hydrates. Additionally, operational safety issues, such as placement of infrastructure on sea floor, drilling and production scenarios, still need to be better addressed.

Recommendations

- Conduct research to ensure that the best and safest technologies are developed and applied in the exploration of ocean energy sources, thus reducing the risks.

- Offer up-front royalty incentives to make sure that oil and gas companies that undertake large investments in energy exploration can get more capital back as they wait for royalties to begin.

- Congress should extend the production tax credit under Section 45 of the Internal Revenue Code, slated to expire next year, to incentivize more investment of private capital into the renewable energies, including wind.

- Enact clear policies and goals for renewable energy markets, including a Renewable Portfolio Standard to ensure continuous growth in the field.

- Congress should address any concerns about renewable energy through legislation that does not disrupt the newly developing industry, and continue the fair and expeditious review of pending projects as outlined in Executive Order 13212.

- In the quest for methane hydrates, use new technologies—such as autonomous underwater vehicles—to do ocean mapping surveys that are more accurate, faster to conduct, and less intrusive to the marine environment.

- Conduct more research to understand the dynamics of methane hydrates, their rates, exchanges and cycling.

- Establish an integrated global ocean drilling program to help address questions in high/low flux environments and to examine changes over time.

- Establish long-term monitoring programs, as proposed in ICEY-HOPE, to track changes in these dynamic systems.

Exploring Our Oceans: Ocean Observing Systems

Why It Matters

Creation of an integrated Ocean Observing System has the potential for significant positive impacts on everything from commercial shipping to weather forecasts. Specifically, such a system could strengthen marine safety and operational efficiency, reduce public risks, improve predictions of climate change and variability, more effectively mitigate the effects of natural hazards, improve national and homeland security, enable sustained use of marine resources and enhance understanding of coastal and ocean systems.

Panel Overview

From real-time conditions at sea to biological data, ocean observing systems provide a plethora of vital information to a variety of users. Panelists discussed current systems, such as the Gulf of Maine Ocean Observing System, as well as future efforts. The Honorable Thomas Allen (D-ME), Co-Chair, House Oceans Caucus, opened the session.

Moderator: Rear Admiral Richard D. West, USN (Ret.), President, Consortium for Oceanographic Research and Education

Panelists: Dr. Madilyn Fletcher, Director, Baruch Institute, University of South Carolina
Mr. David Keeley, Acting Director, Maine State Planning Office
Captain Jeffrey Cockburn, Penobscot Bay and River Pilots Association
Dr. Rick Spinrad, Assistant Administrator, NOAA National Ocean Service

Challenges

- There is no one central integrated ocean observing system network that provides continuous long-term information.
- The structure and governance of an integrated ocean observing system, must be better defined to accommodate the existing planning, programming, and budgeting system within each of 14 agencies that make up the National Ocean Research Leadership Council (NORLC) with a multiyear planning process.
- A full inventory of each NORLC agency does not exist, thus the needs for an integrated ocean observing system are not well defined.
- Coordination is the biggest challenge—especially between government agencies, as well as industry and Congress.
- Partnerships do not currently exist to share, integrate and transport large volumes of diverse data from different systems for analysis and synthesis into effective tools.
- The scientific understanding and technologies required to address biological systems need to be developed.

Recommendations

- Establish and agree upon national/international standards for ocean observation that people will use, which includes new data management tools, and a commitment to participate in the venture.
- Develop a plan to justify the investment in these systems, as well as a plan that evaluates progress and assesses priorities for the allocation of funding. In the Gulf of Maine, the cost benefit analysis indicated that the cost to run the system is $3 million, while the benefits average $30 million.

- Use data from ocean observing systems to understand and address some of the critical issues affecting biological resources and human health conditions.
- Conduct more research to addresses the applications of ocean observing systems, but not at the expense of basic research.
- Change the university system culture to value the contributions made to the real world applications of ocean observing systems that support interdisciplinary scientific collaborations, in addition to the current focus on cutting-edge research.
- Encourage scientists to work more in cross-disciplinary, multidisciplinary programs that address the development of products that go into the hands of citizens.
- Integrate regional ocean observing systems in order to gain support from Congress for a national ocean observing system.
- NOAA should take the lead for development of the United States' investment in an integrated ocean observing System.
- Government agencies should share concerns and issues in order to define how coordination will occur best between federal, state and regional efforts.
- Engage industry, not just as a user of products of an integrated ocean observing system, but as a provider of data and information. Moving forward, it is inevitable that industry will become a third-party service provider of tools and products that support observing systems.
- Engage Congress through the work of federal agencies and open discussions like Capitol Hill Oceans Week. Ensure that it hears the same messages from all different sectors about the benefits of an integrated ocean observing system.

Ocean Exploration: An International Perspective

Why It Matters

A global perspective on ocean exploration allows for enhanced cooperation, collaboration and communication among members of the international ocean community. Benefits include working with other nations to build a global ocean observing system complementing the Nation's ability to explore new territory and unknown waters. In addition, cooperation on an international scale will maintain U.S. effectiveness in protecting worldwide navigation and overflight freedoms, communications, and interpretation of oceans law.

Panel Overview

From the Law of the Sea to the quest for creating a full census of all the creatures in the sea, panelists shared their expertise and experiences, as well as their thoughts about future expeditions and the tools that will be required. The Honorable Jim Greenwood (R-PA), Co-Chair, House Oceans Caucus, opened the session.

Moderator: Dr. William Brennan, NOAA Deputy Assistant Secretary for International Affairs, U.S. Department of Commerce

Panelists: Dr. John Norton Moore, Director, Center for Oceans Law and Policy, UVA School of Law
Dr. Ron O'Dor, Senior Scientist, Census of Marine Life, CORE
Captain Craig McLean, Director, NOAA Office of Ocean Exploration
Mr. Terry Garcia, Vice President , Mission Programs, National Geographic Society

Challenges

- Despite strong support from the executive branch through Democratic and Republican administrations and the Department of Defense, the United States has yet to adhere to the 1982 Convention of the Law of the Sea, which was renegotiated to meet all of the U.S.A.'s demands.

- There is no established forum for sharing ideas and collaborating at a government-to-government level in an effective way to sustain exploration. The 100-year-old International Council on the Exploration of the Seas comes close to meeting this objective; however, it is more about applied science than exploration.

- NOAA has not routinely funded exploration for the sake of looking and acquiring new knowledge–to go to unexplored areas "just to know what's there." In the past, funding went to more hypothesis-driven science.

