

THE STATE OF THE OCEANS 2006

HEARING

BEFORE THE

SUBCOMMITTEE ON NATIONAL OCEAN POLICY
STUDY

OF THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

—————
AUGUST 3, 2006
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Printed for the use of the Committee on Commerce, Science, and Transportation



U.S. GOVERNMENT PRINTING OFFICE

68-021 PDF

WASHINGTON : 2011

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ONE HUNDRED NINTH CONGRESS

SECOND SESSION

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THE STATE OF THE OCEANS 2006

THURSDAY, AUGUST 3, 2006

U.S. SENATE,
SUBCOMMITTEE ON NATIONAL OCEAN POLICY STUDY,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10:10 a.m. in room SR-253, Russell Senate Office Building, Hon. John E. Sununu, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF HON. JOHN E. SUNUNU, U.S. SENATOR FROM NEW HAMPSHIRE

Senator SUNUNU. Welcome to this hearing of the National Ocean Policy Study. This hearing on the state of the oceans 2006 will serve as an opportunity to review the progress we've made in terms of ocean policy reform over the past few years and give us a chance to look forward, for the immediate and long-term priorities we should set for further legislation. I will note with regret from the outset, the absence of Admiral James Watkins, who was the Chairman of the U.S. Commission on Ocean Policy. We certainly hoped he could have been with us today but we do wish him a complete and speedy recovery. This Subcommittee has tackled a series of complex issues, including protection of coral reefs, prevention of the introduction of aquatic invasive species, preservation of sensitive coastal land and the promise of aquaculture in the open ocean. We have not yet addressed the way in which we govern our ocean resources or the current state of the Nation's lead ocean agency, the National Oceanic and Atmospheric Administration, known to all of us as NOAA.

Today, I know we're going to hear a lot of important words like ecosystem or coordination that are often presented before committees like this, but it is my hope that we'll go a little bit beyond the jargon to really explore how NOAA can best achieve the many important missions we expect of it. I want to thank Senator Boxer for her continued work as Ranking Member of this Subcommittee. I think we've worked very well in a bipartisan way, on a number of the pieces of legislation that I discussed in my opening remarks. Much of the legislation approved by the Commerce Committee this year does deal with ocean policy and we'll keep pushing to get these important ideas considered, acted on, and passed into law. I want to ask that all the witnesses' submitted testimony and supplemental materials be made part of the hearing record and we will keep the record open for 2 weeks for any additional questions that members of the Commerce Committee might have for today's wit-

nesses. Without objection, I will enter into the record the statement from Congressman Sam Farr and testimony from the National Fisheries Institute as well as supplemental materials that other senators would like to enter into the record.*

Senator SUNUNU. I see that we are joined by Senator Lautenberg and we'll turn to him, at this point, for any opening remarks he might have.

**STATEMENT OF HON. FRANK R. LAUTENBERG,
U.S. SENATOR FROM NEW JERSEY**

Senator LAUTENBERG. Thanks, Mr. Chairman. This is an important subject and I'm glad we're holding this hearing and I thank you for it.

Hello? Oh, you want to hear me?

Anyway, not to be repetitive, I thank the Chairman for holding this hearing. Coming from New Jersey, I've always loved the ocean. It means so much, not just to our economy, but also to the culture of our state. We've got a lot of coastline for a little bit of land and we treasure every drop of water that is in that ocean and the quality of its being. We are proud of our shore. It is a place where we go for recreation, for natural beauty, fishing and seafood or just to relax. Tourism is a major industry in New Jersey. We support almost 400,000 jobs. On the Jersey Shore; our appellation is the top attraction for visitors to our state. The same is true for all other members who represent coastal states. We all love our beaches and the coastal environment is critical to each of our state's economies. Unfortunately, while most people love the ocean, they don't always understand that the oceans are under siege. These threats include pollution, overfishing, ongoing threats to marine mammals theme, the impact of global warming and there is, despite the fact that there are some here who don't believe we are in a stage of global warming. I guess they carry a fan.

There is mounting evidence that global warming is increasing the acidity of the oceans, which could have devastating effects on small organisms at the bottom of the food chain and I strongly support efforts to increase the appreciation and the involvement of the Congress in our oceans and the challenges that confront them. I have introduced a plan to expand ocean education programs in our Nation, spear-headed by NOAA and I'd appreciate hearing what our witnesses think about the need for more education about our oceans. The U.S. Commission on Ocean Policy; Pew Oceans Commission; each did excellent work to identify these challenges and I'm pleased that some of their members remain engaged in the public dialogue about our nation's oceans policy through the Joint Ocean Commission Initiative. There are many issues to discuss today and we probably won't get to them all, but one issue that must be discussed is funding. A budget is a blueprint of priorities and I am concerned about the Administration's commitment to protect and restore the oceans. It has proposed Fiscal Year 2007 budget cuts to several important NOAA programs. For example, NOAA's proposed budget includes elimination of funding for ongoing ocean and coastal research, including the LEO-15 project at

*The information referred to has been printed in the appendix.

Rutgers University in New Jersey, which conducts important underwater research in the Oceans and Human Health programs.

So our oceans are facing enough man-made difficulties. We shouldn't compound the problem by refusing to allocate the resources that we must have in order to meet these challenges and I am grateful to the witnesses that we have appearing here and I thank you once again, Mr. Chairman, for calling this hearing.

Senator SUNUNU. Thank you, Senator Lautenberg. I'd like to welcome Senator Boxer, our Ranking Member and invite her to give her opening statement.

**STATEMENT OF HON. BARBARA BOXER,
U.S. SENATOR FROM CALIFORNIA**

Senator BOXER. Thanks very much. First of all, I want to thank you so much. I very much enjoy working with you on this subcommittee and I think we've made some good progress. We agree that oceans are a precious resource. They are a vital source of food, recreation, and commerce for the United States and they hold promise for medical research and potential cures. Ocean diversity exceeds that of any other ecosystem on Earth and I think, clearly, we need to save the oceans. If ever there was a bipartisan issue, it's this and in my state, you see everyone, almost everyone, from every political persuasion, joining together to save the coast. I want to say that the Honorable Leon Panetta was one of the earliest voices on this and when I came to Congress, he was already well at work. We teamed up and seriously got everyone involved and so I would hope, if there were any time that we could prove that we can work together, it is now and it is on the oceans. In my state, the reason that I voted against that drilling bill that we just had, is because I think it opens the door, it incentivizes drilling and I think if you look at the oceans, just the way they are in their natural and beautiful state, they are an enormous economic resource. We won't get into the moral obligation that I believe we have to save the oceans but as an economic resource, nothing comes close to that. Nationally, the figure is \$58 billion annually, one million, six hundred thousand jobs and that doesn't even include jobs and revenue from other oceans sectors, such as fishing and shipping. So we've worked hard on this subcommittee and on the full Committee on invasive species prevention, coral reef protection, coastal and estuary land protection. We have much more to do. I would ask that my full statement be placed in the record and I wanted to close with a couple of charts if I could.

Senator SUNUNU. By all means.

[The prepared statement of Senator Boxer follows:]

PREPARED STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM CALIFORNIA

Mr. Chairman, I want to thank you for holding this important hearing on the state of the oceans. This is a great opportunity to confront head-on the urgent problems our oceans are facing and see what we have accomplished so far.

The oceans are a precious resource—they are a vital source of food, recreation, and commerce for the United States, and hold untold promise for medical research and potential cures.

Ocean diversity exceeds that of any other ecosystem on Earth—that, and the importance they play in coastal state economies, is why we must act to save them.

This is particularly important to me because in California, as Secretary Chrisman can attest to, beautiful beaches are big business—Mr. Chairman, I know you can appreciate that.

In fact, according to 2003 statistics, California's ocean economy from tourism alone is \$11.1 billion annually and accounts for 271,000 jobs in my state.

Nationally, for all coastal states, the figure is \$58.8 billion annually and 1.6 million jobs—again, that does not include jobs and revenue from other ocean sectors such as fishing and shipping.

This subcommittee has helped move bills out of the full Committee on invasive species prevention, coral reef protection, and coastal and estuary land protection. I am proud of what we have accomplished so far, but as you know, there is still much to be done.

Mr. Chairman, I would like to submit for the record an excellent five-part series that is being published over this week in the *LA Times* on the health of the oceans.**

It does a superb job of capturing how we have altered the oceans' ecosystem and how the impacts have direct consequences for our health and the health of our environment.

For example, pollution, overfishing, and warming ocean temperatures have contributed to increased algal blooms, including algae that contain toxins that poison and kill wildlife and fish.

The *LA Times* story also discussed how other toxic algal blooms are making beaches unsafe for children, including a 10 year old Florida boy, who suffers from terrible respiratory problems because of airborne toxic algae—Clearly, the oceans are in trouble.

In June, I was surprised to hear President Bush speak so eloquently about the oceans. On June 15, he said the following:

“The vibrant beauty of the oceans is a blessing to our country and it's a blessing to the world . . . We have a responsibility, a solemn responsibility to be good stewards of the oceans and the creatures who inhabit them.”

Unfortunately, his Administration's policies are not matching these words. Indeed, just this week, the Administration and the Senate supported a bill that will lead to more drilling off the Gulf Coast, and could very well lead to more drilling off all of our states' coasts if it merges with an even worse House-passed drilling bill.

Whatever eloquence the President expressed in June for the oceans was certainly not matched by his budget for the oceans for FY 2007.

In June, he said:

“To fight the destructive effects of abandoned nets and other debris, the ocean action plan directed the Coast Guard and EPA and NOAA and the State Department and the Interior Department to coordinate efforts to improve how the Federal Government tracks, prevents and cleans up maritime waste. And we've got more work to do. And I expect these agencies to be robust in our efforts to prevent this kind of debris from polluting . . .”

Well, that sounds wonderful—however, in the same year he said those words, his budget *zeroed out* funding for NOAA's marine debris program—eliminated its funding!

The President also spoke of our “solemn responsibility to be good stewards of the oceans and the creatures who inhabit them.” Yet, his budget nearly *halved* funding for NOAA's Marine Mammal protection program.

Additionally, despite the promise of pharmaceutical research from the marine ecosystem, the President's budget also eliminated funding for NOAA's Oceans and Human Health program.

This valuable program also researches the causes and effects of harmful algal blooms and seafood contamination, the relationship of climate change on coastal and human health, and other important health issues.

Indeed, NOAA's overall budget was slashed by \$227 million—6 percent from the previous year's enacted figure!

Despite the pollution, despite overfishing, despite all of the warnings of scientists and the Ocean Commission, the Administration cut—*cut*—ocean funding.

Mr. Chairman, our oceans need more than occasional eloquence; we need more than an occasional proclamation. Our oceans are in trouble and we need real action.

** The information referred to is printed in the appendix.

It is time for Congress to establish a strong NOAA in law, so that it can better accomplish its primary missions to conserve and manage the ocean, its ecosystem and resources, and conduct scientific research and educate the public.

We need the Administration and this Congress to meaningfully commit to the oceans.

This is a very distinguished panel and I am very pleased that this hearing has been called. I look forward to the testimony of the witnesses.

Senator BOXER. OK. I want to pick up on where Senator Lautenberg left off and how proud I am that he is on this committee. We're actually on a couple of committees together that deal with the environment and I want to thank him for his continuing leadership. But he talked about what the budget reflects and I was so glad when President Bush spoke eloquently about the oceans. He said these words, "The vibrant beauty of the oceans is a blessing to our country. It is a blessing to the world. We have a responsibility, a solemn responsibility to be good stewards of the ocean and the creatures who inhabit them." And then there is the quote. It is a beautiful quote. It could be said by every one of us, again, regardless of political party but then we want to look at his budget and this is what happens.

Could you hold it up a little higher? The Marine Debris program is eliminated, from \$4.9 million. Oceans and Human Health, eliminated from \$5.2 million. Marine Mammals, cut to \$23 million from \$40.2 million. Marine Aquaculture, cut to \$1.5 million from \$4.5 million. Coastal and estuarine land, eliminated from \$38.9 million. So, Mr. Chairman, in closing, we really do have a job to do. I hope we can restore these cuts working together but we could say all the things we want to say but if we don't really show that we mean it by investing in this resource that is, in many cases, certainly in my state, an economic engine of our economy, an economic engine, then I think it is useless to say these words. We shouldn't be saying these words if we don't really mean what we say. Thank you very much.

Senator SUNUNU. Thank you, Senator Boxer. And we are indeed joined by a panel that I would consider to be the right people to try to answer those questions, talk about priorities, to talk about where whatever resources we do have, whether they are limited or not, should be applied. We are joined by, going right to left, our right to left, Vice Admiral Conrad Lautenbacher, who is the Under Secretary for Oceans and Atmosphere at NOAA, Secretary Mike Chrisman, who is coincidentally enough from California, the Head of the California Resources Agency; Leon Panetta, to whom you referred, who was Co-Chairman of the Joint Ocean Commission Initiative; Mr. Paul Kelly, who was a Commissioner on the U.S. Commissions on Ocean Policy and Professor Michael Orbach of Duke University Marine Laboratory. I think this panel reflects a nice cross-section, both of academics and policymakers and regulators, people who have responsibility for oversight but also people who have clearly shown in their past, a great commitment to protecting, maintaining, preserving, and wise use of our ocean resources. So I welcome you all. We'll begin with Admiral Lautenbacher. Please, if you are able, keep your remarks to 5 minutes and rest assured, any formal statement or additional materials will be included in the final record. Welcome, Admiral.

STATEMENT OF VADM CONRAD C. LAUTENBACHER, JR., U.S. NAVY (RETIRED), UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE; ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), DOC

Admiral LAUTENBACHER. Thank you, Mr. Chairman. Is this on? OK. It looks like it. Can you hear me? OK, great.

Mr. Chairman, Senator Boxer, Senator Lautenberg, distinguished Members of the Committee, thank you very much for the opportunity to testify before you on this very important subject. Before I start, I have to thank you for your support and interest in this area, which is near and dear to my heart and this is an important part of, I think, the public dialogue on the way we should progress with our oceans. I'm also very honored to be testifying with these distinguished gentlemen and colleagues in the ocean community. They have spent a great deal of time and effort to promote the health and well being of our oceans and coasts.

As a Nation, we benefit enormously from marine resources. More than half of the population—141 million people—live within 50 miles of the coast and the number is expected to grow significantly in the coming years. More than 95 percent of U.S. overseas trade comes and goes by our oceans and U.S. consumers spend over \$55 billion a year for seafood and fisheries products. Oceans are home to the majority of the world's living organisms and are a critical component of the Earth's climate system. It is hard to overstate the importance of the oceans yet at a time of increasing dependency, our oceans are in trouble. To help our Nation better understand the challenges facing the oceans and to look for ways to improve management, Congress established the U.S. Commission on Ocean Policy. The Commission's report addressed a broad range of ocean and coastal topics with more than 200 recommendations. These included enhancing ocean leadership, better coordination at all levels of government, increasing ocean research and moving toward an ecosystem-based management. In response, the President established a cabinet-level committee on ocean policy, whose membership includes nine Federal departments, numerous independent agencies and several key White House offices. The Committee created a framework to coordinate the oceans and coastal-related activities of more than 20 Federal agencies that administer more than 140 laws. The President also released a U.S. Ocean Action Plan, which identifies immediate, short-term, and long-term actions necessary to manage more effectively our ocean and coastal resources. The committee oversees the implementation of the Ocean Action Plan with its inter-agency support bodies and we are taking our roles and duties very seriously. White House involvement through CEQ and OSTP has also been critical. They have provided the high-level guidance and support necessary to focus the committee on achievable goals in order to maintain its momentum. Recent efforts by the committee have focused on developing an Ocean Research Priorities Plan. This plan will provide strategic direction for future research, foster more collaboration between agencies and set priorities among competing demands. A draft version of this plan will be later reviewed by the National Academy of Sciences at the end of the summer. NOAA is the lead or co-lead on a majority

of the tasks contained within the Ocean Action Plan. Our activities include developing a status report on deep-sea corals in the EEZ, working jointly with EPA to conduct community-based workshops to improve watershed protection and improving navigation into and out of our Nation's ports by enhancing our observations networks. Resource protection is a major component of the Ocean Action Plan. NOAA plays a crucial role. I was honored to be with the President as he recently designated the Northwestern Hawaiian Islands as a Marine National Monument. The creation of the largest marine conservation area in the world is an exciting achievement and recognizes the value of marine resources to our Nation. For the first time in history, NOAA will play a leading role in managing a national monument. Last week, NOAA established the Aleutian Islands Habitat Conservation Area in Alaska, which covers 280,000 square nautical miles, a historic measure that will protect essential fish habitat. This follows closely on the heels of our announcement last month of similar habitat protection measures off the coast of Washington, Oregon and California. In designating these areas, NOAA worked with local, state and regional partners to restrict fishing activities that can destroy sensitive habitats on the ocean floor. NOAA strongly embraces this regional approach to ocean and coastal management as emphasized by both the Ocean Commission and the Administration's Ocean Action Plan. Another major component of our efforts to improve conservation and management is an enhanced, Integrated Ocean Observing System known as IOOS. It is a network of systems that will provide observations and manage the way data—it will enable us to make better decisions. The Administration designated NOAA as the Federal lead agency for implementation of the IOOS. We have been working with our partners to develop design concepts, to ensure it meets the varied needs of local, regional and national users. The goal for IOOS is to be part of the larger, Global Earth Observation System of Systems or GEOSS. Taken together, all of these observations will give us the pulse of the planet and significantly enhance our ability to conserve and properly manage Earth's most critical resources.

While the Administration continues to make progress in implementing the Ocean Action Plan, Congress has a critical role to play as well. In addition to providing funding and oversight, we are hopeful Congress will pass several key pieces of legislation. The passage of the NOAA Organic Act would authorize and consolidate into one law, its divergent roles and responsibilities that now reside in more than 200 separate statutes.

I will be brief here to finish up. Reauthorization of the Magnuson-Stevens Fishery, Conservation and Management Act is also critical to our efforts. I thank the members of this Committee and the staff for your support and leadership in getting the bill through the Senate. Another important priority for us from the Ocean Action Plan is the National Offshore Aquaculture Act. This bill would provide the Department of Commerce the authority to regulate aquaculture in Federal waters. I greatly appreciate your efforts so far in promoting this legislation.

In conclusion, our coasts, oceans and Great Lakes are more important to us now than ever. The Commission on Ocean Policy and the Administration's Ocean Action Plan has provided us with a

roadmap to foster more effective management and conservation of ocean and coastal resources. NOAA is critical to our Nation's ability to navigate that map and to achieve our destination, a world that contains healthy and sustainable resources for future generations. I look forward to continuing to work with you on this journey and I am happy to answer any questions you might have. Thank you, Mr. Chairman.

[The prepared statement of Admiral Lautenbacher follows:]

PREPARED STATEMENT OF VADM CONRAD C. LAUTENBACHER, JR., U.S. NAVY (RETIRED), UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE; ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), DOC

Good afternoon Chairman Sununu, Senator Boxer, and members of the Committee. I am Vice Admiral Conrad Lautenbacher, Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce. Thank you for the opportunity to testify before you today on NOAA's response to the final report of the U.S. Commission on Ocean Policy and our role in implementing components of the Administration's response to that report—the *U.S. Ocean Action Plan*.

On September 20, 2004, the U.S. Commission on Ocean Policy fulfilled its Congressional mandate to submit recommendations for a coordinated and comprehensive national ocean policy to the President and Congress. The Commission's final report, *An Ocean Blueprint for the 21st Century*, contains 212 recommendations addressing a broad range of ocean and coastal topics. The U.S. Commission on Ocean Policy outlined the need for enhancing ocean leadership and coordination, developing the institutional capacity to coordinate across jurisdictional boundaries, and strengthening the agency structure in phases in order to enhance the goal of addressing management needs through an ecosystem-based approach.

In response to the Commission's findings and recommendations, the President issued Executive Order 13366, on December 17, 2004, establishing a Cabinet-level Committee on Ocean Policy, whose membership includes the Secretaries of Commerce, State, Defense, the Interior, Agriculture, Health and Human Services, Transportation, Energy, and Homeland Security, and the Attorney General. Other members of the Committee on Ocean Policy include the Administrator of the Environmental Protection Agency, the Director of the Office of Management and Budget, the Administrator of the National Aeronautics and Space Administration, the Director of National Intelligence, the Director of the Office of Science and Technology Policy, the Director of the National Science Foundation, and the Chairman, Joint Chiefs of Staff; and the Assistants to the President for National Security Affairs, Homeland Security Domestic Policy, Economic Policy, and an employee of the Office of the Vice President. The Committee on Ocean Policy created a framework to coordinate the ocean and coastal related activities of over 20 Federal agencies that administer over 140 laws, and facilitates coordination and support to the numerous state, tribal, and local programs with the overall goal of improved ocean governance. At the same time, the President released the *U.S. Ocean Action Plan*, which identifies immediate short-term and long-term actions necessary to more effectively manage coastal and ocean resources.

Both the final report of the U.S. Commission on Ocean Policy, and the *U.S. Ocean Action Plan*, recognize that partnerships are vital to halting the degradation of our oceans, and to our realizing their full potential. Thus, an underlying theme of my testimony today is "partnerships are essential for success." There are many agencies with important ocean and coastal responsibilities with which NOAA partners, and we take great pride and place great importance in continuing to strengthen our role as the lead civilian ocean agency.

NOAA is at the center of the Federal Government's understanding, awareness, and stewardship of our ocean resources and has been given a lead role in carrying through on the *U.S. Ocean Action Plan*. Because of the size and breadth of NOAA's involvement in the implementing activities, today I will highlight just a few results from the six sections of the plan. These will demonstrate how NOAA is actively working with Federal, state, tribal, and international partners, as well as Congress and other stakeholders, to meet our Nation's challenges with respect to the oceans. In addition, I will highlight a few of the legislative priorities that would allow NOAA to improve its effectiveness at addressing issues raised by the U.S. Commission on Ocean Policy.

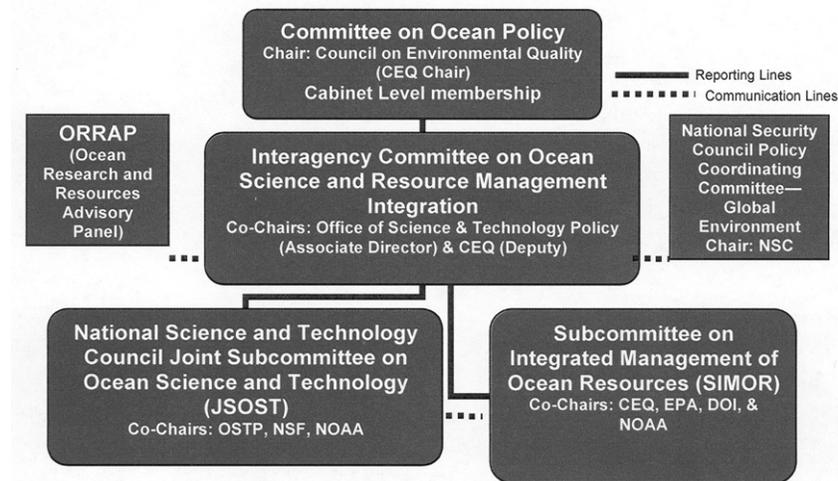
U.S. Ocean Action Plan—Enhancing Ocean Leadership and Coordination

Coordinated Ocean Governance Structure

The Committee on Ocean Policy conducts its operational work through the Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI) and its subordinate bodies, the Subcommittee on Integrated Management of Ocean Resources (SIMOR) and the National Science and Technology Council's (NSTC) Joint Subcommittee on Ocean Science and Technology (JSOST). Within this new coordinated ocean governance structure (Figure 1), ICOSRMI is incorporating the mandate and functions of the National Oceanographic Partnership Program's (NOPP) National Ocean Research Leadership Council (NORLC) into its broader ocean and coastal policy mandate, which now includes ocean resource management. The purpose of a high-level group like the ICOSRMI is to provide oversight to the implementation of the *U.S. Ocean Action Plan*, and direct further actions to advance ocean science and resource management activities. The ICOSRMI is comprised of Under/Assistant Secretaries or their equivalents from the Executive Branch agencies and departments of the Committee on Ocean Policy, and is co-chaired by the White House's Council on Environmental Quality (CEQ) and Office of Science and Technology Policy. The White House involvement in this effort has been critical to providing the high-level guidance and support necessary to focus the group on achievable goals, and to maintain its momentum, and I play an active role in ICOSRMI and its bimonthly meetings.

In addition to my role in ICOSRMI, NOAA has taken a leadership role in both SIMOR and the JSOST, serving as Co-Chair on each respective group and further supporting their activities. SIMOR seeks to identify and promote opportunities for collaboration and cooperation among agencies on resource management issues, and to build partnerships among Federal, state, tribal, and local authorities, the private-sector, international partners, and other interested parties.

Figure 1. Coordinated Ocean Governance Structure



SIMOR's counterpart in the new coordinated ocean governance structure is the JSOST. The principal roles of JSOST are to identify national ocean science and technology priorities and to facilitate coordination of disciplinary and interdisciplinary ocean research, ocean technology and infrastructure development, and the development and implementation of the U.S. Integrated Ocean Observing System (IOOS). The JSOST was created through expansion of the former NSTC's Joint Subcommittee on Oceans in 2005 to include the issues of science and technology. Because of this evolution, the JSOST continues to report to the NSTC Committee on Science and the Committee on Environment and Natural Resources, in addition to the ICOSRMI.

ICOSRMI seeks advice from its Federal advisory committee, the Ocean Research and Resource Advisory Panel, comprised of 18 members from academia, as well as the public- and private-sectors, with interest and expertise in ocean science and resource management. ICOSRMI also coordinates with the National Security Council

Policy Coordinating Committee—Global Environment, Subcommittee on Ocean Policy.

NOAA's Implementation of the U.S. Ocean Action Plan

The tenets of the *U.S. Ocean Action Plan* include: developing management strategies that ensure continued conservation of our ocean, coastal and Great Lakes resources, while at the same time ensuring that the American public enjoys and benefits from them; employing the best science and data to inform decisionmaking; working toward an ecosystem-based approach to management; and, where possible, employing economic incentives over mandates.

CEQ designated NOAA as lead, or co-lead, on 45 items from the *U.S. Ocean Action Plan*. The diverse range of actions begun by NOAA to date include developing a status report on deep sea corals in the U.S. Exclusive Economic Zone, working jointly with the U.S. Environmental Protection Agency (EPA) to conduct community workshops to improve watershed protection, and improving navigation by updating the National Water Level Observation Network. NOAA also continues to emphasize the importance of local and regional leadership in ocean management, co-leading with EPA the Federal working group supporting the Gulf of Mexico Alliance, participating in the Great Lakes Regional Collaboration, and joining other SIMOR members in working with interested states to move forward to new regional initiatives such as the Northeast Regional Ocean Council. These regional bodies possess the unique ability to focus discussion on areas of most need, and provide lasting commitments to the stewardship of regional resources by those most affected by them.

Recognizing the continuing need for resource protection, President Bush designated the Northwestern Hawaiian Islands as a marine national monument on June 15. Encompassing nearly 140,000 square miles, the monument covers an area larger than all of our national parks put together. This designation builds upon the public sanctuary designation process, and provides lasting protection to this important resource. The creation of the largest marine conservation area in the world is an exciting achievement and recognizes the value of marine resources to our Nation.

For the first time in its history, NOAA will play a leading role in managing a national monument. This will be an exciting new opportunity and one that will present many challenges. Thankfully, we will have great partners in the Department of the Interior (DOI) and the State of Hawaii to help us as we go forward.

I think President Bush said it best: "You know, in America, there's a great consensus that we have an obligation to be good stewards of the environment. Success of a generation is not defined by wealth alone. We also will be measured by the respect we give to the precious creatures of our natural world. We have great choices before us in this country. And with the designation of the Northwestern Hawaiian Island Marine National Monument, we are making a choice that will leave a precious legacy."

In my view, progress on implementing the *U.S. Ocean Action Plan* has been significant as highlighted below and NOAA will continue to work to enhance its partnerships in order to meet present and future challenges.

Legislative Priority—NOAA Organic Act

An ocean leadership priority identified in both the final report of the U.S. Commission on Ocean Policy and the *U.S. Ocean Action Plan* is the passage of a *NOAA Organic Act*. We believe it is necessary to consolidate into one authorization NOAA's myriad purposes and responsibilities, which now reside in over two hundred separate statutes. It should encompass the full spectrum of NOAA's responsibilities, including programs to protect and restore the Nation's fisheries, and its responsibilities to provide products that foster safe transportation on marine highways. The Administration transmitted a proposal for such legislation to Congress in April 2005, and we are hopeful that this Committee will play an integral part in its passage. Most importantly, NOAA believes the agency must maintain its current flexibility in determining how best to structure itself to address current and future needs. In responding to the recommendations of the U.S. Commission on Ocean Policy thus far, flexibility has proved to be a vital tool for NOAA leadership. An organizational structure that serves the Nation well today may not be the best structure to serve the Nation in the future. We believe that specific programmatic changes should be made through authorization bills that are revisited every few years. We would be happy to work with the Committee on such bills.

U.S. Ocean Action Plan—Advancing Our Understanding of the Oceans, Coasts, and Great Lakes

Ocean Research Priorities Plan

As outlined in the *U.S. Ocean Action Plan*, an important role of the JSOST within the interagency process is to improve our understanding of oceans, coasts, and Great Lakes by seeking enhanced collaboration, coordination, cooperation, and synergies. JSOST's recent efforts focus on developing an *Ocean Research Priorities Plan* and an Implementation Strategy for the plan. This plan will provide strategic direction for future research and articulate priorities among competing demands for scientific information. These documents are being prepared in an open and transparent manner with advice from the ocean research community (government, academic, industry, and other nongovernment entities), including SIMOR and the National Academy of Sciences. A national workshop with several hundred participants from academia, as well as the public- and private-sectors, convened earlier this spring to solicit input for the plan. A draft version of this plan will be available to the public and the National Academy of Sciences for review later this summer.

NOAA is undertaking a number of other activities in partnership with external partners or other agencies to enhance our scientific knowledge of marine ecosystems. These include a review of ecosystem science, integrating U.S. ocean observations, ocean and coastal mapping, coordinating ocean education, and hosting a conference on ocean literacy.

NOAA External Ecosystem Science Review

NOAA is currently engaged in an effort, through the NOAA Science Advisory Board, to solicit external input to evaluate and strengthen the structure and function of ecosystem research within NOAA. This will allow NOAA to better address changing needs for ecosystem-based management. The NOAA Science Advisory Board formed an external panel, named the External Ecosystem Task Team, to conduct this external ecosystem science review. The External Ecosystem Task Team recently published a preliminary report on its findings for public comment. NOAA anticipates that the team's final report will assist the agency in identifying the scientific activities conducted, and/or sponsored by NOAA, that meet its ecosystem science needs, including its legislative and regulatory requirements, and will also organize its ecosystem research and science enterprise.

Integrate U.S. Ocean Observing Efforts

The *U.S. Ocean Action Plan* and the final report of the U.S. Commission on Ocean Policy endorse implementation of a sustained Integrated Ocean Observing System (IOOS). NOAA is pleased that the goals of S. 361, The Ocean and Coastal Observation System Act of 2005, passed by the Senate in July 2005, are similar to the Administration's goals outlined in its report to Congress on, *An Integrated and Sustained Ocean Observing System for the United States: Design and Implementation*. These goals are also similar to the ICOSRMI approved planning document, *The First U.S. Integrated Ocean Observing System Development Plan*. IOOS is the U.S. component of the Global Ocean Observing System, and is the key ocean component of the U.S. Integrated Earth Observation System (IEOS) now being developed. Both IOOS and IEOS will become part of GEOSS—the Global Earth Observation System of Systems. IOOS is envisioned as an interagency, end-to-end system designed to meet seven societal goals by integrating research, education, and the development of sustained ocean observing capabilities. Ocean.US, the National Office for Integrated and Sustained Ocean Observations, has the lead for planning the multi-agency IOOS effort. NOAA is heavily involved in this planning, and has been designated by the Administration as the lead Federal agency for administration and implementation of IOOS. Coordination between agencies will continue to grow as the Interagency Working Group on Ocean Observations (IWGOO), chaired by NOAA with Vice Chairs from the National Aeronautics and Space Administration (NASA), the Navy, and the National Science Foundation (NSF), is established under the JSOST.

NOAA, NASA, NSF and other Federal agencies working through the JSOST, in partnership with private-sector entities, are actively working on design concepts for IOOS to ensure it meets the varied needs of local, regional, and national users. NOAA has awarded two six-month industry contracts to Lockheed Martin Corporation and Raytheon Corporation. These companies will develop a comprehensive, "end-to-end," conceptual design and cost estimate, along with a narrative explanation, that could help structure NOAA's efforts for implementing IOOS and shape how IOOS fits into GEOSS. To ensure consistency with the broader observing system community, resulting conceptual designs will be structured according to the three IOOS subsystems: data management and communications, national backbone, and regional ocean observing system components coordinated with the IWGOO

agencies and other IOOS partners, such as the U.S. IOOS Regional Associations. The two conceptual designs with viability narratives and cost estimates are expected in early September 2006. Additionally, NOAA has continued to work with regional entities to establish organizational structures that capture local and regional needs. To date, 11 IOOS Regional Associations are working on plans for regional implementation of the IOOS, including the development of Regional Coastal Observing Systems.

Ocean and Coastal Mapping Activities

Improved information on our ocean and coastal areas is essential to improved management and advances in ocean and coastal management and science. NOAA is working with its interagency partners to advance our Nation's capabilities in this area, taking advantage of new technologies such as LIDAR (Light Detection and Ranging) and autonomous underwater vehicles. Among its efforts, NOAA is working to ensure the most effective use of our fleet of research vessels and aircraft by integrating our multiple program mapping requirements, developing new techniques for data acquisition, working with other agencies, and making seamless the use of our mapping missions. We are building a Geographic Information System support tool to be able to better plan and integrate mapping efforts in order to narrow the gaps between current program mapping capability, and a modern fully integrated ocean mapping system. The goal is to meet the broadest range of program needs and eliminate duplicative efforts in NOAA's ocean and coastal mapping activities. In addition, NOAA is working with other agencies to develop an inventory of coastal and ocean mapping programs, their existing data, and planned acquisitions, along with a web-based system to search and display records from the inventory.

Increase Ocean Education Coordination

Together, SIMOR and the JSOST have formed the joint Interagency Working Group on Ocean Education, to identify opportunities and articulate priorities for enhancing ocean education, outreach, and capacity building. Improved ocean management requires an ocean literate public and, to this end, NOAA is committed to advancing lifelong ocean education. Our formal and informal activities include scholarship and fellowship programs, education and research grants, and strategic partnerships with education institutions and industry. In 2005, NOAA provided scholarship and internship opportunities to over 150 undergraduate students and 57 graduate scholarship opportunities. In 2005, 28 teachers participated in NOAA's Teacher at Sea Program. NOAA's education investment is also geared toward hiring students trained through these scholarship and internship opportunities. Through June 15th, NOAA had hired 31 students trained through its Graduate Sciences Program.

To raise national attention to the need for ocean literacy, NOAA, with EPA, DOI, NSF, NASA, and the National Marine Sanctuary Foundation, co-hosted CoOl—the Conference on Ocean Literacy—on June 7–8, 2006, in Washington, D.C., as part of the Presidentially-proclaimed National Oceans Week, June 4–10. The conference brought together key participants to discuss the essential principles of ocean literacy, and the current challenges and opportunities for both formal and informal education efforts in educating the public to make informed, responsible decisions about the ocean and its resources. This partnership event also identified priority next steps we can take to advance ocean literacy. The conference extended beyond Washington, D.C., through five regional workshops hosted by aquariums across the country including: Aquarium of the Pacific, Long Beach, CA; John G. Shedd Aquarium, Chicago, IL; J.L. Scott Aquarium, Ocean Springs, MS; National Aquarium in Baltimore, Baltimore, MD; and National Mississippi River Museum and Aquarium, Dubuque, IA. Each site viewed portions of the presentations via satellite and discussed regional challenges and opportunities for promoting ocean literacy principles.

U.S. Ocean Action Plan—Enhancing the Use and Conservation of Ocean, Coastal, and Great Lakes Resources

SIMOR Work Plan

Established as part of the Committee on Ocean Policy, SIMOR provides a strong mechanism to coordinate Federal activities and respond to regional concerns, and is jointly co-chaired by NOAA, EPA, DOI, and CEQ. It has fostered mutual interest and proactive dialog among agencies in addressing difficult resource management issues that cross jurisdictional boundaries. SIMOR has developed a work plan with 21 actions that build on the *U.S. Ocean Action Plan*. NOAA has a leadership role in 12 of these actions and participates in nearly all of the others. Examples of the benefits of SIMOR activities include: improved understanding of an ecosystem approach to management through regional workshops, and the development of educational standards for resource managers; coordinated Federal support to new and

ongoing regional partnerships; and formation of a Federal-state team of resource managers to provide timely input into the JSOST's, and development of the *Ocean Research Priorities Plan*.

Implement Coral Reef Local Action Strategies

The Federal agencies and seven jurisdictions (Florida, Hawaii, Guam, American Samoa, Puerto Rico, the U.S. Virgin Islands and the Commonwealth of the Northern Mariana Islands) that comprise the U.S. Coral Reef Task Force, as well as the freely-associated states, have developed and begun implementing *Coral Reef Local Action Strategies* to address key threats to coral reefs in their respective jurisdictions. The action strategies provide a framework for Task Force member agencies to identify, and collaboratively address, these threats and additional local needs, connect local priorities to national goals, and coordinate Federal agency actions with local management of reef resources. This effort is a significant step forward in advancing the goal of cooperative conservation between the Federal, state, territorial, and commonwealth governments. NOAA, DOI, EPA, and the Department of Agriculture have been key partners in implementing the action strategy effort and building local capacity for coral reef conservation and management. For example, agencies organized a successful Caribbean Coral Reef Grants and Funding Opportunities Workshop in August 2005 to help state and local partners identify and pursue funding opportunities for local action strategy support. A Coral Reef Grants Funding Workshop was held in late June 2006 for Hawaii that was organized by local agencies and highlighted priority projects. Similar workshops will be held in Guam and the Commonwealth of the Northern Mariana Islands.

Legislative Priority—Reauthorization of Magnuson-Stevens Fishery Conservation and Management Act

A number of actions highlighted within the *U.S. Ocean Action Plan* intend to improve coordination and effectiveness of marine fisheries management activities. Reauthorization of the Magnuson-Stevens Act is a high priority of the Administration and I would like to thank the Members of this Committee, and the Senate, for your leadership in recently passing the reauthorization of the Magnuson-Stevens Act. My hope is that we will soon see similar action taken in the House.

Legislative Priority—National Offshore Aquaculture Act

In June 2005, the Administration released its National Offshore Aquaculture Act. Subsequently, Senator Stevens introduced S. 1195. Since that time, this Committee hosted a hearing on the bill in April 2006, and a second hearing on June 8, 2006. Enactment of S. 1195 will provide the Department of Commerce the authority to regulate aquaculture in Federal waters, and to establish a coordinated process among the Federal agencies. We envision a one-stop regulatory shop, coordinated by NOAA, and integrated into NOAA's environmental stewardship responsibilities. I appreciate the work and leadership of this Committee to move legislation forward to allow NOAA to begin a public rulemaking process to produce a comprehensive, environmentally-sound permitting and regulatory program for aquaculture in Federal waters.