- The U.S. is NOT the leader in the worldwide competition of ocean exploration, especially regarding technology. This is largely due to a lack of funding. NOAA's Ocean Exploration department has a budget of only $14 million, which encompasses not only research and exploration, but also technology development and education and outreach.

- The U.S. is required as a signatory of the U.N. Convention on Biodiversity to gather information on living resources; however, it has yet to finalize this agreement.

- The public has little knowledge of the vast unexplored areas out there or the technologies that allow us to look at things in new ways. There is no obvious cohesive public constituency to support ocean exploration.

Recommendations

- To avoid losing a leadership position regarding America's ocean interests, Congress should ratify the Law of the Sea Treaty and adopt the U.S. Commission on Ocean Policy's and the U.S. Outer Continental Shelf Policy Commission's resolutions urging the accession of the U.S. to the U.N.'s Law of The Sea Convention.

- The U.S. should create a new forum where members of the international ocean community can come together to share basic exploration concepts that will help sustain ocean exploration.

- The U.S. should embrace the sharing of technology to further exploration. Internationally for example, investigators share technology regardless of international boundaries.

- Create an international consortium to search for globally important habitats like deep corals and hydrothermal communities and the animals that inhabit them instead of each nation investing in exploration individually.

- Create a global ocean constituency—a generation of people who think in an entirely different way and view their position in the world in an entirely different way—and educate them to make the changes that are necessary to sustain ocean exploration. This can be achieved through formal education curriculum changes, as well as informal educational tools like those produced by National Geographic Society.

- Create a national ocean policy and an independent agency to carry the policy out. This agency should not be burdened by crippling legislation or overlapping and conflicting regulations and jurisdictions.

- Take other nations' example and stop the "exploration versus research" mentality. Change the focus of ocean exploration from a 'results-oriented' approach to a more 'complete body of science' approach.

Day Two
Managing Our Marine Areas

In the end, we conserve only what we love. We will love only what we understand. We will understand only what we are taught.

Baba Dioum, Senegalese poet

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2003

Managing Marine Areas: Success Stories

Why It Matters

Over the past several decades, coordinated cohesive efforts to manage marine areas have been undertaken. While marine managed areas may differ in scope and approach, benefits and positive impacts have been documented. For example, marine reserves and no-take areas have been shown to protect habitat, species, and ecosystem interaction; as well as providing spillover, export, insurance, and reference areas. While there is a dramatic need to protect, preserve and sustain the ocean's resources in order to continue the flow of ocean derived goods and services, experience has shown these efforts can be managed in a balanced, sustainable manner.

Panel Overview

From the management of a marine sanctuary amidst oil and gas platforms to responsible commercial fishing practices, panelists shared their experiences and involvement with the management of current marine areas, as well as what will be required for successful management of marine areas in the future. The Honorable Sam Farr (D-CA), Co-Chair, House Oceans Caucus, opened the session.

Moderator: Mr. Daniel Basta, Director, NOAA National Marine Sanctuary Program
Panelists: Dr. Jane Lubchenco, Distinguished Professor of Zoology, Oregon State University
Mr. Paul Holthus, Executive Director, Marine Aquarium Council
Mr. Richard Grathwohl, Charter Fishing/Flats Guide, Florida Keys
Mr. G.P. Schmahl, Manager, Flower Garden Banks National Marine Sanctuary

Challenges

- There is a perceived trade-off between economics and the environment. A sustainable approach, involving tools such as marine reserves, will ensure that both commercial and recreational fishing can continue. However, not everyone is willing to limit 'take' today in order to ensure future viability of fish stocks.

- Technology has all but eliminated de facto marine reserves–areas where it was too far away or too deep or otherwise inaccessible to fishing efforts. Globally, less than one percent of the ocean is set aside in reserves.

- The current overfishing in many populated recreational areas may result in a one fish limit in future years. Some charter boat captains tend to think in terms of the "here and now," rather than of future business development or the environment. Some anglers also worry more about their rights as fishermen/women than environmental conservation.

- The U.S. is the largest importer of marine organisms for aquaria. Ninety-five percent of these are caught from the wild, thus, greatly impacting coral reef habitat.

- Some activities seem incompatible—such as oil and gas production in a marine sanctuary. Over time, partnerships have developed to help deal with such perceived conflicting uses, as is the case with the Flower Garden Banks National Marine Sanctuary.

- Sanctuaries are affected by exogenous factors outside their control, including run-offs and dead zones, which can negate the results of the best marine management practices.

Recommendations

- Create a system of networks of marine reserves that are placed at various distances from one another. Within these reserves, fish are protected allowing them to mature and

reproduce resulting in spill over to non-reserve areas. Networks would benefit both conservation and fisheries.

- Enlist the support of actual working charter captains to share their message with others of how they have seen the reserves work in their area and how it has benefited them in their livelihood of fishing.

- Consult local anglers about the placement of ecologically sound bottom structures such as reef ball systems or fishery attraction devices that can take the place of areas used as reserves.

- Learn from previous success stories. For example, the Florida Keys National Marine Sanctuary ground-truthed the sanctuary's preservation areas with the fishing men and women in its community by listening to their concerns and perspectives and taking action.

- Seek to establish successful working relationships with major industries that may be seen as prohibitive at face value. For example, the Flower Garden Banks National Marine Sanctuary has successfully maintained a healthy coral reef in one of the most active oil and gas exploration and extraction areas in the world.

- Create universal standards of performance and a certification system, like the Marine Aquarium Council Certification Program, for coral reef species within the international marine aquarium trade. These standards would encompass working with the local community to define a collection area; placing orders, quality controls and a systematic approach to village-based fisheries that link to international markets; setting up export/import/retail quality controls through maintaining water quality, packing standards, transport standards, etc.

Habitat Restoration: Community-Based Efforts

Why It Matters

Healthy coastal habitat is critical to the survival of both land- and ocean-based creatures. Development, erosion and other factors have resulted in significant loss of habitat–up to 85 to 90 percent in some of the nation's most important estuaries. One solution is community-based restoration programs that are designed to create partnerships with local constituencies to accomplish meaningful, small-scale restoration projects. They foster significant community support and they depend upon citizen's hands-on involvement to implement restoration. These efforts help to leverage technical expertise and funding, as well as instilling stewardship and a conservation ethic in restoration participants.

Panel Overview

From recreational fishermen to corporate America, a strong commitment to restoring vital marine and coastal areas exists around the country. Panelists discussed the challenges their efforts face, and made recommendations for future restoration projects. The Honorable Wayne Gilchrest (R-MD), Chair, House Resources Subcommittee on Fisheries, Conservation, Wildlife and Oceans, opened the session.