U.S. Ocean Action Plan—Managing Coasts and Their Watersheds

Gulf of Mexico Alliance

One example of SIMOR's role in enhancing coordination on managing coasts and watersheds is the Gulf of Mexico Alliance. In response to priorities articulated by the states of Alabama, Florida, Louisiana, Mississippi, and Texas, this initiative brought together 13 agencies under the leadership of NOAA and EPA. The Alliance formally released the *Governors' Action Plan for Healthy and Resilient Coasts* at the Gulf of Mexico Summit in March 2006, which includes 11 key actions across the Alliance's five priority issues; water quality, restoration, environmental education, habitat identification for management purposes, and reductions in nutrient loadings. In order to capture local community input during the development of the *Governors' Action Plan*, the Gulf Alliance hosted a series of eight Community Workshops across the five U.S. Gulf States from June 2005, to February 2006. Some of the expected outcomes from this effort are improvement in Gulf water quality, with an emphasis on healthy beaches and shellfish beds, and restoration and conservation of coastal wetlands.

Cooperative Conservation Executive Order

The Administration remains committed to the tenets of Cooperative Conservation, as outlined in the Executive Order of 2 years ago. Last year, at the White House Conference on Cooperative Conservation, NOAA announced a new grants program to aid communities in removing small obstructions to their rivers. The goal of the

Open Rivers Initiative (ORI) is to not only improve habitat for diadromous fish populations, but also foster new economic development opportunities. In addition to ORI, NOAA will continue to find new and innovative ways to advance Cooperative Conservation throughout the agency.

U.S. Ocean Action Plan—Supporting Marine Transportation

Interagency Committee on the Marine Transportation System

Consistent with the final report of the U.S. Commission on Ocean Policy, the *U.S. Ocean Action Plan* called for the elevation of the previous Federal interagency marine transportation effort—the Interagency Committee on the Marine Transportation System—and directed the creation of a Cabinet-level interagency committee on marine transportation. As a result the Committee on the Marine Transportation System (CMTS), an interagency committee with 14 member agencies and chaired by the Secretary of Transportation, was established in April 2005. I am proud to say that the Department of Commerce, with strong representation by NOAA, is a charter member of the CMTS, and actively supports its mission. The purpose of the CMTS is to promote a partnership of Federal agencies with responsibility for the Marine Transportation System (MTS)—waterways, ports, and their intermodal connections—to ensure the development and implementation of national MTS policies, and to communicate to the President its views and recommendations for improving the MTS.

The CMTS is executing a work plan that will provide a comprehensive assessment of the MTS; development of an MTS national strategy; improved collection and management of MTS data; and development of a decisionmaking matrix for improved coordination and response to natural disasters affecting the Nation's MTS.

U.S. Ocean Action Plan—Advancing International Ocean Policy and Science

Advance the Use of Large Marine Ecosystems

The *U.S. Ocean Action Plan* included a chapter on implementing international efforts. Several of the action items in the *Ocean Action Plan* include international components. However, as many of today's challenges to our oceans and coasts are transboundary and international in nature and scope, the *Plan* also includes a section that addresses the advancement of international ocean policy and science. One example of these efforts is a new partnership that has been developed to link the United Nations Environment Programme Regional Seas Programme and the use of the NOAA-originated concept of Large Marine Ecosystems (LMEs). This partnership acts as a tool for enabling ecosystem-based management to provide a collaborative approach to management of resources within ecologically-bounded transnational areas. This effort has attracted funding from the Global Environmental Facility and various donor countries, specifically focusing on capacity building in the developing world. LME sponsored projects are underway in 10 regions involving 70 countries, and seven new projects are planned with an additional 51 countries participating. NOAA has contributed in-kind technical expertise to assist the planning and implementation of these programs.

2007 Budget Priorities

NOAA continues to streamline activities and shift priorities to support and implement the President's *U.S. Ocean Action Plan*. Legislative action on the priorities identified could greatly enhance NOAA's ability to implement the activities outlined within the *U.S. Ocean Action Plan*. While NOAA is realizing efficiencies in programs through partnering with Federal, state, local, and international entities, NOAA has also identified a need for additional budget support to fully implement activities of interest to this Committee. I would like to thank the Senate for the support you have recently shown NOAA through the appropriations process. NOAA appreciates your continued support for our programs as we execute our responsibilities under the *U.S. Ocean Action Plan* and work together to improve our products and services for the American people. These resources are vital to meeting the challenges facing our Nation's oceans.

Conclusion

In conclusion, I would like to reiterate the importance of the efforts of the U.S. Commission on Ocean Policy, and stress that NOAA is strongly committed to continued implementation of the related recommendations of the *U.S. Ocean Action Plan*, as well as through improvements in existing program management and partnerships. NOAA will continue to work with its partners in a collaborative and systematic fashion, as we believe collaboration is critical to the ongoing development of our national ocean policy. We look forward to continuing to work with the members of

the Committee in raising the bar for the long-term conservation and management of our coastal and ocean resources.

Thank you again for your time and I am happy to answer any questions that the Members of the Committee may have.

Senator SUNUNU. Thank you very much, Admiral. Our second witness is Secretary Mike Chrisman of the California Resources Agency. Welcome back.

**STATEMENT OF MIKE CHRISMAN, SECRETARY FOR
RESOURCES, CALIFORNIA RESOURCES AGENCY**

Mr. CHRISMAN. Thank you, Senator and thank you, members of the Committee, for holding this hearing. We really appreciate the opportunity to be here. Let me start by saying that 35 coastal states, territories and commonwealths are members of the Coastal States Organization and are at the forefront of ocean and coastal management in this Nation. Whether it is salmon fishing closure off the coast of California, hurricanes off the Gulf Coast, new energy proposals off the Northeast Coast or coral bleaching of the Pacific Islands, states are on the forefront of these issues. Our ocean and coastal resources are not only important to us at the state level, but obviously to citizens throughout this great Nation. The National Ocean Economics Study determined that ocean-dependent industry in California alone contributed \$43 billion to state and national economy in 2002. Coastal states are leading the Nation in the management of these resources but we cannot bear this burden alone. When Governor Schwarzenegger came into office in late 2003, we moved rapidly to address ocean and coastal issues in our great state. In May 2004, we held a California Ocean Summit to obtain the views of experts, academia, industry and public on a draft report of the U.S. Commission on Ocean Policy. The Governor strongly concurred with the preliminary findings of the U.S. Commission that oceans were in trouble and in need of assistance from all levels of government, academia, private-sector and the public. The Governor supports the call for greater Federal involvement and funding and directed action on these issues. However, we have also made a strong commitment in California for leadership and action in this area. In June 2004, the Governor directed me and my counterpart at the California Environmental Protection Agency to produce a California ocean action plan within 90 days. In October of that year, we released the final Ocean Action Plan titled, *Protecting Our Ocean: California Action Strategy* on the Shores of Point Lobos Marine Reserve in Monterey. Since the release of that report, several major actions have included the Governor signing the California Ocean Protection Act that created the California Ocean Protection Council with \$26.2 million to begin its operations. The Governor also signed legislation addressing issues such as bottom trawling, prohibiting certain air and water discharges from cruise ships, requiring water quality monitoring of the San Francisco Bay and most recently signed the California Sustainable Oceans Act to address the impacts of new aquacultural operations off the coast. The California Ocean Protection Council approved over \$17 million in ocean and coastal projects dealing with coastal water quality, marine research, seafloor mapping, new ecosystem-based pilot projects, invasive species management, market-based

fisheries approaches, environmental review of aquacultural practices and many, many more. The Council also went on to introduce an information, research and outreach strategy that Admiral Watkins and Leon Panetta identified as a national model. Similar efforts are occurring in other states across the Nation: the State of Alaska, the State of Washington, the Gulf of Mexico Alliance, Great Lakes Regional Collaboration and the Gulf of Maine Council. The Western Governors Association in June of this year adopted a resolution sponsored by Governor Schwarzenegger. This resolution called for the ratification of the Law of the Sea Treaty, the reduction of the fragmentation of government processes at the Federal level, the reauthorization of the Coastal Zone Management Act and other key statutes. It provides sufficient Federal funding and technical assistance to coastal states. I would like to mention one pressing problem on the West Coast. In June of this year, the Governor declared a state of emergency in 13 northern and central California counties, from Santa Barbara up to Siskiyou County, effected a recently restricted salmon fishing season. The economic impact of the lost season this year for both California and Oregon is in the area of \$150 million. The Governor is sponsoring state legislation to provide more than \$45 million in economic relief to fishermen and businesses affected by the partial closure of the salmon season. We are encouraged with the recent developments that will bring much-needed Federal aid to the fishing-dependent communities in California, including the \$10 million in aid approved by the Senate Appropriations Committee. An important message in my testimony today is that coastal states are moving forward with the efforts to implement many of the recommendations of the U.S. and Pew Ocean Commissions Report. Unfortunately, we cannot do it alone. We are ready to work with the Bush Administration, Members of Congress and other Governors and a wide variety of stakeholders to make progress on these issues. Currently, the Federal Government lacks a clear national oceans policy that is set in statute that will enable Federal council dedicated to reducing the fragmentation of improving coordination or framework in support of regional ocean governance efforts. Therefore, we recommend that Congress consider legislation to provide a level of Federal assistance necessary to achieve these goals. We believe there are three necessary components to the legislation that will advance thoughtful ocean governance; that is, the creation of a national ocean policy, direct management of ocean resources for the Nation as a whole, a regional governance structure with the states and the Federal Government in partnership, and improved Federal agency coordination where all various arms of the U.S. Government are working in concert with their state partners, not at cross purposes. California and other states stand ready to work with this committee and Members of Congress to bring all of this about and again, Mr. Chairman, thank you for calling this hearing today.

[The prepared statement of Mr. Chrisman follows:]

PREPARED STATEMENT OF MIKE CHRISMAN, SECRETARY FOR RESOURCES,
CALIFORNIA RESOURCES AGENCY

Introduction

Good morning Mr. Chairman and members of the Subcommittee. My name is Mike Chrisman, and I am the California Secretary for Resources and a member of Governor Arnold Schwarzenegger's cabinet. I also serve as Chair of the California Ocean Protection Council and as Vice Chair of the Coastal States Organization. Thank you for holding this important hearing this afternoon and for inviting me to testify.

Let me start by saying that the 35 coastal states, territories, and commonwealths that are members of the Coastal States Organization are at the forefront of ocean and coastal management in this Nation. Whether it's a salmon fishing closure off California, a hurricane off the Gulf states, new energy proposals off the Northeast Coast, or coral bleaching in the Pacific Islands, states are on the front lines of these issues. Our ocean and coastal resources are not only important to us at the state level, but to citizens throughout this Nation. The National Ocean Economic Study determined that ocean-dependent industry in California alone contributed \$43 billion to the state and national economy in 2002. Of course the value of having safe places to swim, healthy marine resources and fisheries, wide sandy beaches, or spectacular rocky headlands and shorelines is difficult to quantify, but the benefits of these resources are clearly substantial.

Coastal states are leading the Nation in the management of these resources, but we cannot bear this burden alone. I'd like to provide you with some background about California and the activities of some other coastal states and then focus my remarks on some important national issues for your consideration.

Governor Arnold Schwarzenegger moved rapidly to address ocean and coastal issues in California. In 2004, we held a California Ocean Summit to obtain the views of experts from academia, industry, and the public on the draft report of the U.S. Commission on Ocean Policy. That technical review provided the basis for the Governor's comments on this document. The Governor strongly concurred with the preliminary findings by the U.S. Commission that the oceans were in trouble and in need of assistance from all levels of government, academia, the private-sector, and the public. The Governor's comments addressed governance; economic sustainability; research, education, and technology development; and stewardship.

The Governor supports the call for greater Federal involvement, funding and directed action on these issues. However, the Governor also made a strong commitment for California leadership and action. He directed me and my counterpart at the California Environmental Protection Agency to produce a California ocean action plan within 90 days. On October 18, 2004, Governor Schwarzenegger released his ocean action plan titled, "*Protecting Our Ocean: California's Action Strategy*" on the shores of the Point Lobos Marine Reserve in central California. Since the release of that report some major actions include:

- The Governor signed the California Ocean Protection Act, which created the California Ocean Protection Council with \$26.2 million to begin operations.
- The Governor also signed legislation addressing issues such as bottom trawling, prohibiting certain air and water discharges from cruise ships, requiring water quality monitoring in San Francisco Bay, and most recently he signed the California Sustainable Oceans Act to address the impacts of new aquaculture operations off the coast.
- The Ocean Protection Council approved more than \$17 million in ocean and coastal projects dealing with coastal water quality, marine research, sea floor mapping, new ecosystem-based management pilot projects, invasive species management, market-based fishery approaches, environmental review of aquaculture practices, and more.
- The Council produced an "Information, Research, and Outreach" strategy that Admiral James Watkins and Leon Panetta identified as a model for the Nation.
- California sponsored an Ocean Economic Summit and released the National Ocean Economic Program report on the value of ocean-dependent industry in California.
- California has committed \$21 million to develop an ocean currents monitoring system to help contribute to the call for such ocean observation systems throughout the Nation's coastlines.
- California set in motion a new and workable process for establishing networks of marine protected areas off our coastline, and our Fish and Game Commission

will be evaluating the recommendations for the first new designations along the Central California coast this summer and fall.

Similar efforts are occurring throughout the Nation. A few examples include:

- Alaska Governor Murkowski created the Alaska Ocean Policy Cabinet to advise the Governor on ocean and coastal issues.
- In Washington, the Puget Sound Partnership was formed with 14 members, four legislative liaisons and co-chaired by the Governor to accelerate the protection and restoration of the Puget Sound and the Hood Canal.
- The Gulf of Mexico Alliance was formed by five Gulf Governors to focus efforts to address nutrient loading, water quality, wetland restoration, habitat management, and environmental education.
- The Great Lakes Regional Collaboration was formed by the Great Lakes Governors to address sediment issues, coastal health, habitats, invasive species, non-point source pollution and other issues.
- The Gulf of Maine Council formed in 1989 launched a new mapping initiative to conduct comprehensive sea floor mapping throughout the region.

Western Governor's Association—Ocean Resolution

On June 13, 2006, the Western Governors Association, made up of 21 western U.S. states, territorial, and commonwealth Governors adopted a new Ocean resolution sponsored by Governor Arnold Schwarzenegger. The Governors recognize the compelling need for action to address ocean and coastal issues at the international, national, state and regional levels. The Governors have identified the following goals:

- a. Stewardship—To assess, conserve, restore, sustain and manage ocean resources and the ocean ecosystem.
- b. Economic Sustainability—To encourage environmentally-sound, sustainable, and economically-beneficial ocean resource development activities.
- c. Research, Education and Technology—To advance research, sound science, education programs, and technology developments to meet future needs and uses of the ocean.
- d. Jurisdiction and Ownership—To maximize interests of states, commonwealths, and territories, within state tidelands, the territorial sea, and the Exclusive Economic Zone.

The Western Governors believe that key management questions can be better addressed through a more coordinated and accountable approach at the Federal level with full participation and cooperation with coastal states. Key management issues of concern include:

- ocean and coastal habitats,
- water quality concerns,
- coastal hazards,
- maritime commerce,
- tourism, and
- research.

The Governors are calling for:

- Ratification of the Law of the Sea Treaty,
- Reduced fragmentation of government processes at the Federal level,
- Reauthorization of the Coastal Zone Management Act and other key Federal statutes,
- To provide sufficient funding and technical assistance to coastal states, and
- To support environmentally-sound development and sustainable resource harvest activities.

It's clear that coastal states are taking significant steps to improve ocean and coastal management, but need the assistance and partnership of the Federal Government to continue to make progress in these areas.

The following testimony discusses ocean and coastal management issues that California and other states are current facing and suggests ways that the Federal Government can help.

Ocean and Coastal Governance

The U.S. and Pew Ocean Commission reports identified the issues with fragmentation at the Federal level regarding ocean and coastal governance. These reports emphasized the need to take bold new initiatives such as adopting a clear national ocean policy and setting up a permanent national ocean council to provide the level of leadership that will be necessary to address the problems facing our Nation's coasts and oceans. For coastal states, it is increasingly difficult to determine how best to engage the Federal Government on complex management issues facing us. California and many other states have addressed this issue at the state level by passing legislation to clarify state ocean policy and by establishing executive level ocean councils. However, to this point the Federal Government has failed to take this needed step.

There is renewed interest and momentum in the United States for regional approaches to protect and manage ocean and coastal resources. Both the U.S. Commission on Ocean Policy (USCOP) and the Pew Oceans Commission (POC) reports recommended the initiation of regional approaches to ocean and coastal management throughout the Nation. Regional approaches can help resource managers account for more of the factors that affect a particular resource or an ecosystem, not just the ones that fall within a particular jurisdiction. Regional approaches such as the ones mentioned above in the Gulf of Mexico, the Great Lakes and the Gulf of Maine are driven by the activities of coastal states. The states of California, Oregon, and Washington are working together to develop a regional partnership.

Legislative Proposal. Currently, the Federal Government lacks a clear ocean policy set in statute, a statutorily enabled Federal council dedicated to reducing fragmentation and improving coordination, or a framework and support for regional ocean governance efforts. Therefore, we recommend that Congress consider legislation to provide the level of Federal assistance necessary to achieve these goals.

We believe that there are three necessary components for legislation that will advance thoughtful ocean governance:

1. A national ocean policy,
2. A regional governance structure with the states and the Federal Government in partnership, and
3. Improved Federal coordination.

A national ocean policy is needed to direct the management of ocean resources for the Nation as a whole. Regional structures are needed to implement that direction and to address regional priorities. Federal coordination is needed so all of the various arms of the U.S. Government are working in concert with their state partners and not at cross purposes.

California and other states, through our membership in the Coastal States Organization, would welcome the opportunity to work with this Committee on that legislation.

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) established a partnership between the Federal Government and coastal states regarding the management and protection of the Nation's coastlines. This statute provides a national template for the Nation's coastlines with key management objectives to be implemented. In this partnership coastal states develop coastal management plans that are then certified by the Federal Government as being consistent with these Federal standards. Unfortunately, the CZMA is long overdue for re-authorization. A key objective of California and the Coastal States Organization is to seek reauthorization and reinvigoration of this important coastal management statute. We urge that this reauthorization be a priority in the next of Congress.

Ocean and Coastal Economics

Many coastal states have conducted analyses of the economic contribution of the ocean and coast to the state and national economies. The findings of these analyses have demonstrated that our Nation's ocean and coasts provide substantial economic benefits directly through coastal port activity, tourism, fishing, and other economic generators. Although other sectors of the national economy such as the agricultural industry are monitored nationally on an annual basis there is no similar accounting system in place in the United States to regularly assess the economic benefits derived from the ocean and coast. Such a system should be incorporated in any new national ocean governance framework that is crafted at the national level.

Research, Monitoring, and Ocean Observations

Research should be the foundation of good public policy, but often it is not. The Federal Government has established the Subcommittee on Integrated Management of Ocean Resources (SIMOR) and the Joint Subcommittee on Science and Ocean Technology (JSOST) to help develop a comprehensive and robust system for research, monitoring, and ocean observations. We applaud these efforts and have directly participated in the Federal-State Task Team (FSTT). Recently I provided opening comments at the JSOST meeting in Denver. However, as the U.S. and Pew Oceans Commission reports pointed out, our national investment in ocean and coastal research, monitoring, and ocean observations is inadequate. We hope that the Federal Government will use these processes to determine a clear path for research, monitoring, and ocean observations and also provide the resources necessary to support them.

Ocean Education and Outreach

Coastal and ocean education exist at a variety of levels ranging from technical doctorate and field programs to K–12 level education, and programs run by state and Federal agencies, to those run by nonprofit groups. In California, such programs exist through the University of California, the California State University System, private institutions, state programs through agencies like State Parks and the Coastal Commission, and Federal programs such as the National Marine Sanctuary Program, the National Estuary Program, and the National Estuarine Research Reserve Program. California is currently in the process of ensuring that ocean and coastal education is included in the environmental principles and concepts being developed to implement the Education and the Environment Initiative in California. This initiative is designed to incorporate environmental principles and concepts into the K–12 curriculum for California children.

Unfortunately, instead of increasing funding for key Federal ocean and coastal programs, in most cases Federal funding for these programs is decreasing. For example, NOAA's National Marine Sanctuary Program experienced a dramatic reduction in funding in the FY 2006 appropriations cycle, dropping from \$51 million in FY 2005 to \$35 million in FY 2006. This 30 percent budget reduction is significant and cannot be sustained without impacts to the services and programs provided by the sanctuary program to communities around the country, including California's central coast. Congress should evaluate closely the funding levels necessary to sustain key Federal ocean and coastal management programs that have proven to be important components of ocean and coastal management at the state level.

Law of the Sea

Governor Schwarzenegger has joined many other Governors throughout the nation, leaders in Congress, and members of industry, the academic community, and the public in calling for the United States to provide advice and consent for the U.S. accession to the United Nations Convention on the Law of the Sea Treaty. This will once again allow the United States to assume a leadership role in international forums dealing with scientific research, deep-sea mining, and a wide variety of environmental protection issues.

California Salmon Issues

In June, Governor Schwarzenegger declared a state of emergency in 13 northern and central California counties, from Santa Barbara to Siskiyou, affected by the recently restricted salmon fishing season. The restricted season will significantly impact California's commercial ocean salmon fisheries and result in severe economic losses throughout the state. This also threatens subsistence and cultural fisheries of the Yurok Tribe, Hoopa Valley Tribe and the Karuk Tribe. The economic impact of a lost season this year for both California and Oregon could be \$150 million.

Governor Schwarzenegger is sponsoring legislation to provide more than \$35 million in economic relief to fishermen and businesses affected by the partial salmon season closure. Specifically, the proposal provides \$5 million in grants and \$20 million for a zero interest revolving loan program. Additionally, the Governor has proposed expanding the Small Business Expansion Fund by \$1 million to leverage a total of nearly \$20 million in loan guarantees. Governor Schwarzenegger also asked the Department of Fish and Game to reimburse all impacted fishermen for the cost of their commercial salmon fishing licenses, and to waive fees for next year's license.

I am encouraged by recent developments that will bring much-needed Federal aid to fishing-dependent communities in California, including \$10 million in aid approved by the Senate Appropriations Committee. This relief, along with the recent fishery disaster declaration by the Secretary for Commerce, is a step in the right direction. But much more work needs to be done to provide full financial relief to

California's salmon fishermen and fishing-dependent communities, and to insure the long-term sustainability of this fishery.

While the Schwarzenegger Administration is working to address the immediate impacts of a reduced salmon fishing season, we realize that our work toward long-term solutions must continue. The Administration has budgeted more than \$21 million since 2003 for grants supporting critical salmon and steelhead habitat restoration projects. Governor Schwarzenegger also joined the Governor of Oregon in signing the Klamath River Watershed Coordination Agreement to develop a long-term management approach, common vision and integrated planning for the Klamath Basin. There is no easy solution to this challenge. Poor ocean conditions, drought, water management, disease, and unsuitable spawning habitat have plagued Klamath River Chinook Salmon for several years. These issues cross geographic and bureaucratic boundaries. However, this is the kind of problem that will require assistance from the Federal Government and a long-term partnership between Federal, state, and local governments, and all the other impacted stakeholders.

Conclusion

Thank you again for the opportunity to address the Subcommittee. The State of California and the Coastal States Organization stands ready to work with you on making important improvements to ocean and coastal management. We believe that will require bold new steps in establishing a clear Federal policy, to provide sufficient funding, and to identify a clear path for coastal states or others to access it. We look forward to the advancements that we can make in the coming year.

Senator SUNUNU. Thank you, Mr. Secretary. Our third witness is no stranger to the Halls of Congress, having served for eight terms in California's 16th District, I believe. Leon Panetta has also served as Chairman of the Pew Oceans Commission in addition to being the current Co-Chair of the Joint Ocean Commission Initiative. Welcome, Congressman Panetta—Chief of Staff Panetta.

STATEMENT OF HON. LEON E. PANETTA, CO-CHAIRMAN, JOINT OCEAN COMMISSION INITIATIVE

Mr. PANETTA. Thank you very much, Mr. Chairman and thank you as well to my two friends, Senator Boxer and Senator Lautenberg. I really appreciate the fact that this Committee is looking at the issue of the oceans and thank all of you for the leadership that you've shown on this issue.

I appear before you as Co-Chair of the Joint Ocean Commission Initiative. I was Chair of the Pew Oceans Commission. Admiral Watkins was Chair of the U.S. Commission. In his stead is Paul Kelly because as you know, he is recovering from an illness but he is doing well. The purpose of our joint initiative is basically to implement the recommendations of both commissions. What we found is that both commissions, through a series of hearings going across the country, came to the very same conclusions, which is that our oceans are in trouble. As some of you know, the Joint Ocean Commission Initiative responded to a letter from a bipartisan group of Senators that asked for, what are the key actions that need to be taken in the Congress? We presented that in this report called, *From Sea to Shining Sea** and I would ask that that be made part of the record, because that does outline the additional steps that need to be taken.

Let me just summarize very briefly the state of the current situation and I think some of things that are happening here that indicate some progress is being made. Our oceans are in crisis. All you

*This report is available at http://www.jointoceancommission.org/resource-center/1-Reports/2006-06-13_Sea_to_Shining_Sea_Report_to_Senate.pdf.

have to do is look at the front page of the *Washington Post* today if you want to see that continuing crisis. There is an article on the left-hand side of the *Washington Post* that talks about the fact that there are 20,000 beaches this last year that were either closed or put on advisories because of pollution problems. Turn to the third page, where it talks about filth in California ports. The *LA Times* is running a huge series on the problems dealing with our oceans. The reality is that we have some very serious problems. Our fisheries are being depleted. Few people—the President of the United States was stunned to find out that 90 percent of the large fish in the ocean are gone. Ninety percent of the large fish in the ocean are gone. Our fisheries are being depleted, whether it is cod, whether it is salmon. In my hometown of Monterey, California, we had a huge sardine industry. That industry was largely wiped out and doesn't exist today as a result. We are seeing increasing pollution, algae blooms that are spreading, not only into large dead zones appearing in the Gulf of Mexico, that are the size of the State of Rhode Island, but in addition to that, we are seeing dead zones now appearing off of the West Coast as well as off the East Coast, dead zones in which there is no sea life. There is nothing because of the pollution that is taking place. Coastal development, something we are all familiar with, you're all familiar with it from coastal states, huge coastal development—over 50 percent of our population lives near the coast and we expect another 20 million people to move to the coastlines within the next few years. That produces tremendous pressures. We've lost our wetlands. In California alone, 95 percent of our historic wetlands are gone. Those are the nurseries for the fisheries of the future. In addition to that, we have invasive species and we have problems with our coral reefs now, because of global warming and acidification. There is a real problem of acidity in our oceans that are not only impacting our coral reefs but if it continues, could literally wipe out ocean life as we know it. Then if you add to that, the governance problems that both commissions identified, the reality is that there is a fragmented, convoluted, uncoordinated approach to dealing with our oceans. There are a number of Federal laws, there are local laws and there is sometimes very little coordination between all of them. So those are some of the problems, obviously, that confront our oceans. The good news is that we can, in fact, deal with these problems and make progress and you are. Here in the Congress, on the Senate side in particular, I want to commend you for the work you've done on passing a strong Magnuson-Stevens bill. You've got an ocean exploration bill. You've got coastal zone management, marine debris, tsunami warnings, ocean observation, and coral legislation. I commend you for passing that legislation. I hope you will continue to push it through. The Executive Branch, I would commend as well, for establishing the Committee on Ocean Policy. Certainly the designation of the Northwest Hawaiian Islands National Monument and in addition to that, obviously tremendous progress is being made at the state-level in California and other states as well. But the bottom line is that there are areas that we need to pay attention to and I'm going to briefly hit the key areas.

Number one, we do need a national ocean policy in this country. We've done it for clean water, we've done it for clean air. We do

not have a national ocean policy that commits this country to protecting our oceans. We need to have that. Second, we need to establish and codify NOAA. NOAA was established by an Executive Order. You need to provide NOAA as the key agency involved here with ocean policy and establish that national ocean policy, hopefully as part of that codification. Third, you need to pass the Law of the Sea Treaty. My God! It is a disgrace that the United States of America is the only industrialized country in the world that has not confirmed the Law of the Sea Treaty. Most of you support it. It just has not come up to a vote on the floor. That is a disgrace. And the last point I would make, very frankly, is on funding, which was mentioned here. Less than 6 percent of our budget goes to the oceans. We need to provide better research, we need to provide science, and we need to provide education for our oceans. I commend Senators Mikulski and Thad Cochran and others that are restoring the funding that is needed in many of these programs and I hope you will continue to support that. A hundred years ago, Teddy Roosevelt established a commitment of this country to protecting our lands. A hundred years later, I think we can establish a commitment and a legacy for this country that protects our oceans. Thank you.

[The joint prepared statement of Mr. Panetta and Mr. Kelly follows:]

JOINT PREPARED STATEMENT OF HON. LEON E. PANETTA, CO-CHAIRMAN, JOINT OCEAN COMMISSION INITIATIVE AND PAUL KELLY, MEMBER, JOINT OCEAN COMMISSION INITIATIVE TASK FORCE

Chairman Sununu, Senator Boxer, and Members of the National Ocean Policy Study, we are pleased to appear before you today in our respective capacities as the Co-Chair and Task Force Member of the Joint Ocean Commission Initiative, a collaborative effort of members of the U.S. Commission on Ocean Policy and the Pew Oceans Commission. The purpose of the Joint Initiative is to advance the pace of change for meaningful ocean policy reform, and we are delighted to have the opportunity to join a discussion about how to improve ocean policy and governance and to share some of our thoughts about priorities for legislative action.

As many of you know, the Joint Ocean Commission Initiative delivered a report to the Senate on June 13, outlining just that—our priorities for Congressional action needed to address the many pressing issues we are facing with regard to our oceans. We request that a copy of our report be submitted as part of the public record for this hearing.* We delivered that report pursuant to a letter requesting our input from a bipartisan group of ten Senators, a number of you among them. We welcomed the opportunity to provide that input, just as we welcome the opportunity to share some of our findings and recommendations with you today.

The State of Our Oceans

Implicit in the topic for this hearing is “what is the state of our oceans?” and we have to report to you that the state is not good, and getting worse. There are many problems besetting our oceans and coasts, including:

- Overexploited fisheries that bring economic hardship to fishing communities and businesses and jeopardize the living marine resources held in trust for the benefit of all U.S. citizens.
- Enormous human, environmental, and economic impacts associated with hurricanes and other increasingly frequent and intense storms,
- Increasing frequency and size of harmful algal blooms in many of our coastal areas, including the Northeast and Florida,
- Massive Dead Zones in the Gulf of Mexico, as well as in the Chesapeake Bay and most recently off the coast of Oregon,

*This report is available at http://www.jointoceancommission.org/resource-center/1-Reports/2006-06-13_Sea_to_Shining_Sea_Report_to_Senate.pdf.

- Continued loss of coastal wetlands, despite conservation commitments,
- Growing problems due to introduction of invasive species, and
- Continuing loss of coral reefs.

And these problems are exacerbated by a dysfunctional, out-of-date, and inadequate system of ocean and coastal governance. For example:

- Fragmented laws, confusing and overlapping jurisdictions, and the absence of a coherent national ocean policy hinder our management efforts.
- A lack of Federal support for emerging regional ocean and coastal governance initiatives that hampers the ability of these initiatives to help solve important ocean and coastal problems.
- A dearth of U.S. leadership in international ocean and coastal forums threatens our national economic and security interests.
- Dwindling U.S. investment in ocean and coastal research, science, and education compromises our ability to tackle such problems as global warming, resource depletion, harmful algal blooms, invasive species, and non-point source water pollution, to name just a few.

Yet, we are also here to report to you that we are in a time of unprecedented opportunity. Today, as never before, we recognize the links among the land, air, oceans, and human activities. We have access to advanced technology and timely information on a wide variety of scales. We recognize the detrimental impacts wrought by human influences. We can and should act now to ensure that the ocean, coasts, and Great Lakes are healthy and productive and that our use of their resources is both profitable and sustainable.

As is made clear in the reports of the Pew Oceans Commission, U.S. Commission on Ocean Policy, and now the Joint Ocean Commission Initiative, our Nation's leaders need to take action now to reform ocean governance, pursue ecosystem-based management, improve fisheries management, rely more heavily on science in making management decisions, and adequately fund ocean and coastal programs. These recommendations reflect the conviction of the two Commissions that our Nation can change its course and achieve a new ocean blueprint for the 21st century.

The reports of the two Commissions bring into sharp focus the importance of our oceans and coasts to our Nation's natural heritage, security, and economy. With an offshore ocean jurisdiction larger than the total land mass of the United States, U.S. waters support rich and diverse systems of ocean life, provide a protective buffer, and support important commerce, trade, energy, and mineral resources. The economic contributions the oceans make are staggering:

- More than \$1 trillion, or one-tenth, of the Nation's annual gross domestic product (GDP) is generated within nearshore areas, the relatively narrow strip of land immediately adjacent to the coast.
- When considering all coastal watershed counties, the contribution swells to over \$6.1 trillion, more than half of the Nation's GDP.
- In 2003, ocean-related economic activity contributed more than \$119 billion to American prosperity and supported well over 2.2 million jobs.
- More than 13 million jobs are related to trade transported by the network of inland waterways and ports that support U.S. waterborne commerce.
- Annually, the Nation's ports handle more than \$700 billion in goods, and the cruise industry and its passengers account for \$11 billion in spending.
- The commercial fishing industry's total value exceeds \$28 billion annually, with the recreational saltwater fishing industry valued at around \$20 billion, and the annual U.S. retail trade in ornamental fish worth another \$3 billion.
- Nationwide retail expenditures on recreational boating exceeded \$30 billion in 2002.

Of course, these figures capture only a small part of our oceans' worth and potential.

Also consider that born of the sea are clouds that bring life-sustaining water to our fields and aquifers and drifting microscopic plants that generate much of the oxygen we breathe. The oceans host great biological diversity with vast medical potential and are a frontier for exciting exploration and effective education. Other ocean assets, such as functioning coastal habitats, contribute to the health of our environment and the sustainability of commercial and recreational resources. Still others assist in what our Nation's founders referred to as the "pursuit of happiness."

At the dawn of the 21st century, it is clear that these invaluable and life-sustaining assets are vulnerable to the activities of humans. Our failure to properly

manage the human activities that adversely affect our oceans and coasts is compromising the health of these systems and diminishing our ability to fully realize their potential.

Priorities for Congressional Action

Upon the release of the reports by the two Commissions, the President and Congress publicly embraced the major recommendations of the U.S. Commission on Ocean Policy and the Pew Oceans Commission. The President issued the U.S. Ocean Action Plan and established the Committee on Ocean Policy. Congress held hearings and introduced ocean-related legislation. At the state level, several Governors demonstrated strong leadership by initiating strategies for coordinating ocean and coastal science and policy in regions that include the Great Lakes, Northeast, Gulf of Mexico, West Coast, and Southeast, and states that include California, Washington, Massachusetts, New York, Florida, New Jersey, Alaska, and Hawaii.

These actions set high expectations for significant progress toward ocean policy reform. Results, however, have been slow in coming. There has been concerted attention to ocean and coastal issues by Congress, including, of course, hard work by the Senate Commerce Committee's National Ocean Policy Study, as well as the full Commerce Committee, and a number of bills that have made significant progress through the legislative process in the 109th Congress. The Joint Initiative strongly urges Congress to enact ocean and coastal legislation that has already progressed significantly, and in so doing demonstrate progress toward implementing the recommendations of the U.S. Commission on Ocean Policy and the Pew Oceans Commission. It is vitally important to realize some near-term successes while continuing the essential work of achieving the broader comprehensive reforms necessary to reverse the decline of our oceans. If enacted, these bills will demonstrate progress, address important issues, and show that Congress is serious about restoring the vitality of our oceans. These bills are summarized in *Appendix A* to this written testimony, and include:

- Magnuson-Stevens Fishery Conservation and Management Act.
- Marine Debris Research, Prevention and Reduction Act.
- Tsunami Preparedness Act.
- National Ocean Exploration Program Act.
- Coastal Estuarine Land Protection Act.
- Coral Reef Conservation Amendments Act.
- Ocean and Coastal Mapping Integration Act.
- Ocean and Coastal Observing System Act of 2005.
- Coastal Zone Enhancement Reauthorization Act.
- Ballast Water Management Act of 2005.
- Water Resources Development Act of 2005.
- Flood Insurance Reform and Modernization Act of 2006.

In addition to passing pending bills such as the ones mentioned above, outlined below are several additional legislative proposals that the Joint Ocean Commission Initiative believes provide a solid framework for action by Congress. Many of these actions can and should be carried out right away, signaling progress and paving the way for some of the more challenging and long-term measures that will be needed to achieve meaningful ocean policy reform.

Congress should adopt a statement of national ocean policy, acknowledging in legislation the importance of oceans to the Nation's economic and ecological health and adopting a national policy to protect, maintain, and restore marine ecosystems so that they remain healthy, resilient, and able to deliver the services people want and need.

A statement of national ocean policy should include recognition that it is the policy of the United States to establish and maintain for the benefit of the Nation a coordinated, comprehensive, and long-range national program of ocean and atmospheric research, conservation, management, education, monitoring, and assessment. A new declaration of national ocean policy should incorporate provisions relating, but not limited to, the following concepts:

- acknowledge the linkage of ocean, land, and atmospheric systems.
- protect, maintain, and restore the long-term health, productivity, and diversity of the ocean environment.
- protect life and property against natural and manmade hazards.
- ensure responsible management and sustainable use of fishery resources and other ocean and coastal resources held in the public trust, using ecosystem-based management and a balanced precautionary and adaptive approach.

- assure sustainable coastal development based on responsible state and community management and planning.
- develop improved scientific information and use of the best scientific information available to make decisions concerning natural, social, and economic processes affecting ocean and atmospheric environments.
- enhance sustainable ocean-related and coastal-dependent commerce and transportation, balancing multiple uses of the ocean environment.
- provide for continued investment in and improvement of technologies for use in ocean and climate-related activities.
- expand human knowledge of marine and atmospheric environments and ecosystem.
- facilitate a collaborative approach that encourages the participation of diverse stakeholders and the public in ocean and atmospheric science and policy.
- promote close cooperation among all levels of government, academia, nongovernmental organizations, the private sector, and other stakeholders based on this policy to ensure coherent, accountable, and effective planning, regulation, and management of activities affecting the oceans and the atmosphere.
- enhance and preserve the role of the United States as a global leader in ocean, atmospheric, and climate-related activities.