Moderator: Mr. Tom Kelsch, Eastern Regional Director, National Fish and Wildlife Foundation

Panelists: Mr. Chris Doley, Director, NOAA Restoration Center, NOAA Fisheries
Mr. Forbes Darby, Director, Special Projects, American Sportfishing Association
Ms. Sally Yozell, Vice President, Battelle Memorial Institute
Mr. Mark Wolf-Armstrong, President, Restore America's Estuaries

Challenges

- More than 110 million people live in coastal communities, which comprise only seventeen percent of the total land mass, putting immense pressure on coastal habitats. There is a need for better understanding of the effects of population growth on the coast, including better models.
- Better coordination is necessary at the federal, state and local level to develop restoration priorities and to leverage each other's capabilities.
- Federal programs designed to address coastal zone issues and aid local and regional efforts are facing deep budget cuts.
- The Estuary Restoration Act mandates that one million acres be restored by 2010. It calls for a $275 million authorization; however, only $1 million has been appropriated.
- While the federal government funds programs for habitat restoration and conservation, these programs require a local match that is difficult for the local NGO or government to meet. The end result is that Federal dollars appropriated for restoration activities go unspent and communities forego important habitat restoration opportunities.
- Current monitoring does not give the necessary feedback required to improve efforts. Therefore, better restoration monitoring protocols need to be developed.
- Real-time data to address corrective actions and aid in locating potential restoration projects is not available. These data would provide better understanding of the functions and values of habitat and the effectiveness of activities within those habitats.
- Historically, people have focused on commercial extraction from the ocean first, and

conservation second. There is a need to look at our societal values and matching that with the needs of nature.

- A lack of knowledge and understanding of the real vs. perceived problems related to habitat loss are among the most significant challenges. There needs to be more active citizen involvement because people experienced with the water are more informed advocates for habitat.

- While more and more habitat restoration projects are underway, user conflicts are starting to emerge. This is due to the fact that industry may lose certain business activities due to restoration and conservation efforts.

- There is a tremendous amount of scientific research being done in habitats, however, this science is not being communicated well enough for practical application purposes.

Recommendations

- Obtain more funding from the government to create new habitat programs, and sustain and augment the programs already in place.

- Develop a strategy to restore coastal and estuarine habitat, not at the national level, but at the level where the work will be carried out–on a regional basis with the scientific community, practitioners, and community leaders.

- Engage volunteers in habitat restoration efforts; participants see the fruits of their labor and it shows them that they can make a difference by participating in restoration.

- Engage unconventional groups to take part in restoration work. For example, anglers. Anglers are among our greatest conservationists, not only because they know about the habitat and they have vested interest in long-term health of the resource, but also because they back up that conservation ethic with an unprecedented financial commitment. They realize that without habitat, there are no fish, and without fish there is no sport-fishing industry.

- Develop corporate partnerships, like the Corporate Wetlands Restoration Partnership, to work with the federal government and local communities to get important dollars spent in the name of habitat restoration. Use these corporate partnerships as a tool to coordinate with federal, state and local governments to get needed funding.

- Find creative solutions to the big picture of habitat restoration. An example is the California Rigs to Reef Initiative, which is an effort that sees the opportunity to save habitat that has grown on oil rigs by leaving abandoned oil rigs in the ocean.

Enjoying Marine Areas: Public Interaction

Why It Matters

In addition to providing valuable resources, the ocean is also a playground: a place to swim, surf, sail, snorkel, dive and fish. Beaches are among the most popular vacation destinations, and seaside communities derive much of their income from marine-oriented tourism. However, with recreation comes responsibility—to preserve and protect the precious resources of the sea: the kelp forests, coral reefs, sea grass beds, and open ocean. Recreational and other user activities have begun to take their toll on these environments. Now is the time to turn the tide and foster a new awareness of the fragility of these ecosystems and the actions needed to ensure they can be enjoyed by future generations.

Panel Overview

From divers to boaters, from cruise passengers to shore-side strollers, millions of people enjoy our nation's marine and coastal waters each year. Panelists discussed their efforts to ensure that people interact with marine areas in an environmentally responsible manner.

Moderator: Ms. Lori Arguelles, Executive Director, National Marine Sanctuary Foundation
Panelists: Mr. Ed Larenas, Chairman, San Mateo Chapter of Surfrider Foundation
Dr. Alex F. Brylske, Marine Conservation & Education Specialist, PADI Project Aware Foundation
Mr. Cliff McCreedy, Marine Management Specialist, National Park Service
Mr. Daniel Basta, Director, National Marine Sanctuary Program

Challenges

- Unlike national parks on land, marine managed areas have wide-spread access, making the management of public user activities much more difficult. As a result, dissemination of information, including how to avoid sensitive areas, is difficult.

- There is a lack of stewardship for ocean resources that are not really seen or not perceived as important. And, even if people know, the case has not been made for why they should care. In addition, the "what's in it for me" mentality has not been adequately addressed. There is no public will to ensure that recreational activities do not hurt the environment.

- Communities do not always consider beach access as part of land use planning efforts. The involvement of developers, farmers and ranchers in the development of watershed management plans rarely occurs.

- At the local government levels, the posting of water quality in public access areas of the beach come days after water testing is completed. This greatly delays getting the word to the public about when water quality is bad; thus, people are swimming in dirty water without realizing it.

- There are very few databases that track water quality in the rivers, streams and creeks that feed into the ocean.

Recommendations

- Establish some marine protected areas that are truly no-take zones to ensure that some parts of the ocean are truly wilderness areas.

- Establish a 'carrying capacity' for marine managed areas, and work with concession owners to disperse activities to other areas.

- Require concessionaires and their staff to participate in mandatory interpretive and resource protection training.

- Find other portals to the public for educational outreach. Work with the media, get on the Web, get on radio and television. Go to private marinas with education programs. Make the education target all 300-million Americans.

- Promote and expand partnerships between resource managers, the marine science education community and the diving community.

- Partner with industry to better distribute existing environmental educational programs to a broader constituency.

- Establish programs where citizens monitor the local environment and get information into a local database. These programs could encourage beach clean ups and other activities that teach people how to take care of their environment and foster good stewardship.

- Build public will by continuing the National Marine Sanctuary Program's efforts to make the public an integral part of the management of sanctuary sites–bring them effectively into the process, sharing information and knowledge, and helping to create those specific actions and management activities that leadership will undertake. By connecting and building a larger support base and understanding and sharing of experiences, the public will begin to "own" sanctuaries.