Congress should establish the National Oceanic and Atmospheric Administration (NOAA) in law and work with the Administration to identify and act upon opportunities to improve Federal agency coordination on ocean and coastal issues. Congress should pass a strong Organic Act establishing NOAA as the lead civilian ocean agency and restructuring the agency to enhance its ability to fulfill its core mission to further our understanding of oceans and coasts and apply that knowledge to effectively manage our marine resources on an ecosystem basis. Specifically, a NOAA Organic Act should:

- Establish NOAA as the lead civilian ocean agency by statute.
- Set forth core missions of: assessment, prediction, and operations; ecosystem-based management of ocean and coastal areas and resources; and science, research, and education.
- Call for reorganization of the agency along functional lines to better equip it to carry out its core mission and remain science-based, but with its management programs better connected to make use of that science in decisionmaking.
- Establish leadership roles and accountability mechanisms for implementation of major elements of the agency's mission.

NOAA was established in 1970 by a Presidential reorganization order and has operated under that authority since that time. Over the years, several bills have been introduced that can provide the basis for an Act that would codify NOAA. Most recently these include the National Ocean Policy Leadership Act (S. 2647), which was introduced by former Senator Ernest F. Hollings in the 108th Congress. The Bush Administration has put forward simple Organic Act language, and Congressman Vernon recently reintroduced his National Oceanic and Atmospheric Administration Act (H.R. 5450), which reported out of the House Committee on Science in June and was referred to the House Committee on Resources, which is expected to consider the legislation by addressing NOAA's resource and conservation activities, issues that fall under that committee's jurisdiction. By building on these bills, Congress can codify and strengthen NOAA and thereby enhance its mission, improve its structure, and better enable it to carry out existing and new responsibilities in a manner that is consistent with ecosystem-based management.

In addition, although NOAA plays a very important role and should be strengthened to carry out its mission, there are a number of other Federal agencies with ocean and coastal responsibilities and important ocean science and research programs, including the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA). Congress should take action to enhance Federal agency coordination and leadership by conducting oversight of the Administration's implementation of the U.S. Ocean Action Plan to evaluate whether modifications or improvement are needed and work with the Administration to identify opportunities to strengthen the interagency processes for coordinating ocean and coastal issues.

In this regard, the Joint Initiative recommends Congressional actions that include:

- Require the Administration to prepare a progress report outlining priorities, activities, and results achieved by the Committee on Ocean Policy and its related subcommittees, including implementation of the U.S. Ocean Action Plan and the overall effectiveness of the interagency structure.
- Schedule a National Ocean Policy Study oversight hearing on national ocean governance with discussion of the progress of the interagency structure as a topic.
- Based on the results of the progress report and the oversight hearing, pass legislation that would:
 - Codify a permanent Federal coordinating committee with staff support provided by an Office of Ocean Policy in the Executive Office of the President to oversee the Federal Government's implementation of a national ocean policy, resolve interagency disputes, and coordinate ocean budgets (or manage the integrated oceans budget).
 - Call upon the President to appoint an Assistant to the President to provide leadership and support for implementation of the national ocean policy.
 - Establish a non-Federal Council of Advisors to provide advice on ocean and coastal issues.

Congress should foster ecosystem-based regional governance. Congress should pass legislation to create a national framework to support regional approaches and collaboration and enable coordinated, integrated ecosystem-based management that builds on existing regional and ecosystem-based efforts. This framework should guide the development and implementation of processes that involve Federal, state, tribal, and local governments, as well as the private-sector, nongovernmental organizations, and academic institutions, working together toward regional actions that advance national ocean and coastal interests. Regional governance mechanisms will vary to meet needs of different regions, but should be encouraged to possess the following characteristics:

- Regional governance entities that are manageable in size (approximately 20–25 representatives) with a mix of Federal agency and state representatives.
- Regional entities that are advised and supported by a citizens' advisory committee.
- Development of regional ocean strategic plans that:
 - Identify short- and long-term goals.
 - Assess the region's social, economic, and ecological characteristics to guide progress toward those goals.
 - Determine priority issues and solutions to address them.
 - Identify indicators of management efforts.
 - Analyze gaps in authority.
 - Identify and prioritize research, data, and information needs.
 - Commit to dedicated public education and outreach efforts.
 - Implement solutions or policies to address priority problems.

In addition, Congress should improve Federal coordination of regional activities by calling upon the President to direct Federal agencies to identify opportunities to further coordinate existing programs and activities to assist and support more effective implementation of regional approaches. Improving coordination of Federal agency activities at the regional level would be an important complement to state, local, and tribal efforts to address ocean and coastal resource management issues on a regional basis. Enhanced coordination would enable Federal agencies to better address state and local needs while also furthering national goals and priorities.

Congress can further enable the transition toward an ecosystem-based approach by expressly acknowledging that management of all marine resources should be carried out in an ecosystem-based approach, and by calling upon Federal agencies to develop guidelines that enable improved coordination and analysis to assist in the transition toward an integrated management approach that considers the entire ecosystem. Such an express acknowledgment should be part of ocean, coastal, and water laws currently up for reauthorization. These include the Magnuson-Stevens Fishery Conservation and Management Act, the Coastal Zone Management Act (CZMA), the National Marine Sanctuaries Act, the Clean Water Act, and other statutory regimes governing the use and management of ocean and coastal resources.

Through reauthorization or passage of these statutes, Congress can provide that management goals should be set to ensure that ocean and coastal ecosystems remain productive with respect to all resources. For example, through language in-

cluded in the reauthorization of the Magnuson-Stevens Act, Congress can acknowledge that a first step toward effective ecosystem-based management of fisheries is to enable coordinated analysis of cumulative impacts of activities on fishery resources, as well as the impacts of fishing activities on other sectors, by developing guidelines for Regional Fishery Management Councils and other state and Federal agencies and management entities to perform such analyses.

Likewise, through reauthorization of the CZMA, Congress can require that state coastal programs work with Federal, state, and local agencies to provide for periodic assessments of the state's natural, cultural, and economic resources, and based on those assessments, set specific, measurable goals that reflect the growing understanding of ocean and coastal environments and the need to manage growth in regions under pressure from coastal development. Congress can also direct that states redefine the landward reach of their coastal zones to include coastal watersheds, thus better enabling coastal programs to look across political boundaries and incorporate a coastal watershed focus and the basic tenets of ecosystem-based management.

Statutory acknowledgement of the need to incorporate ecosystem-based management into marine resource management regimes is intended to be a first step toward ecosystem-based management by enabling improved coordination and analysis among agencies managing marine resources and providing for a transition toward an integrated management approach that considers the entire ecosystem.

Congress should reauthorize an improved Magnuson-Stevens Fishery Conservation and Management Act that incorporates a stronger reliance on science to guide management actions to ensure the long-term sustainability of U.S. fisheries. Further, it should reinforce the principle that fishery resources are held in the public trust for the benefit of all U.S. citizens and need to be managed in a way that considers the relationships between and among all components of the marine ecosystem. In addition, care should be taken to avoid changes that compromise existing conservation provisions or allow exemptions to established review processes that help ensure that fishery-related actions are considered in a broad ecosystem context.

Progress on the reauthorization of the Magnuson-Stevens Act is promising. We applaud Senator Stevens, the Chairman of your parent Committee, and the many other Senators who helped move S. 2012 through the Senate. We have high expectations that the House will move its reauthorization bill to the floor after the August break and a resolution of the few differences between the House and the Senate will be reached before adjournment.

We are pleased that both bills address recommendations made by the U.S. Commission on Ocean Policy and the Pew Oceans Commission. We would simply reiterate that, while progress on these bills is encouraging, the Joint Initiative believes that a final bill should reflect the principles outlined above, and therefore should:

- Avoid any rollback of existing law that could result in increased fishing pressure on vulnerable stocks and threaten their ability to rebuild.
- Show greater movement toward ecosystem-based management.
- Strengthen provisions to ensure that the best available science is used to make management decisions.
- Retain the provision in S. 2012 that strengthens the ability of the United States and international fishery management organizations to combat illegal, unreported, and unregulated fishing.

In addition, the Joint Initiative supports provisions in S. 2012 that strengthens the ability of the United States and international fishery management organizations to combat illegal, unreported, and unregulated fishing. The Joint Initiative encourages the House and Senate to work together to enact a strong Magnuson-Stevens reauthorization bill in 2006.

The United States should accede to the United Nations Convention on the Law of the Sea. The U.S. Senate should provide its advice and consent to U.S. accession to the convention so that the United States can once again assume a leadership position in international forums deciding such vital ocean matters as jurisdictional claims over the continental margin with its vast energy resources, deep seabed mining, scientific research, and environmental protection.

The Joint Initiative agrees with the President that accession supports vital U.S. national security, economic, and international leadership interests and that rapid Senate approval is needed. As a party, the United States would be in the best position to lead future applications of this framework for regional and international cooperation in protecting and preserving the marine environment. U.S. accession to the convention would send a clear message in support of our efforts to foster international approaches while significantly furthering our own national interests. As

the lone industrialized nation not part of the convention, we jeopardize our role as a world leader by failing to join.

The convention has been thoroughly reviewed in Senate hearings and public forums, and U.S. accession is supported by a broad coalition of ocean interests. The Navy and Coast Guard have testified that joining the convention will strengthen our ability to defend freedoms of navigation and overflight essential to military mobility and our homeland security efforts. All major U.S. industries, including offshore energy, maritime transportation and commerce, underwater cable communications, and shipbuilding support U.S. accession to the convention because its provisions help protect vital U.S. economic interests and provide the certainty and stability crucial for investment in global maritime enterprises. Environmental organizations strongly support the convention as well.

The Senate should adopt a Sense of the Senate Resolution that supports the Administration's position in the World Trade Organization (WTO) negotiations calling for an end to fishing subsidies that promote overcapitalization and subsequently contribute to the global depletion of fish stocks. Such an action would send a strong signal to the WTO negotiations, where legally binding language on fish subsidies is currently being developed, and would further reinforce the Senate's leadership role in ocean and coastal policy reform. In addition, the U.S. Commission on Ocean Policy and the Pew Oceans Commission reports both identified overcapitalization of the global commercial fishing fleet as a major contributor to the widespread depletion of economically-important fish stocks. At the global level, a significant factor in the continued overcapitalization of the commercial fishing fleet is the system of fishing subsidies that exists in many countries. Fishing subsidies that support overcapitalization harm the competitiveness of U.S. exports in the international seafood market and promote illegal, unregulated, and unreported (IUU) fishing, which further harms our domestic commercial fisheries, both ecologically and economically. According to the Office of the U.S. Trade Representative, the international commercial fishing industry receives annual subsidies of at least \$15 billion, equivalent to more than 20 percent of the value of the world's commercial fish catch.

Congress should expand innovation and competitiveness legislation to incorporate ocean science and education consistent with the Bush Administration's Ocean Research Priorities Plan and Implementation Strategy. The innovation and competitiveness initiative being pursued as a result of the recommendations issued by the National Academies in its report, *Rising Above the Gathering Storm*, highlights the importance of improving and maintaining strong research and education programs. Ocean-related research and education programs in agencies across the Federal Government hold immense potential for propelling the economic interest of the United States and should be incorporated into this initiative.

The Ocean Research Priorities Plan and Implementation Strategy will identify the best investment opportunities in marine science. Our oceans are rich in energy resources, marine biotechnology is a rapidly growing industry that is capitalizing on the vast biological and genetic diversity of marine life, and advanced underwater vehicles are opening up an era of ocean exploration that has captured the imagination of a new generation of school-aged children. Cutting-edge research using massive oceanic and atmospheric data sets and a new focus on promoting multi-disciplinary studies in support of ocean science are laying the groundwork for technological advances and a sophisticated workforce that will allow our Nation to be a leader in the global shift toward a service sector that provides environmentally-sensitive technologies and policies.

Congress and the President have proposed legislative and funding initiatives to implement innovation and competitiveness activities, with a focus on programs in the Department of Energy, NSF, and the National Institute of Standards and Technology. Congress should expand its vision and include enhanced programs for ocean-related research and education as part of the initiative. Congress should target the initiatives identified by the President's Committee on Ocean Policy in its Ocean Research Priorities Plan and Implementation Strategy, which is currently in development. This strategy, developed with input from the ocean community and subject to a comprehensive review by a special National Academies review committee, will identify ocean-related research and education priorities government-wide, providing Congress with an ocean science funding roadmap. This strategy is scheduled to be completed at the end of the year. However, the other priority recommendations described in this section offer immediate opportunities to focus and strengthen currently uncoordinated programs and platforms from which new initiatives can be launched.

Congress should enact legislation to authorize and fund the Integrated Ocean Observing System (IOOS). The IOOS is the domestic element of the international Global Ocean Observing System, which is part of the Global Earth Observing System

of Systems. Congress should authorize and fund a comprehensive and sustained national IOOS that will support and enhance our ability to understand and manage ocean and coastal resources in a number of ways, including: protecting lives and livelihoods from natural hazards; supporting national defense and homeland security efforts; safeguarding public health; developing new energy resources; adapting to climate change; and conserving biodiversity. Congress needs to consider both ground- and space-based research (NASA, NSF) and operational (NOAA) ocean-observing assets in developing the budget for the IOOS. Implementation of the IOOS should be carried out in a manner that recognizes, nurtures, and makes use of existing non-Federal infrastructure and capacity.

Together, IOOS, the international Global Ocean Observing System, and the multi-dimensional Global Earth Observing System of Systems offer scientists and managers a more complete view of atmospheric, terrestrial, and oceanic interactions occurring at the global, national, and regional scales.

IOOS, broadly speaking, provides the infrastructure and tools needed to translate science into products and services needed by decisionmakers. IOOS supports the hardware, software, data management, synthesis, and modeling activities that integrate the data and information generated by the research community. IOOS also helps ensure that research efforts are directed toward issues and questions that are limiting the capacity of decisionmakers to make informed policy and regulatory decisions. For example, IOOS supports activities such as the enhanced water quality monitoring system called for in the President's Ocean Action Plan, ecosystem modeling that supports multi-species management of our ocean fisheries, and forecasting and tracking harmful algal blooms.

IOOS is also where disparate data sets are integrated to detect short- and long-term shifts in the health and productivity of key ecosystems and where socioeconomic trends are analyzed. This information is then synthesized and translated into products that are understandable to decisionmakers, who then use it to guide their decisions. Hidden inside this process are infrastructure requirements (*e.g.*, ships, satellites, sensors, laboratories, computer soft- and hardware) and the development of tools (*e.g.*, new or expanded ecosystem models) that are increasingly sophisticated and costly. Consequently, a comprehensive IOOS requires Congress to pass authorizing legislation that will guide both the activities of Federal agencies and the numerous state and private sector partners who are also deeply vested in the system. Without a clear specification of the roles and responsibilities of the various players and increased funding to implement such a system, the ocean will continue to be the weak link in a global observing system that is already driving major economic policymaking.

Congress should establish a New Ecosystem Research Initiative to foster scientific cooperation and integration by rewarding interagency and multidisciplinary research that addresses ecosystem questions. Decisionmakers need information that will help them manage human activities and natural resources in a manner that provides the greatest benefit to the Nation. While there is broad agreement among scientists and natural resource managers that the United States must transition toward ecosystem-based management, there is considerable confusion about what this process entails. Will specific ecosystem concerns, such as the fate or habitat needs of an endangered species, or a regime-wide phenomenon, such as climate change, take precedent over human priorities? Are we headed toward dramatic ecological regime shifts induced by human activities, or are these changes being driven by natural processes?

These are legitimate questions that require the government to develop a more coherent and broad-based research program. Such a program must be based on multidisciplinary approaches and the cooperation of scientists from differing disciplines within and outside the government. An Ecosystem Research Initiative should integrate ongoing basic and applied ecosystem research across the spectrum of Federal agencies currently engaged in such research. The consolidation of ecosystem-related research activities under a broad interagency cross-cutting initiative—perhaps modeled on the Climate Change Research Program—is key to delivering usable information to managers and policymakers. For the initiative to be successful, it must be granted an appropriate level of discretionary funding authority to direct existing and new resources toward high priority research areas through a competitive process.

Congress should support an enhanced National Ocean Exploration Program. It should enact a National Ocean Exploration Program Act that supports an expanded national ocean exploration program. A robust exploration program that coordinates, enhances, and strengthens activities across Federal agencies is a missing link in a national strategy to better understand the Earth's environment. Exploration focuses on curiosity-driven research of ocean-related processes, properties, and places that

are poorly known or understood. Put into context, more than 1,500 people have climbed to the summit of Mt. Everest, more than 300 have journeyed into space, 12 have walked on the moon, but only 2 people have descended and returned in a single dive to the deepest part of the ocean, spending less than 30 minutes on the ocean bottom, 95 percent of which remains unexplored.

The opportunity is ripe to develop a multi-agency exploration initiative given the placement of NOAA, NSF, and NASA in the same Congressional Appropriations Subcommittee, augmented by the support and guidance provided by the Navy. Such an initiative should work across the spectrum of the biological, chemical, and geological sciences and be guided by a competitive process coordinated by NOAA and NSF with strong guidance from the research community. It should ensure that resulting technological and scientific advances, like other basic research programs, will generate returns far in excess of their costs.

The discovery of new ecosystems and species has the potential for accelerating our understanding of the origin of life and evolutionary processes on Earth and possibly on other planets as well. An expanded national ocean exploration initiative will allow Congress and the Administration to create a legacy that will be recognized by future generations as a turning point in the development of a national ocean policy.

Congress should support a National Ocean Education Strategy. Congress should mandate the development of a national ocean education and outreach strategy that coalesces and integrates the existing array of independently conceived and implemented education and outreach programs and activities. There are growing numbers of ocean-related education and outreach activities occurring at all levels of government and within the nongovernmental sector. The lack of a coherent strategy for aligning these activities is compromising their effectiveness and limiting their capacity to generate additional funding support. Congress should work with the President to establish a governing body responsible for developing a national ocean education and outreach strategy. The strategy should enhance educational achievement in the natural and social sciences, increase ocean awareness, include a five-year plan for formal and informal activities, and facilitate links among Federal, state, local, and nongovernmental programs. NOAA and NSF should be given the lead for this activity, and Congress should look for opportunities to increase support for successful programs within these and other agencies, such as the NSF Centers for Ocean Science Education Excellence.

Congress should establish an Ocean Trust Fund in the U.S. Treasury as a dedicated source of funds for improved management and understanding of ocean and coastal resources by Federal and state governments. Both Commissions addressed the need for stable funding for implementing their recommendations, making the case that our oceans, coasts, and Great Lakes are major contributors to the U.S. economy, with half the Nation's GDP generated in coastal watersheds. Maintaining the economic and ecological viability of our oceans and coasts requires decision-makers at the national and state governmental levels to have access to unbiased, credible, and up-to-date information to make informed decisions. Unfortunately, chronic under-investment has left much of our ocean-related infrastructure in woefully poor condition. In addition, Federal and state ocean and coastal agencies need more financial resources to meet the challenges that were so clearly documented in the reports of the two Commissions.

Given this acknowledged under-investment, each Commission was well aware of the budget implications inherent in its set of recommendations. Implementation costs outlined in the two reports arrived at similar projections—it will cost approximately \$3–4 billion in new funds annually to meet the needs of a comprehensive ocean policy. A portion of those funds should be allocated to *all* coastal states to help sustain their renewable coastal resources. The other portion should be used to support the programs and activities of the various Federal agencies with ocean and coastal responsibilities. To address these needs and to demonstrate a national commitment to a new national ocean policy, each Commission recommended that an Ocean Trust Fund, composed of *dedicated* resources, be established in the U.S. Treasury.

However, each Commission had a somewhat different approach to the sources of and uses for the funds. The U.S. Commission on Ocean Policy proposed a dedicated fund in the U.S. Treasury to be composed of all “unallocated” receipts from outer continental shelf (OCS) oil and gas development and resource rents from other new and emerging Federal offshore activities. The U.S. Commission made clear that its proposal would not affect programs that currently receive OCS oil and gas revenues, specifically the Land and Water Conservation Fund and two additional programs. Rather, only after revenues for those programs were allocated in accordance with law, would any remaining offshore proceeds be deposited in the Trust Fund to be

used by all coastal states and Federal ocean agencies for a range of purposes. Generally, those purposes for the coastal states (to receive \$1 billion annually) would focus on the conservation and sustainable development of renewable ocean resources, including any new responsibilities that arise as a result of the U.S. Commission's recommendations and the enhancement of programs that are currently under-funded. Additionally, the U.S. Commission recognized that the OCS producing states should be compensated for the impacts of energy activity in adjacent Federal waters. Finally, the remainder of the funds would be distributed among Federal agencies to address the new or expanded activities assigned to them as a result of Commission recommendations.

The Pew Oceans Commission recommended that Congress create a permanent, dedicated fund for coastal conservation. It looked at a broad range of potential sources of ocean-related revenues, but ultimately recommended using general revenues with the additional suggestion that Congress consider tapping proceeds derived from OCS oil and gas development for habitat protection. The Pew Commission went on to maintain that this should be done in a way that does not encourage additional OCS energy development.

We are aware that recently the House, and on Monday of this week, the Senate, each took action to move bills that, in part, would share a portion of OCS oil and gas receipts with "producing" or "adjacent" coastal states. As noted above, these bills indirectly address one of the key issues reviewed by each of our Commissions—the source of ocean-related financial resources dedicated to carry out a range of ocean and coastal activities, including those occasioned by offshore energy activity and those needed to implement a new and comprehensive national ocean policy (Ocean Trust Fund). With respect to such sources and the eligible uses of the revenues, the Joint Initiative recognizes that there are several options to consider and difficult decisions to be made. We stand ready to engage with Congress in an ongoing discussion about how to resolve these important issues. In the end, establishing a dedicated Ocean Trust Fund is one of the most important early steps Congress could take to demonstrate its commitment to a new national ocean policy.

Congress should increase base funding for core ocean and coastal programs. The loss of funding for some key ocean and coastal programs in FY 2006 and the lack of enhanced funding to address high-priority challenges identified in the Commissions' reports must be reversed if we are to preserve the economic benefits derived from ocean-dependent activities and protect the health and productivity of ocean and coastal ecosystems. Congress should increase funding for ocean and coastal activities throughout the Federal Government in FY 2007 and beyond, with an initial focus on enhancing core base programs and support for a few broad initiatives. To this end, the Joint Initiative would like to convey our deep appreciation for support provided for ocean-related programs in the FY 2007 Commerce, Justice, Science appropriations bill reported out of the Committee on Appropriations this month. We are heartened by the Senate's strong action and available to help secure the needed support for the spending bill as it goes before the full Senate and into conference with the House of Representatives. Details related to the Joint Initiative's funding recommendations are provided in *Appendix B* to this written testimony.

Further, Congress should direct that the Administration develop an integrated ocean budget. The lack of a coherent listing and analysis of ocean and coastal programs distributed throughout the Federal Government hampers the ability of Congress and the Administration to evaluate, coordinate, and integrate ocean- and coastal-related science, management, and education programs within agencies across the Federal Government. To address this problem, either as separate legislation or as part of an appropriations bill, Congress should direct the President to submit an integrated ocean budget, making it easier to track support for and analyze the progress of departmentally-isolated but highly interactive ocean and coastal programs, and thus facilitating greater coordination among Federal programs.

Conclusion

We close by commending this National Ocean Policy Study and its staff for your commitment to making meaningful change in the way we manage our oceans and coasts. The time is ripe for Congress again to act boldly to transform a dysfunctional Federal management regime into a truly effective and farsighted system for managing our magnificent oceans and coasts to benefit current and future generations. The members of the Joint Ocean Commission Initiative stand ready to assist the Congress in every way possible to meet this formidable challenge.

APPENDIX A—PENDING OCEAN AND COASTAL LEGISLATION IN THE 109TH CONGRESS

The following lists a number of bills that have progressed significantly through the 109th Congress, passage of which would signal progress and demonstrate Congressional commitment to addressing the need to improve management of our oceans and coasts. This list does not include reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act, which is discussed in the body of this testimony.

Marine Debris Research, Prevention and Reduction Act (S. 362) establishes within NOAA a Marine Debris Prevention and Removal Program that would reduce the adverse impacts of lost and discarded fishing gear on living marine resources and navigation safety and would encourage outreach and education of the public and other stakeholders in the fishing, fishing gear manufacturing, and plastic and waste management industries. This bill has been approved by the Senate and in the House was referred to the Committee on Transportation and Infrastructure and additionally to the Committee on Resources. Both Committees have reported the bill and it was placed on the House calendar on July 24, 2006.

Tsunami Preparedness Act (S. 50) directs the Administrator of NOAA to improve our Nation's tsunami detection, forecast, warning, preparedness, and mitigation capacity through improved sensing technology, data collection and analysis abilities, and information and communication systems. The bill directs the Administrator to take a strong international leadership role to facilitate the development of a global warning system. This bill was passed by the Senate in July 2005. In the House, it was referred to the Committees on Resources, Science, and Transportation and Infrastructure.

National Ocean Exploration Program Act (S. 39) calls for the Secretary of Commerce to develop within NOAA a coordinated national ocean exploration program that will increase scientific knowledge for the informed management, use, and preservation of oceanic, coastal, and large lake resources through undersea research, exploration, education, and technology development. This bill was passed by the Senate in July 2005. In the House, it was referred to the House Committees on Resources and Science.

Coastal and Estuarine Land Protection Act (S. 1215) would codify an existing Federal program in NOAA by which coastal states can compete for matching funds to acquire land or easements for the protection of sensitive coastal ecosystems with the goal of better ensuring the ecological and economic health of coastal communities. This bill has been reported out of the Senate Commerce Committee and placed on the Senate calendar. A companion bill in the House, H.R. 3187, has been referred to the Committee on Resources.

Coral Reef Conservation Amendments Act of 2005 (S. 1390) enhances funding for coral reef conservation, creates a community-based planning grants program to implement locally designed coral management and protection plans, and strengthens Federal authority to undertake emergency response actions to prevent or mitigate imminent coral reef destruction from vessel or other physical damage. This bill was passed by unanimous consent in the Senate and has been referred to the Committee on Resources in the House.

Ocean and Coastal Mapping Integration Act (S. 364) directs the Administrator of NOAA to establish a program to develop a coordinated and comprehensive Federal ocean and coastal mapping plan for the Great Lakes and coastal state waters, the territorial sea, the Exclusive Economic Zone, and the continental shelf of the United States. The mapping plan should enhance ecosystem approaches in decisionmaking, establish research priorities, and advance ocean and coastal science. This bill has been reported out of the Senate Commerce Committee and placed on the Senate calendar.

In addition, the following bills should be high priorities for Congress to work on this year. The Joint Initiative is working to provide input on specifics of each of these bills and stands ready to work with Congressional staff to ensure that these bills incorporate the principles embodied by the two Commissions in their reports.

Ocean and Coastal Observation System Act of 2005 (S. 361) calls on the President to establish an integrated system for ocean and coastal observation that would provide data and information for the timely detection and prediction of changes in the ocean and coastal environment that impact the Nation's social, economic, and ecological systems. This bill was passed by the Senate in July 2005. In the House, it was referred to the House Committees on Resources and Science.

Coastal Zone Enhancement Reauthorization Act (S. 360) would improve the planning and coordinating capabilities of coastal states, support community-based planning to address pressing development issues in the coastal zone, protect coastal habitats, and encourage the development and use of innovative technology in coastal

and estuarine management. This bill was the subject of a hearing by the Senate Committee on Commerce, Science, and Transportation and was reported favorably by the Committee. It is currently on the Senate legislative calendar.

Ballast Water Management Act of 2005 (S. 363) is designed to prevent ballast water introductions of nonindigenous species, and address aquatic nuisance species and the significant adverse environmental and economic harm that results from these releases. The bill was reported from the Senate Committee on Commerce, Science, and Transportation in November 2005 and is currently on the Senate legislative calendar.

The Flood Insurance Reform and Modernization Act of 2006 (S. 3589) would forgive nearly \$24 billion owed to the U.S. Treasury by the National Flood Insurance Program for the 2005 hurricane season. It would also phase-out premium subsidies on all non-primary residences and severe repetitive loss properties and calls for new standards that program officials must use to complete a floodplains map modernization process. This bill was introduced at mark-up and reported out of the Senate Committee on Banking, Housing, and Urban Affairs and was placed on the Senate calendar.

Water Resources Development Act of 2005 (S. 728) would reauthorize the Act and reform the U.S. Army Corps of Engineers. The bill was reported by the Senate Committee on Environment and Public Works in April 2005, and is on the Senate legislative calendar. It underwent Senate floor action in July 2006 and was returned to the Senate calendar.

APPENDIX B—OVERARCHING INITIATIVES FOR FUNDING INTEGRATED OCEAN AND COASTAL GOVERNANCE

As Congress considers ocean-related funding during the FY 2007 appropriations process and beyond, its funding priorities should recognize and support programs and activities that strengthen the long-term economic health of the Nation. The ocean and coastal economies of the coastal states generate roughly three-quarters of the Nation's annual GDP, exceeding \$7.0 trillion in 2000. The "ocean economy" alone, meaning those activities that rely specifically on the oceans to support production, generated approximately \$120 billion in 2000. Thus, the ocean economy was almost 2.5 times larger than the agricultural economy in terms of output and over 150 percent larger than employment in the farm sector.¹

Unfortunately, under-investment in core ocean and coastal science, management, and education programs have left the Nation vulnerable to both chronic and catastrophic threats along our coasts. Poor water quality due to non-point source pollution, ecologic degradation associated with invasive species and habitat loss, and inappropriate land use that has resulted in escalating costs associated natural hazards are all evidence of the inadequacies of current ocean and coastal governance and funding regimes.

Further exacerbating the situation is the fact that the funding regime for Federal ocean-related programs is in disarray. NOAA, the Nation's lead civilian ocean agency, has a \$3.9 billion budget consisting of hundreds of budget lines, which support important but discrete activities. Ocean and coastal programs in other agencies, such as DOI, EPA, and NASA, are often considered lower priorities and suffer from chronic under-investment. The lack of emphasis on enhancing core ocean programs and activities across the government is clearly illustrated by the Administration's 2005 *Ocean and Coastal Activities Report to the U.S. Congress*² outyear budget projection for FY 2010, which shows decreases in most agencies' ocean budgets, with NOAA decreasing by \$60 million, Department of Defense by \$180 million, NASA by \$90 million, Department of Transportation by \$120 million, and USDA by \$100 million, while the ocean budget for DHS increases by \$500 million.

Due to the wide distribution of ocean-related programs throughout the Federal system and the lack of a coherent process for monitoring their support, the Joint Initiative recommends that Congress begin moving toward a more comprehensive funding regime for ocean-related programs that is capable of focusing on high priority, large-scale initiatives that provide the agencies with increased flexibility and discretionary funding authority to respond to existing and emerging challenges. This will require a significant shift in the Administration budget formulation process, as well as how Congress exercises its fiscal oversight of Federal ocean programs and activities.

¹*An Ocean Blueprint for the 21st Century*. U.S. Commission on Ocean Policy, Appendix C, 2004.

²*Federal Ocean and Coastal Activities Report to the U.S. Congress*. Prepared by the Inter-agency Committee on Ocean Science and Resource Management Integration. December 2005.

Following the approach outlined above, the Joint Initiative has identified four broad functional categories for organizing ocean and coastal funding. These are:

- Ocean Governance and Coastal Management.
- Ocean Science and Research.
- Monitoring, Observing, and Mapping.
- Ocean Education and Outreach.

Outlined below, the Joint Ocean Commission Initiative recommends \$715 million in new funding above FY 2006 levels to cover the costs of implementing a new national ocean policy consistent with the recommendations of the two Commissions. In addition, recommended new funds for implementing a strengthened Magnuson-Stevens Fisheries Act (\$29 million) and for implementation costs related to accession to the United Nations Convention on the Law of the Sea (\$3 million) bring the overall new funding needed to a total of \$747 million.

Funding Category 1: Ocean Governance and Coastal Management

Congress should provide funds to support new governance efforts at both the Federal and regional levels, with additional emphasis on expanding support for watershed initiatives that support ecosystem-based management. Moving toward an ecosystem-based management approach will demand major changes to the current Federal approach to ocean management and governance. The coordination and integration required as part of this process has demanded considerable additional effort by managers given the increasing complexity of the issues being addressed, such as evaluating cumulative impacts on coastal watersheds. This process should mature over time, but it will languish unless managers are provided with additional funding to help facilitate the communication and coordination needed to make it successful. While funding is needed across a broad spectrum of ocean management activities, the Joint Initiative believes that the greatest potential for short-term gains is associated with the support for the following actions.

Support for the new interagency coordination efforts. The President established the Committee on Ocean Policy and its supporting science and policy coordination subcommittees to facilitate greater interagency collaboration and communication. The costs associated with these efforts have been borne by the member agencies, which provide staff and funding to support the interagency effort. While this is a functional approach, providing both CEQ and the Office of Science and Technology Policy with \$500,000 each to support a small permanent staff dedicated to supporting interagency cooperation, as recommended by both Commissions, would greatly increase the effectiveness of the current effort to integrate Federal programs and also enhance Federal, state, and regional partnerships. *Total: +\$1 million.*

Support regional coordination. Efforts to develop regional ocean and coastal coordination strategies are increasing around the Nation. Great progress has been made in the Great Lakes and the Gulf of Mexico, and efforts are beginning to emerge on the West Coast and in the Southeast. Funding for these efforts has come from a mixture of sources, but there is no coherent Federal strategy for supporting these efforts. The U.S. Commission on Ocean Policy estimated the cost supporting regional coordination efforts at roughly \$5 million the first year, rising to \$12 million in the third year. *Total: +\$5 million.*

Support watershed-related activities. There is growing recognition of the value of a watershed approach and the importance of addressing the cumulative impacts of all activities that take place within a watershed. EPA has reoriented Federal and state clean water programs to address certain problems on a watershed basis and has developed extensive guidance for use by states, tribes, and territories, including the development of an online Watershed Academy and a targeted watershed grant program that encourages community-based approaches. USDA has chosen high priority watersheds in which agricultural runoff is a major source of pollution as the basis for distributing funds under its conservation programs. NOAA's Coastal Zone Management Program has been instrumental in guiding state efforts to watershed management approaches, and the opportunity exists for Congress to strengthen its support for watershed management during the reauthorization of the CZMA. The transition toward watershed management would benefit from additional resources for these programs, and the Joint Initiative suggests providing an additional \$20 million for the NOAA Coastal Zone Management Program, \$5 million for the EPA watershed grant program, and \$4 million for USDA's Watershed Surveys and Planning account, above their FY 2006 funded levels. The U.S. Army Corps of Engineers also requires greater ability to use its funding to support watershed-wide feasibility studies and impact analyses prior to making final determinations on proposed coastal projects. *Total: +\$29 million.*

Other established conservation and management programs have made significant contributions toward maintaining and improving the quality of coastal resources and could make even greater contributions with additional fiscal resources. These include the EPA National Estuary Program; the DOI Coastal Program, Coastal Barrier Resources System, and Coastal Wetland Grants Program; and NOAA's Coastal and Estuarine Land Conservation Program and National Marine Sanctuaries Program. While the Joint Initiative has not identified discrete levels of funding applicable to each of these programs, the need clearly exceeds \$50 million, recognizing that the U.S. Commission suggested at least an additional \$35 million in support for the Coastal Estuarine Land and Conservation Program and the +\$10 million funding cut endured by the National Marine Sanctuary Program in FY 2006. *Total: +\$50 million.*

Total for Ocean Governance and Coastal Management: +\$85 million.

Funding Category 2: Ocean Science and Research

Congress should encourage greater interagency collaboration in support of all dimensions of ocean science, from exploration and basic research to applied research, by supporting a number of overarching initiatives, including ocean exploration, ecosystem research, ocean observing, and education, the Administration is currently developing an Ocean Research and Priorities Plan and Implementation Strategy³ that will eventually provide a roadmap to assist Congress in prioritizing ocean science and research funding. However, given the overwhelming need to take meaningful action promptly, priority should be given to supporting endeavors that offer frameworks capable of providing focus and continuity for ocean science and research programs. The Joint Initiative strongly encourages Congress to support an enhanced ocean research and education program, establishment of a new ecosystem research initiative, the implementation of an Integrated Ocean Observing System, and a national ocean education strategy.

Congress should expand the national innovation and competitiveness initiative to include oceans. The President's American Competitiveness Initiative provides an excellent opportunity for Congress to draw upon the scientific and educational resources and expertise of the ocean community to contribute toward this broad national initiative. Thus, in the context of supporting an enhanced national research enterprise, Congress should increase resources for ocean research and exploration programs in NOAA, NSF, and the Navy, as well as other ocean and coastal programs in Federal agencies, as part of the innovation and competitiveness initiative.

Ocean science and exploration are closely related endeavors. Explorers discover the new places, species, and phenomena that other scientists then study and explain. Many experts have pointed out that we now know more about the surface of the Moon—and increasingly the surface of Mars—than we do about the bottom of the ocean, despite the huge potential for answering fundamental questions about our planet and discovering new forms of life in the soup of biological diversity contained within our oceans. This effort, in turn, has the potential to not only support a new economic enterprise in marine biotechnology, but also allow us to begin to address the growing health-related concerns associated with harmful algal blooms, seafood-related illnesses, and water-borne chemical contaminants.

Congress should support the development of an expanded ocean research and exploration initiative. The Joint Initiative recommends that Congress support an expanded ocean exploration initiative that incorporates many of the basic ocean research programs and activities within the Federal Government. Currently, ocean exploration is supported by a broad array of Federal programs housed in NSF, NOAA, and the Navy, while basic ocean research is spread across many Federal agencies. Unfortunately, ocean research and exploration funding has stagnated or decreased, resulting in a steady real dollar decline in support for basic research over the past decades. This decline compromises our Nation's economic and national security and was the basis for both Commissions' support for doubling the Federal ocean and coastal research budget from its current level of \$650 million per year to \$1.3 billion over the next 5 years.

Congress must reverse this decline by enhancing ocean research funding. Under an ocean research and exploration initiative, Congress should strongly consider enhancing the NSF Geosciences Directorate account by \$42 million, the NSF Major Research Equipment and Facilities Construction Account by \$50 million, the NSF Polar Programs by \$50 million, and the Navy's 6.1 account by \$50 million from FY 2006 enacted levels. These programs are the foundation of ocean research and exploration, and enhanced support is crucial. In addition, there are numerous other basic

³ *Ocean Research Priorities Plan and Implementation Strategy* (http://ocean.ceq.gov/about/docs/jsost_orpp_planningdoc.pdf).

research programs that merit increased support from their FY 2006 funding levels, including, but not limited to: NOAA Ocean Exploration (+\$36 million); NOAA/National Centers for Ocean Coastal Science (+\$25 million); NOAA/Ocean Human Health (+\$15 million); NOAA/National Undersea Research Program (+\$11 million); DOI/USGS Coastal and Marine Geology Program (+\$10 million); and EPA/ORD Ocean and Coastal Research (+\$10 million). Other areas of ocean-related research of great importance that would benefit from additional funding include ocean and coastal remote sensing, arctic research, atmospheric deposition, economic and social analysis, invasive species, and coral reefs. *Total: +\$299 million.*

Congress should complement its ocean research and exploration initiative with an ecosystem research initiative. Such an initiative would greatly assist the Nation as we transition toward an ecosystem-based management approach. The initiative would stimulate multidisciplinary approaches and scientific cooperation among Federal and non-Federal research entities. The Joint Initiative envisions this initiative as having an applied research focus, addressing issues that will directly benefit managers and policymakers who must understand and balance economic, social, and environmental factors when making decisions that will affect the health and productivity of coastal ecosystem.