Managing Invasive Species: Underwater Aliens

Why It Matters

Underwater aliens or invasive species are classified as self-sustaining populations of species that establish themselves in environments beyond their historical range. When introduced into these new environments, invasives can often seriously disrupt the delicate balance of nature within the new ecosystem. Invasives are a major force for global change resulting in significant ecological, economic, and human health impacts. In addition, they are the second leading cause to habitat destruction as they threaten biodiversity and cause extinctions. For the U.S. alone, the economic cost of invasions is estimated at $137 billion a year. The number of invasives transported by human activities has increased enormously in recent years. Some are intentional, such as the transport of marine aquarium species for in-home use, while many invasives are transported unintentionally, such as those contained in ship ballast water.

Panel Overview

From zebra mussels in the Great Lakes to lionfish off the coast of Florida, non-native species are being introduced in marine and freshwater environments at an alarming rate with major impacts to these habitats. Panelists discussed current and future efforts to identify and manage these underwater aliens. The Honorable Bart Stupak (D-MI), U.S. House of Representatives, opened the session.

Moderator: Dr. Robert R. Stickney, Director, Texas Sea Grant
Panelists: Dr. Anson H. Hines, Assistant Director, Smithsonian Environmental Research Center
Dr. Gary Matlock, Director, NOAA National Centers for Coastal Ocean Science
Ms. Erika Feller, Senior Policy Advisor, The Nature Conservancy

Challenges

- Resources and capacity to support early detection, rapid response, control and management, research and building public awareness are lacking.
- The technology to detect invasive species and respond in an appropriate manner is limited.
- There is a lack of data to characterize patterns adequately and to test relative effects of particular species traits and the characteristics of invasion patterns. Existing data are not available presently to managers, scientists and the public.
- Increased international ship traffic is largely responsible for the increase in Invasives. This is due to millions of metric tons of ballast water being released into American harbors after trans-oceanic trips.
- A majority of the public does not understand that they can carry organisms from one activity to the other – thus introducing a new species to a new place.

Recommendations:

- Establish new funding and support for invasive species management, research, and coordination at the federal, state and local levels.
- Expand the National Invasive Species Act, which includes rapid response and early detection strategies, as well as funding for these activities through the states and coordination through public agencies.
- Authorize a National Invasive Species Council to encourage interagency coordination.

Each agency needs to know what everyone else is doing and combine their efforts to leverage resources.

- Form a national network of surveys and monitoring for invasive species to measure contemporary patterns and effects of non-indigenous species along the coast.

- Develop an early alert system using existing monitoring systems. Make it available in electronic form using Web-based technology to generate an automatic alert from new data compared to the already existing presence of species in a particular geographic area. This gives coastal managers the earliest possible knowledge that an event has occurred and allows them to use the Web to get information on what they might be able to do, helping them to make decisions on how to respond.

- Assess vectors and minimize transfer mechanisms, like mid-ocean exchanges of ballast water.

- Regulate activities of people and interests that occur within the ecosystems that these species show up in–including educating the public about what they can do to prevent the spread of an invasive species that they may encounter.

- Use current research to figure out what's going to be invasive, where it's coming from and prepare local communities and local grassroots stewards of these resources to detect and respond to invasives.

Speaker Biographies

Lori Arguelles, Executive Director, National Marine Sanctuary Foundation
A long-time supporter of the National Marine Sanctuary System, Ms. Arguelles first worked with the system in her capacity as Director of Public Affairs for the National Oceanic and Atmospheric Administration from 1994-1999. Prior to working with the National Marine Sanctuary Foundation, she served as Director of Communications for Girl Scouts of the USA. Starting her professional career as a radio reporter, Arguelles has worked for several local and regional outlets, as well as the NBC/Mutual radio network in Washington, DC. Arguelles has also worked on Capitol Hill as a press secretary for two members of Congress. She earned her undergraduate degree in broadcast journalism and political science from Northern Arizona University and her master's degree in public communication from American University.

Daniel Basta, Director, Office of National Marine Sanctuaries, NOAA Ocean Service
Mr. Basta leads the federal program whose mission is to protect and conserve the unique ecological and cultural marine resources contained in the sanctuary system. He joined the National Ocean Service in 1979, and has applied his training as an environmental engineer to a variety of disciplines including, land use planning, living marine resource assessment, and resource economics. Previously, Basta held positions at Resources for the Future, the Environmental Studies Board of the National Academy of Sciences, and John Hopkins University. He is co-author of more than 50 publications, including textbooks on modeling, atlases of U.S. coastal and ocean regions, as well as reports, books and articles on environmental problems at the national, regional and local levels. Basta holds a bachelor's of science degree in industrial engineering from Hofstra University and a master's of science degree in engineering and policy sciences from the State University of New York at Stony Brook.

William J. Brennan, Deputy Assistant Secretary, International Affairs, NOAA
In April 2002, President Bush appointed Dr. Brennan as the deputy assistant secretary of Commerce for international affairs within NOAA. He began his professional career in 1977 with NOAA Fisheries at the National Marine Fisheries Service laboratory in Sandy Hook, N.J., and later at the NMFS laboratory in Woods Hole. Brennan served in a senior staff position with the U.S. House of Representatives working primarily on issues before the Merchant Marine and Fisheries Committee. In 1987, he was appointed by newly elected Governor John R. McKernan, Jr. to serve in his cabinet as commissioner of the Maine Department of Marine Resources. Upon leaving his state government position, Brennan opened a private consulting firm in Portland, Maine, providing policy guidance to businesses and governments in the marine and environmental policy field. Brennan holds a bachelor's of science degree in marine biology from the University of Maine, a master's of arts degree in marine affairs from the University of Rhode Island, and a Ph.D. in ecology and environmental sciences from the University of Maine.

Alex F. Brylske, Marine Conservation and Education Specialist, PADI Project AWARE Foundation
Dr. Brylske's background includes 25 years experience developing diving and marine environmental education programs. He was a 2001 recipient of the Walter B. Jones Memorial Excellence Award for Coastal and Ocean Resource Management, a Board Member of the Coral Reef Alliance (CORAL) and former member of the Florida Governor's Ocean Committee. He's also an adjunct professor of marine science at Florida Gulf Coast University and Edison College. Brylske has served for over 12 years as the Senior Editor of scuba diving's oldest monthly publication— *Dive Training* magazine. Brylske holds a Ph.D. in marine science education from the Florida Institute of Technology. He is a widely published author whose interests include sustainable marine tourism and recreation ecology.