The Joint Initiative recognizes that budgetary initiatives are primarily a responsibility of the Executive Branch. Thus, we recommend that Congress strongly encourage the Administration to consider developing and supporting an ecosystem research budget initiative. Such an initiative would help identify and begin the process of coordinating the broad suite of ecosystem-related research activities taking place throughout the government. Examples of programs and activities that could possibly be coordinated under this initiative include: aquatic invasive species research; ocean remote sensing; marine mammal research; development of fishery ecosystem plans; habitat restoration; coral reef research; and marine protected areas, including the National Estuarine Research Reserve System. Congress should ensure that funding for these activities and programs is protected, and preferably enhanced, as part of concerted national effort to support Federal, state, and regional efforts to restore the health and productivity of our oceans, coasts, and Great Lakes.

Funding Total for Ocean Science and Research: +\$299 million.

Funding Category 3: Monitoring, Observing, and Mapping

Congress should increase funding for the implementation of an Integrated Ocean Observing System (IOOS) and other scientific tools and infrastructure that are the backbone of the ocean science enterprise. A critical component of a robust ocean science enterprise is the set of tools that allow scientists to collect, monitor, observe, map, model, analyze, and synthesize data, and then translate and communicate their findings in useable and understandable forms to managers and policymakers. An important tool to achieve well-informed, science-based ocean and coastal management with an ecosystem focus is the national IOOS. As the ocean component of the President's Global Earth Observing System of Systems, a fully operating IOOS will provide critical information for: protecting human lives and property from marine hazards; improving ocean health; predicting global climate change; enhancing the Nation's security; and providing for the protection, sustainable use, and enjoyment of ocean resources.

Many of the elements of a national system are already in place, but they operate independently. Support for IOOS is the process through which these elements are interconnected into global and coastal observation networks. Congress should place a high priority on the passage of legislation mandating the implementation of an IOOS and should increase the level of funding in support of global and regional IOOS programs, providing the community with the flexibility to direct funding toward activities and infrastructure that will allow for the orderly and coherent development of an effective and efficient program.

There are many elements that constitute the IOOS, some infrastructure-related, others programmatic activities that develop more effective tools for translating and sharing the information generated. One very important element is the need to create a national base map that is seamless across the shoreline and can incorporate new geospatial data of all types as they are collected. Another is the need to reinforce the network of infrastructure and technology used to support science and exploration, such as research vessels, satellites, buoys, and sensors, as well as computer hardware and software. A third is establishing a data management and communication center where Federal and state agencies can coordinate the collection, archiving, fusion, modeling, and distribution of IOOS-related information and products.

Congress should increase its support for the IOOS. The U.S. Commission on Ocean Policy identified four components that are essential for the IOOS, including: data

management and communications; enhancing regional coastal information systems; accelerating implementation of the Global Ocean Observing System; and enhancing and integrating existing federally-supported observing programs. The first year cost was calculated at \$138 million, with the annual cost increasing to roughly \$500 million in the fifth year. The Joint Initiative strongly recommends that Congress bolster the funding commitment to IOOS, with new funding being targeted among the three areas described above. *Total: +\$138 million.*

*Other monitoring-related activities and suggested levels of increased financial support they require are provided below. The funding levels are generally based on guidance provided in Chapter 30 and Appendix G of the U.S. Commission on Ocean Policy report and represent increases above enacted funding levels: develop a national monitoring network (\$10 million); implement improved sediment research monitoring, assessment, and technologies (\$12 million); expand Federal mapping and charting and data integration (\$50 million); establish a NOAA/Navy ocean and coastal information management and communication partnership (\$20 million); develop regional approaches to address atmospheric deposition (\$3 million); modernize NPDES monitoring, strengthen enforcement, and implement stormwater programs (\$7 million); increase ballast water research and demonstration programs (\$2 million); implement early detection and notification plans for aquatic invasive species (\$30 million); expand marine debris monitoring (\$5 million); create and fund a national program for social science and economic research (\$5 million); and increase support for data management software (\$7 million). *Total: +\$151 million.**

Total for Monitoring, Observing, and Mapping: +\$289 million.

Funding Category 4: Ocean Education and Outreach

*Congress should increase funding for established ocean education programs. We recommend the establishment of a national ocean education strategy, with NOAA and NSF being given the lead in coordinating the program. The strategy should enhance educational achievement in the physical, natural, and social sciences, increase ocean awareness, include a five-year plan for formal and informal activities, and facilitate links among Federal, state, local, and nongovernmental programs. It is our understanding that the Administration's *Ocean Research Priorities Plan and Implementation Strategy* will include recommendations for advancing Federal ocean education programs. The Joint Initiative feels strongly that Congress should increase funding for existing Federal ocean education initiatives in NOAA, NSF, and the Navy in FY 2007. Doing so will contribute directly to the objectives of the innovation and competitiveness initiative supported by Congress by enticing more students at all levels of education into scientific and technical professions. An increased investment in ocean-related education will play a key role in stimulating a new generation of engineers and scientists who will help this Nation maintain its technological lead in an increasingly competitive world while also helping to establish a new ocean stewardship ethic.*

Congress should make funding for formal and informal education a priority and provide support above the FY 2006 enacted level for the following programs: NOAA Education Initiatives (\$12 million); NSF Centers for Ocean Science and Education Excellence (\$10 million); and NOAA Sea Grant (\$20 million). We anticipate identifying a broader suite of programs across other Federal agencies when the Administration completes its Ocean Research Priorities Plan and Implementation Strategy, one component of which will address ocean-related education funding needs.

Total for Ocean Education and Outreach: +\$42 million.

The Joint Initiative recognizes that expanding beyond relatively rigid mission-driven responsibilities toward multi-agency, multi-discipline funding initiatives that are not rewarded in the Federal budget formulation process will require a major change in the Executive Branch budget formulation process. It will also require Congress to reconsider how it authorizes and funds such initiatives. A sustained and successful transition toward ecosystem-based management is as dependent upon the willingness of Congress to reconsider its institutional policy-setting and funding processes as it is upon the ocean science community to demonstrate its capacity for collaborating and coordinating in a meaningful way through the Federal budget process. Thus, Congress should look toward developing oversight mechanisms that will strengthen its capacity to evaluate and guide interagency cooperation and funding.

In this appendix, the Joint Initiative makes a number of funding recommendations, both general and specific, and we want to emphasize that current funding levels are clearly inadequate given the state of our oceans and coasts. It is not our intent to develop a comprehensive budget analysis in this document. Rather, we will continue to work with the ocean community to build upon these funding rec-

ommendations in the coming months and provide Congress with additional information that we hope will be helpful in the appropriations process.

Senator SUNUNU. Thank you very much, Congressman Panetta. Next we have Mr. Paul Kelly, who was a Commissioner on the U.S. Commission on Ocean Policy. Welcome.

**STATEMENT OF PAUL L. KELLY, MEMBER, JOINT OCEAN
COMMISSION INITIATIVE TASK FORCE**

Mr. KELLY. Thank you, Mr. Chairman. It is a pleasure for me to be here this morning. When the U.S. Commission on Ocean Policy, of which I was a Commissioner and the Pew Commission were developing our respective reports, we wondered where the two Commissions would come out but then we discovered that we were looking at a lot of the same problems and issues and in many ways, the recommendations we came up with were strikingly similar. Coincidentally, we had members of the Commission from all three states represented by you here on the panel. We had Andy Rosenberg from New Hampshire, who is a great fisheries expert, Ann D'Amato from Los Angeles in California and we also had Lillian Borrone and a new resident of New Jersey, Admiral Paul Gaffney, who recently became President of Monmouth University. This group was diverse. We worked well together in a different geographical representation. I'm from Texas.

What I wanted to talk about here, Mr. Panetta has covered a number of the issues that are important to us. I wanted to talk some about the concept of regional ecosystem management, which was so important to our commission. In his testimony, Admiral Lautenbacher talks about the Gulf of Mexico region and how five states and groups of agencies within those states are now collaborating under the leadership of NOAA and EPA in looking at a series of issues that have tremendous impact on the Gulf of Mexico, but what is new is how this approach to management seems to be inspiring both the academic community and the private sector. I think what is going on in the Gulf is a good example of this. For example, Texas A&M University and their system has decided to create up to 40 new faculty positions that will, in their system, deal with ocean science and related issues. We had an extraordinary contribution made by a gentleman named Ed Harte, who is a rancher and newspaper publisher from Corpus Christi. Mr. Harte donated \$46 million to Texas A&M Corpus Christi to set up a new institute called the Harte Research Institute for Gulf of Mexico Studies and they are looking worldwide for new researchers on these various issues that we've been talking about. So we see important developments. We find the private sector contributing funds to organizations like the Gulf of Mexico Foundation, which does wetlands restoration and is involved in teacher education and education of middle school students. So we're very excited about all of these activities and I want to say that in the regions, our states are excited by both Commissions' reports and they are taking off, taking actions in response to this. They are excited about what NOAA is doing, but what is missing is the funding component from Congress. So there are a lot of expectations out there in the field and I want you to know about that. Because Dr. Mike Orbach will be talking about science and education, I'll make brief remarks

there but both our Commissions feel that funding of some key ocean and coastal programs are very important and the funding for some of those programs were actually reduced in 2006. If you take, for example, one of the programs that is special to me, is the Sea Grant Program, Sea Grant College Program, which does a tremendous amount of good work in getting students interested in ocean science and ocean policy. Down in the Gulf of Mexico, the programs in the universities have a very interesting liaison with the private sector as well. They work with ports and waterways, they work with the fishing industry to provide research and support. They work with offshore energy in collaborative efforts, often dealing with ocean observations. The recent budget for Sea Grant is \$30 million more in the Senate than it is in the House and to me that is moving in the wrong direction.

Last, I want to elaborate just a little on what Mr. Panetta said about the Law of the Sea issue. It is estimated by people who track things on Capitol Hill that if we took a vote on the floor of the Senate today, there would be at least 95 votes in favor of ratification and yet, we're sitting on our hands. I want to report to you that my company is involved internationally and I've been involved in a number of Law of the Sea meetings put on by the U.N. and some of the academic institutions and what I've learned there is that Russia has applied, pursuant to Article 76 of the Convention, which allows a country to extend the limits of its continental shelf beyond 200 miles if you can prove, through bathymetric mapping and science, that your shelf actually extends beyond there. The Russians have already filed with the Continental Shelf Commission and the U.N. The Canadians are preparing an application. The Norwegians have just announced that they are going to start preparing an application and it becomes pretty obvious that minerals exploration is what is driving this interest. The issue sat there quietly for a long time but with tight oil and gas supplies in growing demand, these countries are beginning to look at the Arctic for future exploration. So again, here in the United States, we have the technology that these countries are using to map their continental shelves but we are not doing anything with it and we haven't even started mapping. So that is another important issue that I hope you'll consider. That really is part of our need to demonstrate international leadership for all things ocean by acceding to the Convention and doing some of the things that NOAA and the Department of State have been doing in this field. Again, I think—let me just conclude by saying that our Joint Ocean Commission Initiative stands by to assist in any we can to provide and support Congressional action. Thank you very much.

Senator SUNUNU. Thank you, Mr. Kelly. And finally we have Professor Michael Orbach of the Duke University Marine Laboratory. Welcome.

**STATEMENT OF DR. MICHAEL K. ORBACH, DIRECTOR,
DUKE UNIVERSITY MARINE LABORATORY; PROFESSOR,
MARINE AFFAIRS AND POLICY, NICHOLAS SCHOOL OF THE
ENVIRONMENT AND EARTH SCIENCE, DUKE UNIVERSITY**

Dr. ORBACH. Thank you, Mr. Chairman, Subcommittee Members. Although I direct a marine laboratory full of primarily biophysical scientists, I am a social scientist by training, an economist and cul-

tural anthropologist. Much of what I say to you today will embody what is called the Human Dimension Perspective on Coasts and Oceans. I will say also that although I am from the academic community, I am representing my own viewpoints here today.

I want to make four points to you. The first point is that I referred in the past to the ocean as the “black hole” of environmental science and policy on this globe. What I mean by that is that we have devoted tremendous and appropriate resources understanding and governing terrestrial environments, we’ve spent tremendous and appropriate resources investigating and governing atmospheric environments but we’ve spent virtually nothing, in comparison for understanding and governing the ocean. This is because the ocean has been “out of sight, out of mind,” to most people who live on the land historically. We understand more about the surface of the moon and Mars than we do about the surface of our own planet, especially the 70 percent of that surface that lies below the ocean. That is a tragic historic error that we have made in allocating our world resources. If we follow the recommendations of our two recent Ocean Commissions, we can help fix that. Second, even though we need a lot more science for many things, we know enough to make significant beginnings in solving some of our problems. We need an organizing concept, and the organizing concept that has emerged is the one of “ecosystem management” or “ecosystem-based management.” This concept will help us organize scientifically and in our policymaking. Consistent with this concept approach to coastal and ocean issues includes their ecosystem—realizing that the proper definition of a coast is the watersheds to the deep ocean, which includes, of course, about a third of the middle of this country, if you look at the Gulf of Mexico. But that’s the kind of definition that we need to make in terms of boundary definitions to address our coastal and oceans issues. Now, the trick with ecosystem management—and here is my social science coming out—is that we don’t ever manage biophysical resources themselves. We don’t ever manage fish, we don’t ever manage water; what we manage is people. So when we build in the concept of ecosystem management, we have to realize that it is the human ecology, not the biophysical ecology that we are going to be addressing. There are very specific ways to do this, and language for the bills that are currently in Congress. Members of our faculty and staff at the Nicholas School of the Environment, at Duke, have in fact, suggested some of that language to some of your committees and subcommittees. We have the tools to accomplish ecosystem management scientifically; we have the tools to do it in terms of geospatial analysis and referencing as well. So we can make progress with what we know if we organize it properly. The third point has to do with what I would call the institutional ecology of coasts and oceans. This is the issue of split jurisdictions, of lack of jurisdiction over coastal and ocean environments. There are two aspects to this. One is what one might call the harmonization of Federal legislation. We have largely passed single-issue legislation in the Congress—fisheries, oil and gas, water quality—that do not coordinate well with one another, so there is some harmonization of legislation to be done. In terms of the administrative agencies, it is widely written in academia and in the Ocean Commissions re-

ports, that we have a very fragmented agency structure. Now, I compliment the wonderful work that Admiral Lautenbacher and his staff have done with NOAA. But frankly, they have been structurally constrained in solving our problems and the reason is, they are placed in an inappropriate agency and have been from the very beginning of the existence of NOAA. They do not have enough control over enough things, that is, there are too many things in other agencies that matter to what NOAA does in terms of coastal and ocean science and policy, to have them do a complete job. They have done a wonderful job with what they have but they've been constrained in a way that does not allow us to solve our problems and that is the important bottom line here. Part of the challenge will be national issues and part of this will be regional issues, as has been pointed out. There are regional models, whether it is the River Basin Commissions or the Fishery Management Councils, that have shown us we can, in fact, coordinate things regionally. But a structure has to be set up to do it and Congress will probably have to take the lead in enabling that to happen. I would also say that although it is a great idea to have this current Committee on Ocean Policy, which coordinates the agencies, that is not enough. As Mr. Panetta said, we need major ocean policy guidance from the Congress to coordinate the framework for all of our ocean policies. One of my colleagues at Duke, Larry Crowder, and some other colleagues have an article coming out in *Science Magazine*, this afternoon which addresses this point. It is embargoed until 2 o'clock this afternoon but I understand the *Science* people are here with pre-released copies for everyone. This article makes this point very well and I would like to enter this into the record as well.

My final point has to do with the international dimension of coastal and ocean policy. What I would like to add to the previous speakers is that the United States has implemented all of the provisions of the Law of the Sea Convention as a matter of substance. Fisheries, oil and gas, continental shelves, even now the deep-sea bed mining legislation. What we haven't done is acceded to the Convention and ratified the Treaty. Now, this has some important symbolic aspects to it, that is, if we are going to be perceived in are role, which I think we should be a leader in ocean science and policy, we have to demonstrate that we are, in fact, part of the international community in spirit, to do this. Ratifying the treaty also has great practical implications, as Mr. Kelly pointed out. The situation that he was describing is one where the U.S. will not be able to protect its interests because we are not a party to the Convention. That is a very important legal and political limitation on us. Again, not ratifying the Treaty will not allow this country to protect its own interests internationally. We cannot solve the ocean policy or scientific or human problems by ourselves. So ascension to that Treaty is very important and I hope you and your colleagues will provide the leadership to ratify that treaty. Thank you very much.

[The prepared statement of Dr. Orbach follows:]

PREPARED STATEMENT OF DR. MICHAEL K. ORBACH, DIRECTOR, DUKE UNIVERSITY MARINE LABORATORY; PROFESSOR, MARINE AFFAIRS AND POLICY, NICHOLAS SCHOOL OF THE ENVIRONMENT AND EARTH SCIENCE, DUKE UNIVERSITY

Ladies and Gentlemen,

I am pleased to testify before you today on the topic of United States coastal and ocean policy, how that policy is reflected in current and pending legislation in the U.S. Congress, and how the development and implementation of that policy could be improved. My own background is the social and policy sciences, including the human and institutional ecology of coastal and ocean environments. I have worked with most of the Federal agencies involved with coastal and ocean policy in the U.S., all of the coastal states in the U.S., all of the Regional Fishery Management Councils and Interstate Marine Fishery Commissions, and with several international marine resource management institutions. I also served as an advisor to both the U.S. Commission on Ocean Policy and the Pew Oceans Commission.

In my testimony today, I will emphasize the concept of *ecosystem management*, and the applications of that term to coastal and ocean policy.

The “Ecologies” of Coastal and Ocean Environments

My definition of the term “coastal and ocean environment” begins with the biophysical resources that occur from the heads of coastal watersheds to the deep ocean, and the interaction of those terrestrial and marine resources with the atmosphere. This environment can be bounded in various ways for particular place-based policy applications, such as in the Chesapeake Bay watershed; the watersheds and ocean jurisdictions of states or nations; or the environments of particular species or biophysical features such as the habitat of Pacific salmon, the Gulf Stream, or the Sargasso Sea. These bounded biophysical resources and environments I term the *biophysical ecology* for a particular policymaking purpose.

Included in my definition of “coastal and ocean environments” are also two other ecologic systems, the *human ecology* and the *institutional ecology*. The *human ecology* are those humans and human behaviors that affect, are affected by, or are otherwise concerned with the elements of a defined biophysical ecology. I define the *institutional ecology* as those governance institutions that govern or affect the behavior of people in the human ecological system. So, for example, if we are considering the salmon fishery of the U.S. Pacific Northwest, the biophysical ecology is defined by the salmon species and their habitats throughout their migratory range (Idaho, Washington, Oregon, Canada, and the North Pacific Ocean). The human ecology consists of those humans and their behaviors that affect the salmon directly (fishing) or the salmon habitats (development, agriculture, or hydroelectric power), or even the biophysical trophic linkages with salmon (predators, prey). The institutional ecology consists of those policy and management institutions (local, state, regional, national, and international) whose policies and rulemaking affect the defined human ecology. There are, of course feedback loops among all of the elements of this “total ecology”, including the relationship between “civil society” and our formal public trust institutions.

Thus, when I use the term “coastal and ocean environment” for the purposes of policymaking, I am including all three of the above “ecologies”—biophysical, human, and institutional.