Guy Carter, Assistant Vice President, Chemical Technologies, Wyeth Research
Dr. Carter has responsibility for several diverse functions in drug discovery at Wyeth. In addition to heading the Natural Products Discovery operation, he is responsible for analytical chemistry support functions at all four Wyeth Research sites (Pearl River, NY; Princeton, NJ; Cambridge, MA; Collegeville, PA), as well as the Chemical Sciences Interface Department. Carter's experience in drug discovery began in 1981 when he joined the former American Cyanamid (Lederle Laboratories) organization as a natural product chemist. In a joint program with the Cyanamid Agricultural Division, he discovered the lead compounds nemadectin and dioxapyrrolomycin, which led to the commercial products Cydectin® (antiparasitic) and Pirate® (insecticide), respectively. In the course of his discovery efforts, Carter has been named as an inventor on 17 issued U.S. Patents and as an author on more than 60 publications. Carter has been Department Head of Natural Products Chemistry since 1994, and has held positions of increasing responsibility following the merger with Wyeth-Ayerst in 1995 until the today.

Jeff Cockburn, **Vice-President, Penobscot Bay and River Pilots Association** Captain Cockburn has a privately held company that provides commercial ship piloting service to customers in Penobscot Bay, Maine. On any given day, Captain Cockburn guides oil tankers carrying more than 10 million gallons of black oil through the bay – one of the most productive lobster fisheries in the world. Cockburn is also on the board of directors of the Gulf of Maine Ocean Observing System (GoMOOS) where he holds the title of treasurer. The captain uses GoMOOS on a daily basis to do his job.

Walter Cruikshank, Deputy Director, Minerals Management Service
Dr. Cruikshank is Deputy Director of the Minerals Management Service. Cruickshank previously served as Associate Director for Policy and Management Improvement for MMS since 1997. As Deputy Director, Cruickshank assists the MMS Director in the administration of programs that ensure the effective management of mineral resources located on the nation's outer continental shelf — including the environmentally safe exploration, development, and production of oil and natural gas — and the collection and distribution of revenues for minerals developed on federal and Indian lands. Cruickshank received a bachelor's of arts in Geological Sciences from Cornell University and a doctorate in Mineral Economics from The Pennsylvania State University.

Forbes Darby, Director, Special Projects, American Sportfishing Association
Mr. Darby is Special Projects Director for the American Sportfishing Association, the leading trade association of the recreational fishing industry. He manages a variety of tasks, including the Association's Freedom To Fish campaign, angler data and statistics program, and the industry's annual Sportfishing Summit of industry leaders and conservation partners. Prior to joining the Association in 1999, Darby worked for Delaware Sea Grant extension where he helped initiate a nationwide public opinion survey on Pfiesteria and other harmful algal blooms. He earned an undergraduate degree in zoology from Connecticut College and master's degree in marine policy from the University of Delaware where he was a recipient of a National Estuarine Research Reserve grant for his research on aquatic nuisance species.

Chris Doley, Director, NOAA Restoration Center
Mr. Doley serves as the Division Chief for the NOAA Restoration Center, within NOAA Fisheries' Office of Habitat Conservation. He has been with the Restoration Center since it was founded in 1990 in response to federal restoration needs identified as a result of the Exxon Valdez oil spill in Alaska in 1989. Doley has been instrumental in leading the NOAA Community-Based Restoration Program during a transition when the program's budget grew from less than $500,000 in 1999 to $10 million in 2003. Under his direction, the Program has become a multi-million dollar, highly visible, effective national program that maximizes

benefits to fisheries resources by leveraging federal seed money and technical expertise. Doley has lead the establishment of groundbreaking partnerships with groups, including the American Sportsfishing Association, the Gulf of Maine Council, National Fisheries Institute, Restore America's Estuaries, Trout Unlimited, American Rivers, The Nature Conservancy, National Fish and Wildlife Foundation and others.

Dennis J. Duffy, Vice President, Regulatory Affairs, Energy Management, Inc.
In his current capacity, Mr. Duffy is part of the team developing the Cape Wind Associates Project. Duffy is a graduate of Columbia Law School, where he was editor of the Columbia Journal of Environmental Law. He was formerly a partner in the law firm of Partridge, Snow & Hahn and served as Chairman of the firm's Public Utilities Practice Group. He has represented a wide range of entities in the energy industry, including electric, gas and water utilities, as well as the independent developers of unregulated energy facilities. Duffy is the treasurer of the Competitive Power Coalition of New England, the region's leading electric generation trade organization. He is also a voting member of the Participants Committee and Markets Committee of the New England Power Pool. He is a member of the Massachusetts, Rhode Island and Federal Energy Bar Associations.

Erika Feller, Senior Policy Advisor, The Nature Conservancy
Ms. Feller is the Senior Policy Advisor for The Nature Conservancy and is the lead for the Conservancy for the National Aquatic Invasive Species Act. Prior to joining the Conservancy she was Senior Legislative Assistant for Environment for Congressman Wayne Gilchrest where she worked on a wide range of coastal and marine issues. She received a M.S. in Natural Resource Economics from the University of Alaska Fairbanks and a B.A. from Saint Mary's College of Maryland. The Nature Conservancy is a 501(c)(3) organization with the mission of protecting the diversity of life on earth by protecting the lands and waters they need to survive.

Madilyn Fletcher, Director, Baruch Institute, University of South Carolina
In her role as Baruch Institute Director, Dr. Fletcher has a strong interest in regional partnering and the development of initiatives that coordinate strong science with real-world applications and needs. Fletcher is Principal Investigator for the Carolinas Coastal Ocean Observing System (Caro-COOPS), a new initiative with partners North Carolina State University and the University of North Carolina-Wilmington. Caro-COOPS is currently being implemented and will comprise a mooring array off of the Carolinas' coast, which is designed to integrate real-time monitoring of hydrologic and meteorological conditions with state-of-the-art computer models to characterize and predict complex coupled air-land-sea processes. The USC portion of this collaborative project is focused on information management and integration. She is also PI for Cast-Net, a multi-institutional program focused on development of tools to facilitate documentation, integration, and sharing of data from laboratories in the Southern Association of Marine Laboratories (SAML).

Tom Fry, President, National Ocean Industries Association
Mr. Fry has served as president of the National Ocean Industries Association since December 1, 2000. Prior to joining NOIA, Fry served as the Director of the Department of the Interior's Bureau of Lands Management, a position he took in 1998. Fry first joined the Department of Interior as the Director of the Minerals Management Service in July 1993, where he was responsible for regulatory oversight of the exploration, development, and production of oil, gas, and other minerals on the nation's Outer Continental Shelf. A long-time Texas resident, Tom earned a law degree from Southern Methodist University Law School in 1969, and a bachelor's degree from Trinity University in 1966.

Terry Garcia, Executive Vice President, Mission Programs National Geographic Society Mr. Garcia is responsible for the National Geographic Society's core mission programs, including the renowned Committee for Research and Exploration, which has funded the work of such notables as Admiral Robert E. Peary, Sir Edmund Hillary, Jacques-Yves Cousteau,

and Jane Goodall; the Geographic Education Outreach Program and the $100 million Education Foundation. Prior to joining the Society in 1999, Garcia was the Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy Administrator of the National Oceanic and Atmospheric Administration (NOAA). In his role, he directed and coordinated U.S. coastal, ocean and atmospheric programs. From 1994 to 1996, he was NOAA's general counsel. Prior to entering government service, Garcia was a Partner in the law firm of Manatt, Phelps & Phillips in Los Angeles. Garcia received his bachelor's degree in international relations at the American University, and his law degree (with honors) from the George Washington University.

Richard Gathwohl, Charter Fishing/Flats Guide
A licensed fishing captain for 32 years, Mr. Grathwohl has extensive personal experience with the creation of the Florida Keys National Marine Sanctuary. A long-time resident of Marathon, in the Florida Keys, Grathwohl is a third-generation fishing captain. He sits on the Sanctuary Advisory Council of The Florida Keys National Marine Sanctuary representing charter and flats guides throughout the Florida Keys area. Grathwohl serves as treasurer of the Marathon Guides Association and also holds the office of Conservation Chairman.

Anson 'Tuck' Hines, Assistant Director, Smithsonian Environmental Research Center
Dr. Hines is the Assistant Director and Marine Ecologist at the Smithsonian Environmental Research Center (SERC), located on Chesapeake Bay, where he has conducted research for 24 years. His responsibilities at the SERC include oversight of research and professional training programs in global change, landscape ecology, ecosystems in coastal regions, and population & community ecology. Hines has a B.A. in Zoology from Pomona College and a Ph.D. in Zoology from the University of California at Berkeley. He has conducted research on coastal ecosystems in Chesapeake Bay, Florida, California, Alaska, Belize, Japan, and New Zealand. Hines serves as Chair of the Smithsonian Diving Control Board, which oversees the safety of the nation's largest scientific diving program. He is also Adjunct Professor at the University of Maryland, North Carolina State University, Virginia Institute of Marine Science, and University of Maryland's Center of Marine Biotechnology.

Paul Holthus, Executive Director, Marine Aquarium Council
As the Executive Director of the recently formed Marine Aquarium Council, Mr. Holthus has the challenge of establishing MAC as an international non-profit whose mission is to conserve marine habitat by creating standards and educating and certifying those engaged in the collection and care of ornamental marine life. The MAC is creating a global multi-stakeholder network involving the marine aquarium industry, environment groups, public aquariums, international organizations and government agencies. Holthus has a wide range of experience in international program and policy development - from global ocean policy work with UN agency directors to site level work with villagers on small islands. He also has extensive project experience in international environmental management planning in over 30 tropical countries/ territories in Asia, Pacific, Central America, and Africa, including conducting field surveys of natural resources, protected areas, and traditional resource use, and preparing resource atlases, management plans, EIA's, and sea level rise impact studies.

David Keeley, Acting Director, Maine State Planning Office
Mr. Keeley has worked in Maine for over 25 years in environmental management, policy development and planning with an emphasis on coastal and estuarine issues. He directed Maine's Coastal Management Program for eight years and served as the Vice-chair and Chairman of the Coastal States Organization in the early 1990's. He devised and is implementing a technology research and development strategy that has produced over $30 million in new investments. In 1989, Keeley was instrumental in forming the international Gulf of Maine Program, a state-provincial environment and economy initiative, and he continues as an active state representative. In 2002, he received EPA's Environmental Merit Award, and, in 2003, he received NOAA's Coastal Steward of the Year Award for his accomplishments and

dedication to ocean and coastal management. Currently, he serves as the Acting Director of the State Planning Office.

Tom Kelsch, Director, Eastern Region and Conservation Education, National Fish and Wildlife Foundation
Tom Kelsch joined the Foundation in 1998 as the Director of Conservation Education and also currently serves as Director of the Foundation's Eastern Region. Previously, Mr. Kelsch worked for eight years as an environmental scientist with the U.S. Environmental Protection Agency's Office of Wetlands, Oceans and Watersheds in Washington, D.C. Since 1995, he served as Chief of the Wetlands Regulatory Policy Section. He also has extensive experience as an environmental planner for a private consulting firm. Kelsch earned a master's degree in Environmental Studies from Yale University and holds a bachelor's degree in Landscape Architecture from Michigan State University.

Art A. Kleiner, Chief Hydrographer and Government Program Manager, C&C Technologies, Inc.
Mr. Kleiner is the Chief Hydrographer and Government Program Manager at C&C Technologies. He is a Member of the Board of Directors of The Hydrographic Society of America (THOSA), President of the Gulf Coast Chapter of the Hydrographic Society of America, and Trustee for the International Hydrographic Society. Art has over twenty-five years of experience in ocean mapping for both the private and public sectors. He holds a B.S. in Business Administration and is a member of The Marine Technology Society, Society of American Military Engineers, and the American Geophysical Union.

Ed Larenas, Chairman, San Mateo Country Chapter, Surfrider Foundation
In addition to his work with the Surfrider Foundation, Mr. Larenas is also a Scientist/Task Leader for Genencor International. He is responsible for the Protein Engineering and Characterization Group that is working on reducing the cost of converting cellulosic biomass to fuel ethanol. This project is being funded by the U.S. Department of Energy's National Renewable Energy Laborites. He earned two bachelor's of science degrees in 1978 from Humboldt State University, one for Oceanography and the other in Chemistry. As Chair of his chapter for Surfrider Foundation, Larenas has worked with local governments and land owners to clean area creeks, established a water quality testing lab known as the Blue Water Task Force, and created a Board of Directors consisting of scientists and engineers for the California Coastal Conservancy.

Jane Lubchenco, Distinguished Professor of Zoology, Oregon State University
Dr. Lubcehnco is an environmental scientist and marine ecologist who is actively engaged in teaching, research, synthesis and communication of scientific knowledge. She grew up in Colorado, received her PhD. and taught at Harvard University, then 25 years ago moved to Oregon State University where she is Valley Professor of Marine Biology and Distinguished Professor of Zoology. Her research interests include biodiversity, climate change, sustainability science and the state of the oceans. She has received numerous awards including a MacArthur Fellowship, a Pew Fellowship, seven honorary degrees (including one from Princeton University) and the 2002 Heinz Award in the Environment.

Gary Matlock, Director, National Centers for Coastal Ocean Science, NOS/NOAA
Dr. Gary C. Matlock is the Director of the National Centers for Coastal Ocean Science in the National Ocean Service(NOS). He has served in that capacity since April 2000 and is helping guide the Centers to become the primary source of scientific information within NOS. Prior to arriving at NOS, he was the Director of the Office of Sustainable Fisheries in the National Ocean and Atmospheric Research (NOAA), National Marine Fisheries (NMFS) since its creation in 1996. Matlock began his federal career with NMFS in 1992 as the Director of Field Operations in the Southwest Region where he became the Acting Regional Director after 3 months with the agency. Prior to joining NMFS, Matlock spent his fisheries career with the Texas Parks and

Wildlife Department (TPWD). During his tenure with TPWD, he earned his Ph.D. in Wildlife and Fisheries Sciences at Texas A&M University and conducted and published the results of research in the scientific literature on many fisheries management and aquaculture topics, including those involved with biology, sociology, and economics.

Cliff McCreedy, Marine Management Specialist, National Park Service
Mr. McCreedy has devoted his career to conservation and environmental protection in a variety of positions in the executive branch, Congress, and nonprofit sector. As Marine Management Specialist for the National Park Service, he develops resource protection programs for 67 coastal Parks with over 3 million acres in marine area. He serves on the Steering Committee for the U.S. Coral Reef Task Force and coordinates marine protected area management and coastal watershed programs at the national level. Prior to joining the Park Service, McCreedy was the chief executive and spokesperson for Oceanwatch, a private, nonprofit organization. He also managed legislative programs at the U.S. Environmental Protection Agency concerning water quality, toxics and enforcement. McCreedy has created successful joint programs and cooperative partnerships, including Protect the Living Reef, a ground breaking training and education program under worldwide distribution by the dive tourism industry.

Craig McLean, Director, NOAA Office of Ocean Exploration
Captain McLean leads NOAA's Office of Ocean Exploration, which was created in 2001 to facilitate a new era of exploration of the sea. McLean is an active duty officer in NOAA's Commissioned Corp, with 21 years of agency service, including working on hydrographic survey, oceanographic and fisheries research ships. McLean studied law and is presently a member of the American Bar Association and the Pennsylvania Bar. He has practiced marine resource and admiralty law for NOAA, and has been assigned to NOAA's Offices of General Counsel for Enforcement and Litigation, Legislation, Fisheries, and represented the National Marine Sanctuaries Program. He has also held the position of Legal Advisor to the Director of the NOAA Corps, Special Assistant and Counsel to the Director of the National Marine Fisheries Service, and Deputy Director of the National Marine Sanctuary Program. In 2001 he became a Fellow with The Explorers Club.

John Norton Moore, Director, Center for Oceans Law and Policy, University of Virginia
Mr. Moore is an internationally recognized expert on ocean issues, and in addition to directing the Center for Oceans Law and Policy is the Walter L. Brown Professor of Law at the University of Virginia School of Law. He has published numerous articles on oceans policy and has overseen completion of a six-volume series entitled *United Nations Convention on the Law of the Sea 1982: A Commentary.* He has served as Chairman of the National Security Council Interagency Task Force on the Law of the Sea, and has served as Ambassador and Deputy Special Representative of the President to the Law of the Sea Conference (1973-76) and as a Member of the National Advisory Committee on Oceans and Atmosphere (1984-85).

Ronald Keith O'Dor, Senior Scientist, Census of Marine Life Senior, CORE
Dr. O'Dor is on leave from Dalhousie University, Canada, where he had served as Director of the Aquatron Laboratory and Chair of Biology. His education includes a UC Berkeley biochemistry B.A., a University of British Columbia medical physiology Ph.D. and Post-Doctoral Fellowships in marine biology at Cambridge University and Stazione Zoologica, Naples. He uses telemetry to study cephalopod behavior, bioenergetics and physiology in nature around the world and was a Principal Investigator for the Aquatic Research Facility on Shuttle Mission 77. He has edited volumes on cephalopod biology, from physiology to fisheries, and published over 150 articles with 40 research students. He has served as President of the Cephalopod Int'l. Advisory Council, an FAO consultant and a convener for ICES, PICES and Expo '98.

Kenneth Olden, Director, National Institute of Environmental Health Sciences
A cellular biologist and biochemist by training, Dr. Olden was named as the third Director of NIEHS and the second director of the National Toxicology Program (NTP) in 1991. He has also served as director of the Howard University Cancer Center and professor and chairman of the Department of Oncology at Howard University Medical School (1985-1991), Washington, D.C., before coming to NIEHS. He joined Howard in 1979 as Associate Director for Research after a stint at the National Institutes of Health, first as a senior staff fellow, second as an expert, then a research biologist in the Division of Cancer Biology and Diagnosis, National Cancer Institute.

Shirley Pomponi, Vice President and Director of Research, Harbor Branch Oceanographic Institute
Dr. Pomponi is Vice President and Director of Research at HARBOR BRANCH Oceanographic Institution, a private research institution in Fort Pierce, Florida. Her research interests are the discovery of marine-derived compounds with therapeutic potential and the development of methods for sustainable use of marine resources for drug discovery and development. She has led numerous research expeditions worldwide. Pomponi received her Ph.D. in Biological Oceanography from the University of Miami, and has authored or co-authored more than 70 publications in marine biotechnology, biodiversity, cell and molecular biology, systematics and natural products chemistry. She is an adjunct faculty member at Florida Atlantic University and the Florida Institute of Technology. She served on the President's Ocean Exploration Panel, and was a member of the National Academies of Science, National Research Council's (NRC) Committees on the Ocean's Role in Human Health, and on Marine Biotechnology. She currently serves on the NRC's Committees on Exploration of the Seas and on Future Needs in Deep Submergence Science. She is a member of the NRC Ocean Studies Board and is on the Science Advisory Panel to the U.S. Commission on Ocean Policy.

Frank R. Rack, Director, DOE Programs, Joint Oceanographic Institutions
Dr. Rack is a senior program manager for scientific ocean drilling and science support programs at Joint Oceanographic Institutions (JOI), a non-profit corporation located in Washington, DC that is a consortium of U.S. academic institutions. Rack directs and manages a technology development and research program to characterize naturally-occurring marine methane hydrates through a cooperative agreement with the U.S. Department of Energy's National Energy Technology Laboratory (DOE/NETL). Rack served as the shipboard Staff Scientist onboard the D/V *JOIDES Resolution* during Ocean Drilling Program Leg 204 - a highly successful expedition to characterize and study methane hydrates offshore Oregon on Hydrate Ridge from July through September 2002. Rack earned a B.S. from the University of Rhode Island, a Ph.D. in geological oceanography from Texas A&M University, and conducted geological and paleoceanographic research for the Ocean Mapping Group of the Department of Geodesy and Geomatics Engineering at the University of New Brunswick, Canada before coming to JOI in 1998.

Paul Sandifer, Senior Scientist, National Center for Coastal Ocean Studies, NOS/NOAA
Dr. Sandifer received a B.S. in biology from the College of Charleston (Charleston, SC) in 1968 and a Ph.D. in Marine Science from the University of Virginia in 1972. After completing a 31-year career with the South Carolina Department of Natural Resources, including nearly six years as agency director, he has just embarked upon a new career as Senior Scientist for NOAA's National Centers for Coastal Ocean Science (NCCOS). In his new position, Sandifer is the principal researcher and scientific advisor to the Director of NCCOS on coastal issues. Sandifer is an Honorary Life Member of the World Aquaculture Society; a Fellow of the American Association for the Advancement of Science; and a recipient of the Order of the Palmetto, South Carolina's highest civilian honor. In July of 2001, he was appointed by President George W. Bush to the 16-member US Commission on Ocean Policy which is

charged to develop a coordinated and comprehensive national ocean policy that addresses a broad suite of ocean issues. He is also author or co-author of over 120 scientific and technical publications in aquaculture, coastal ecology, and marine biology, and holds faculty appointments at the College of Charleston and the Medical University of SC.

George P. Schmahl, Manager, Flower Garden Banks National Marine Sanctuary

Mr. Schmahl has been the manager of the Flower Garden Banks National Marine Sanctuary since March 1999. Prior to that he served for eight years as the Lower Keys Regional Manager of the Florida Keys National Marine Sanctuary in Key West, Florida. As Sanctuary manager, he is involved with a broad array of Marine Protected Area management issues including research, education and resource protection. After obtaining a graduate degree in Zoology from the University of Georgia, Schmahl has held a variety of positions relating to marine research, coastal management, resource planning and environmental regulation. His primary interest is the ecology and management of coral reefs and associated ecosystems, and he has specific interest and expertise in the biology and ecology of marine sponges.

Richard Spinrad, Assistant Administrator, NOAA National Ocean Service

Dr. Spinrad was recently named as Assistant Administrator for NOAA's National Ocean Service, and oversees a diverse portfolio including nautical charting, marine sanctuaries, and coastal zone management activities. Prior to his appointment to NOAA, Spinrad served as technical director to the Oceanographer of the Navy, advising the U.S. Navy on operational oceanographic research and operations. Spinrad first joined the Office of Naval Research (ONR) in 1987 and held a variety of posts including director of ONR's Ocean Biology, Optics and Chemistry Division, and Director of the Ocean, Atmosphere and Space Modeling and Prediction Division. Spinrad also served as the first director of the National Oceanographic Partnership Program Office before becoming CORE's executive director of Research and Education. A native of New York City, Spinrad holds both doctoral and masters' degrees in oceanography from Oregon State University and is a 1975 undergraduate of John Hopkins University where he majored in earth and planetary sciences.

Robert Stickney, Director, Texas Sea Grant College Program

Dr. Stickney is the Director of the Sea Grant Program and a Professor of Oceanography at Texas A&M University, and he also serves as President of the Sea Grant Association. He has been an active scientist and educator in the field of aquaculture for over thirty years. Besides his current scholastic duties, he is also a Certified Fisheries Scientist for the American Fisheries Society; a Fellow with the American Institute of Fisheries Research Biologist; Editor of *World Aquaculture* magazine for the World Aquaculture Society; and Editor of *Reviews in Fisheries Science*. Stickney's education began with a B.S. in Zoology from the University of Nebraska, a master's in Zoology from the University of Missouri, and he earned his Ph.D. in Oceanography from Florida State University.

Richard D. West, U.S. Navy (Retired), President, CORE

As President, Rear Admiral West leads and manages the Washington, DC-based association of 71 of the country's leading oceanographic research institutions, universities, laboratories, and aquaria. CORE's mission is to promote, develop, and support efforts to advance knowledge and learning in the science of oceanography and to disseminate such knowledge to the scientific community and to the public. Prior to his position at CORE, Admiral West served as Oceanographer and Navigator of the Navy. Prior to serving as Oceanographer, he was the Deputy Director for the Ballistic Missile Defense Organization. Other shore assignments include Director, Surface Combat Systems Division on the CNO's Staff, Deputy Chief of Staff for Operations CINCSOUTH, and Commander, Operational Test and Evaluation Force. Admiral West graduated from the University of Rochester, receiving his commission through the ROTC program. He holds Master's degrees in management and national security.

Mark Wolf-Armstrong, President, Restore America's Estuaries
Mr. Wolf-Armstrong is President of Restore America's Estuaries, a national coalition of conservation groups organized to restore coastal habitat. Wolf-Armstrong has 25 years experience in executive-level positions in public service, including 12 years in the field of conservation. His professional experience spans government, private business and nonprofit organizations. He has held posts as Executive Vice President, Rails-to-Trails Conservancy; Founder and President, Ohio Fund for the Environment; Director of Development, International Center for Preservation of Wild Animals; and Executive Director, The Nature Conservancy of Ohio. He has also served as a member of the Board of Earth Share.

Sally Yozell, Vice President, Battelle Memorial Institute
Ms. Yozell is principal policy advisor and manager on matters concerning marine fisheries, environmental research and coastal ecosystem conservation and restoration. She has an extensive background in environmental policy, legislation and government relations. She is the program manager for issues related to the Florida Everglades Restoration Program where she is working closely with the Army Corps of Engineers and the State of Florida to provide the necessary science to make informed decisions on the restoration. She is also a program manager advising the National Oceanic and Atmospheric Administration (NOAA) on projects designed to help improve the ecosystem health of the marine and coastal environment. Before coming to Battelle, Yozell was the Deputy Assistant Secretary at NOAA where she helped develop and implement a variety of natural resource policies to conserve threatened and endangered species, as well as restore and protect coastal and marine habitats and ecosystems. She is currently a national board member of the Corporate Wetlands Restoration Partnership; Long Live the Kings (a NW salmon conservation group); the Massachusetts Aquatic Invasive Species Task Force and Vice Chair of the Stellwagen Bank National Marine Sanctuary Advisory Committee.