It is also important to note at the outset that all public policy for coastal and ocean resources has biophysical, economic and social objectives, and when implemented has attendant biophysical, economic and social impacts. Public policy decisions, usually in the form of regulations or incentives, involve *changing human behavior*. Every public policy decision involves tradeoffs between some state of the biophysical environment (abundance of fish, water quality) and some flow of costs and benefits to humans (dollars, cultural traditions, aesthetic values).

My own definition of the term “ecosystem management” is the policy toward, and management of, human behaviors (human ecology), through a specific governance structure (institutional ecology), that affect, or are affected by, a defined biophysical environment (biophysical ecology). I will frame my comments below within this definition, and discuss the policy frameworks necessary to address the biophysical, human, and institutional dimensions of ecosystem management of coastal and ocean resources.

Characteristics of Coastal and Ocean Environments

For most of the world’s human population, the ocean is “out of sight, out of mind” (Orbach, 2002). Not only do most humans not live or work on or in the ocean, but it is in fact an extremely hostile environment for humans. It is too salty to drink or to irrigate crops. Its density both smothers us if we are immersed in it and crushes us if we go too deep without elaborate protection. Its waves bash us on beaches

and in boats, and its biochemical characteristics foul and corrode our machines and structures. We can more easily go—and commonly do go—one mile up into the atmosphere than one mile deep into the ocean. Even though an increasing number of us live or work near the ocean, it is still not an “intimate environment” for most humans (Revelle, 1969; Orbach, 1982).

This matters precisely because humans develop governance institutions for those spaces and resources about which they care most, and with which they are the most intimately involved. This is why the most complete set of governance institutions evolved first for humans in relation to terrestrial, as opposed to ocean and atmospheric, spaces and resources, beginning several thousand years ago. Those are the spaces and resources for which we first developed awareness, and intimate and dense use.

In the ocean, on the other hand, human societies did not effectively begin to govern human behavior on the ocean through public policy in any large measure until late in the 1700s with the adoption of the 3-mile Territorial Sea, and no substantial universal management of ocean resources occurred until the middle of the 1900s, beginning with the mineral resources of the continental shelves and eventually extending to the current 200-mile Exclusive Economic Zones (EEZ). Even with universal 200-mile Exclusive Economic Zones having been declared by riparian states, in accordance with the Law of the Sea Convention, approximately 40 percent of the world ocean remains outside of areas of national jurisdiction. Added to this are the twin notions of traditional “open access” to resources such as fisheries, and the companion principle of the “freedom of the seas”, elucidated in the early 1600s and still alive today as a basis for much policy-making for the ocean. The principles of private property and the appropriateness of the management of public trust resources, long established in terrestrial and even atmospheric environments, have only recently begun to be applied to ocean environments and resources (Orbach 2002).

Thus, the challenge of managing ocean environments and resources is a relatively new one compared to terrestrial ones and, at the moment, human society has more powerful and complete public policies for human activity on land—and even in the atmosphere—than for human activity in the ocean.

The Biophysical Ecology

In virtually every part of the coastal and ocean environment where human behavior is a significant presence, the biophysical environment continues to degrade. There are notable exceptions to this—some cases of improved water quality, recovered fisheries, or increases in the populations of threatened or endangered species—but they are truly the exception. There are three reasons for this continued degradation: (1) lack of awareness or information regarding the issue; (2) an inadequate public policy framework within which to address the issue; or (3) a lack of political will, or political will that makes the policy trade-off in favor of the conscious degradation of the biophysical ecology.

The ocean covers over 70 percent of the Earth’s surface, and throughout history much of that area has been relatively inaccessible to humans. Although humans have had significant impact on coastal and some nearshore resources for many centuries, it is only in the last 150 years that humans have had the capacity to impact oceanic resources to a significant degree. We have now demonstrated the effects of that capacity.

The important point to this testimony is that the biophysical resources of the oceans—from fisheries, to mineral resources, to pharmaceuticals, to the ocean’s role in weather—are an immense potential resource and are critical for the future of humankind. Our scientific knowledge of these resources, which leads to awareness of their specific importance to, and potential use by, humans, is sorely lacking. Our investment in ocean research and exploration, for example, is only a tiny fraction of that invested in terrestrial or atmospheric research. We must make a comparable investment in ocean research and exploration to see the full potential of ocean resources.

Legislative Implications

This immediate application of the above situation to current pending legislation in the U.S. Congress is that authorizations and appropriations for coastal and ocean research should be significantly increased, in both the biophysical and social sciences, as is recommended in both the reports of the U.S. Commission on Ocean Policy (USCOP) and the Pew Ocean Commission (POC). This will give us the basis for the rational and comprehensive management of ocean resources and environments, as well as the means for increasing awareness of issues involving these resources and environments.

The Human Ecology

As a society, in our conceptualization of “environmental issues”, in our research and data collection, and in our construction of public policy processes, we have made the error of focusing too much on the biophysical ecology of coastal and ocean issues. *It is imperative that we have as much documented, valid data and information about the human ecology of environmental issues as we do about the biophysical ecology.* This is not the case at present. For example, virtually all of the scientific components of our Federal coastal and ocean management agencies are dominated by natural or physical scientists, with only a small smattering of social scientists. The result of this is that we have been unable to adequately document or judge the tradeoffs between the state of the biophysical ecology and the state of the human ecology that are required for rational, comprehensive policy and management decisions.

Legislative Implications

The immediate application of this situation to current pending legislation in the U.S. Congress is that every piece of legislation that makes reference to “ecosystems” or to “ecosystem management” (for example, the Magnuson-Stevens reauthorization bills) should include as much reference to the human ecology of ecosystems (often termed the “socioeconomic” or “sociocultural” characteristics) as to the biophysical ecology of ecosystems, and that this attention should carry through to the research and application funding process, both within the Federal agencies and in extramural funding for social science research.

The Institutional Ecology

The institutional ecology of coastal and ocean governance—ocean and coastal legislation and those entities with authority and responsibility for the implementation of that legislation—in the U.S. is most often correctly characterized as fragmented and single-issue oriented. That is, we have one piece of legislation for marine fisheries, one for offshore oil and gas, one for shipping, one for marine sanctuaries. There is clearly insufficient coordination among these legislative mandates, and among the agencies to which the legislation gives authority and responsibility. There is also a lack of coordination among local, state, regional, national and international levels of policy and policy-making (Cicin and Knecht, 2002; USCOP; POC).

The authority and responsibility for developing, reauthorizing, and implementing this legislation is also fragment and not well-coordinated. For example, a myriad of different committees and subcommittees of the U.S. Congress have authority or responsibility for coastal and ocean legislation, and a myriad of different Federal agencies and sub-agencies have authority or responsibility for implementing this legislation (USCOP, 2004; POC, 2003). The major Federal “ocean agency,” NOAA, is famously placed in an inappropriate agency, the Department of Commerce (see Wenk, 1972, for the history of this placement). Major authority for coastal and ocean policy also resides in, among others, the Departments of the Interior (Fish and Wildlife Service, Minerals Management Service), Defense (Navy, Army Corps of Engineers), and in the Environmental Protection Agency (Oceans, Coast and Estuaries), often for policy and management topics very similar to those under the authority of various NOAA entities (National Marine Fisheries Service, Office of Ocean and Coastal Resource Management (OCRM)). One case of this is the placement of the Coastal Zone Management Program in OCRM/NOAA under the Coastal Zone Management Act, while the National Estuary Program is in Oceans, Coast and Estuaries/EPA under the Clean Water Act.

Much of this split jurisdiction makes both overall policy-making and specific regulatory processes difficult. As an example of the former, a mechanism to mediate conflicts among the mandates of the Magnuson-Stevens Fishery Conservation and Management Act (marine fisheries); the Outer Continental Shelf Lands Act (offshore oil and gas development), and the Marine Mammal and Endangered Species Acts does not exist. All are based on different principles and values, and all direct the Federal regulatory agencies toward different goals. Unfortunately, this occurs in a world where the biophysical and human ecologies of marine fisheries, offshore oil and gas development, and marine mammal and threatened and endangered species protection are inextricably intertwined. In the area of specific regulatory processes, one example is that NMFS/NOAA (Commerce) has authority and responsibility for threatened and endangered sea turtles while they are in the ocean, while the Fish and Wildlife Service (Interior) has authority and responsibility for the same turtles when they come ashore to nest (and local and state governments have authority over many of the factors that affect sea turtles, such as beach lighting and beach nourishment).

Legislative Implications

The immediate application of this issue to current pending legislation in the U.S. Congress is two-fold. First, in cases of conflicting legislative mandates regarding the same resources or environments, the legislation should be “harmonized” to give clear policy direction to the appropriate administrative agencies. Second, serious consideration should be given to the recommendation of both the USCOP and POC that comprehensive ocean policy and planning legislation be passed to reconcile these fragmented and conflicting mandates, authorities and responsibilities under a comprehensive policy and planning framework for coasts and oceans. Such comprehensive legislation would include both attention to specific mandates and agencies (such as the need for organic legislation to establish the structure and function of NOAA, wherever that structure and function may ultimately reside, as proposed by both the USCOP and POC), and to authority and responsibility for overall ocean planning within the U.S. Exclusive Economic Zone in legislative vehicles such as the National Ocean Policy Act proposed by the Pew Oceans Commission. Such legislation could, for example, provide for a comprehensive framework for zoning of the different uses of the EEZ (see Crowder *et al.*, 2006). The current Federal Committee on Ocean Policy, established through Executive Order and which reports to the President through the Council on Environmental Quality, has the potential to provide administrative and some policy coordination for coastal and ocean issues. However, such a Committee will not be able to address the overall integration of policy principles that could be accomplished through comprehensive ocean legislation.

The above recommendations apply primarily to activities in the U.S. EEZ, and between and among the U.S. Federal Government and the states for activities in the EEZ. Bracketing the EEZ, however, are two needs referred to, once again, by both the USCOP and the POC. These are: (1) The need for an ecosystem-based, regional policy and management system for environments and resources that connect the watersheds and EEZ of the U.S. and its Territories, Commonwealths and possessions together, such as is reflected in the idea of “Regional Ocean Councils” (Nicholas Institute, 2006) suggested by both the USCOP and the POC; and (2) the need for better international cooperation on coastal and ocean policy and management, such as would be reflected in the U.S. ratification of the Law of the Sea Convention and Treaty. Even though the U.S. has implemented virtually all of the elements of the Convention, the fact that the U.S. has not formally ratified the Convention and Treaty is an important omission in our necessary linkage with other countries on coastal and ocean policy issues and processes. This fact is also noted by both the USCOP and the POC.

Summary

The coastal and ocean resources and environments of the U.S. will be well-served by the advancement of the concept of “ecosystem management.” Advancing this concept should include attention to the biophysical, human and institutional dimensions of coastal and ocean environments. These three dimensions must be mapped onto one another to provide a complete picture of our coastal and ocean systems, and to allow rational, comprehensive policy and management processes to be developed, both within the U.S. and in the international community.

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ATTACHMENT

Science Magazine, August 2006

SUSTAINABILITY

RESOLVING MISMATCHES IN U.S. OCEAN GOVERNANCE

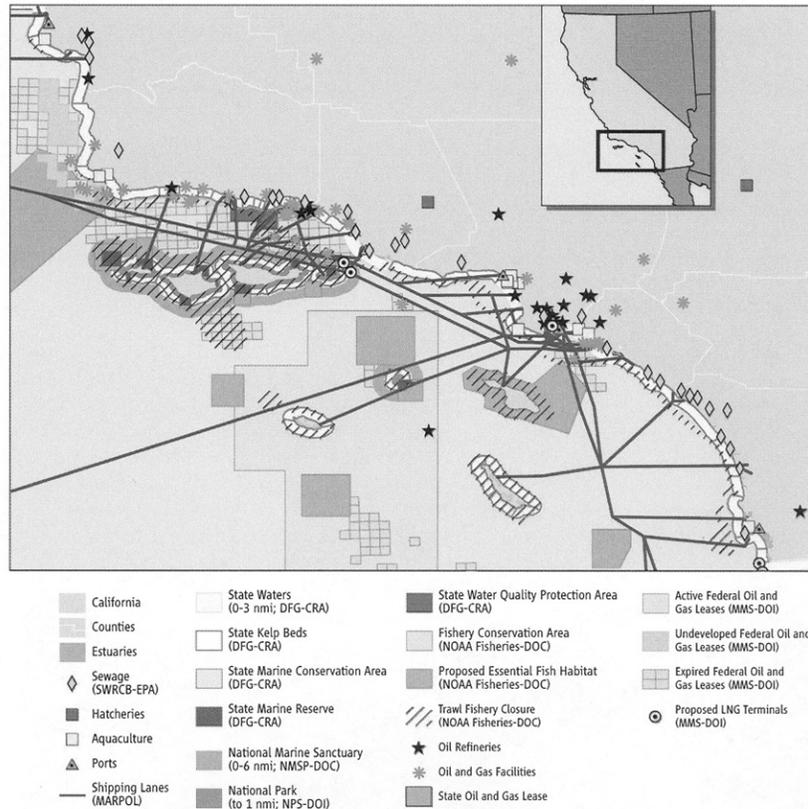
PROBLEMS IN OCEAN RESOURCE MANAGEMENT DERIVE FROM GOVERNANCE, NOT SCIENCE. OCEAN ZONING WOULD REPLACE MISMATCHED AND FRAGMENTED APPROACHES WITH INTEGRATED REGULATORY DOMAINS.

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That the oceans are in serious trouble is no longer news. Fisheries are declining, formerly abundant species are now rare, food webs are altered, and coastal ecosystems are polluted and degraded. Invasive species and diseases are proliferating and the oceans are warming.¹ Because these changes are largely due to failures of governance, reversing them will require new, more effective governance systems.

Historically, ocean management has focused on individual sectors. In the United States, at least 20 Federal agencies implement over 140 Federal ocean-related statutes. This is like a scenario in which a number of specialist physicians, who are not communicating well, treat a patient with multiple medical problems. The combined treatment can exacerbate rather than solve problems. Separate regimes for fisheries, aquaculture, marine mammal conservation, shipping, oil and gas, and mining are designed to resolve conflicts within sectors, but not across sectors. Decision-making is often *ad hoc*, and no one has clear authority to resolve conflicts across sectors or to deal with cumulative effects. Many scientists are now convinced that the solution can be found in ecosystem-based management.² Ecosystem-based management focuses on managing the suite of human activities that affect particular places. This is a marked departure from the current approach. The time has come to consider a more holistic approach to place-based management of marine ecosystems, comprehensive ocean zoning.³

Management regimes for individual sectors operate under different legal mandates and reflect the interests of different stakeholders, so governance is riddled with gaps and overlaps.⁴ Fishing has a larger impact on biological diversity than any other human activity,⁵ but the Magnuson-Stevens Act, which governs fisheries, contains no mandate to maintain biodiversity. Ecosystem-based fisheries management⁶ is only a partial solution—it does not account for impacts on non-target species or manage other activities that degrade fisheries, such as pollution or wetlands loss.⁷ The problem of fragmented governance is growing, as new place-based activities in the sea [*e.g.*, aquaculture, wind farms, liquefied natural gas (LNG) terminals] are increasing the potential range and severity of conflicts across sectors.



Fragmentation of management for human uses of marine areas in southern California.

California's Channel Islands illustrate the potential for conflict and fragmentation of management authority (*see figure, above*). In 2003, California established a network of fully protected marine reserves and conservation areas that allow limited take in the state waters (0 to 3 nautical miles) of the Channel Islands National Marine Sanctuary. This followed a 5-year multi-agency, multi-stakeholder process. Yet Federal agencies still have not implemented the proposed reserves in Federal sanctuary waters (3 to 6 nautical miles) because the roles of the two National Oceanic and Atmospheric Administration agencies (Fisheries and National Marine Sanctuaries) are unclear.

Spatial mismatches between scales of governance and ecosystems are common. Current subdivisions of state, Federal, and international waters are understandable in historical and political terms. But it makes little ecological sense for managing highly migratory fishes or for LNG terminals, which can be built in state or Federal waters.

Spatial mismatches typically arise from jurisdictional boundaries too small for effective management. Leatherback and loggerhead sea turtles forage over much of the Pacific, but bycatch reduction efforts required in U.S. fisheries are not used in foreign fisheries, which potentially contributes to ongoing declines.⁸ Western and eastern substocks of Atlantic bluefin tuna migrate, so the high catches in the East may cancel the potential benefits of restricted catches in the West.⁹

Sometimes, the causes of the problems are too far removed from the effects. Farming in the Mississippi River watershed contributes to nutrient loading and hypoxia in the Gulf of Mexico, displacing fishes and other marine organisms.¹⁰ Jurisdictions can also be too large. Cod management in the Northwest Atlantic focused on the whole region as local stocks experienced serial depletion.¹¹

Temporal mismatches between biological systems and human institutions can also degrade marine ecosystems. Annual appropriations and 2- or 4-year voting cycles drive many policy processes. But problems affecting marine systems can occur on time-scales that are too fast for these policy rhythms (*e.g.*, sudden collapses of fish populations, outbreaks of invasive species or harmful algal blooms) or too slow (*e.g.*, increases in ocean temperatures, acidification, or the cumulative loss of wetlands). The white abalone fishery in California expanded and crashed rapidly in the early 1970s, 20 years before the management agency restricted fishing.¹² Longline tuna fisheries in the Gulf of Mexico reduced oceanic whitetip sharks by 99.7 percent over five decades, but the change was so gradual that managers failed to notice or prevent it.¹³

Problems generated by fragmentation and mismatches become particularly severe in systems that include multiple, interactive, and cumulative stressors. Just as stressed humans are more susceptible to opportunistic infections, stressed ecosystems lack robustness and resilience. On the U.S. West Coast, the combination of degraded spawning habitat, shifting ocean temperatures, and overfishing led to population declines and endangered species listings for salmon. This did not occur in Alaska, because of better river conditions, protection of spawning habitat, and a spatial fisheries permit system.¹⁴

These governance problems are difficult to alleviate even after they become well understood.¹⁵ Incremental improvements in sectoral governance can reduce some problems (*e.g.*, overfishing of target species), but they generally cannot address fragmentation and mismatches.

Marine spatial planning with comprehensive ocean zoning can help address these problems. Although property rights and management arrangements in the sea differ from those on land, spatial planning could be initiated with cooperation among Federal, state, tribal, and local authorities. Zoning would not replace existing fishing regulations or requirements for oil and gas permits, but would add an important spatial dimension by defining areas within which compatible activities could occur.

Key elements of successful zoning include locating and designating zones based on the underlying topography, oceanography, and distribution of biotic communities; designing systems of permits, licenses, and use rules within each zone; establishing compliance mechanisms, and creating programs to monitor, to review, and to adapt the zoning system. Not only does comprehensive ocean zoning directly address fragmentation and spatial mismatches, zoning also facilitates efforts to adjust governance to the rhythms of human institutions and the dynamics of spatially bounded ecosystems.

Of course, establishing an effective system of ocean zoning in the United States will present a formidable challenge. But other countries, including Belgium, China, Germany, the Netherlands, and the United Kingdom, have already begun implementing or experimenting with marine spatial planning.^{16–18} Massachusetts is considering legislation to develop and implement an ocean management plan.¹⁹ A striking example of comprehensive, multiple-use zoning of marine resources is Australia's Great Barrier Reef Marine Park. It provides specific areas with high levels of protection, while allowing other uses, including fishing, to continue elsewhere.²⁰

The transition to comprehensive ocean zoning in the United States will not be easy. Critics point to the contentiousness of efforts to introduce zoning, the difficulties of developing legislation acceptable to all stakeholders, and failures to achieve desired results even after zoning is established. But our current approach simply cannot address the critical issues in the oceans. Recovering ocean ecosystems will require a better understanding of the consequences of interconnections among ecosystem components, as well as a systemic change in the way we consider issues and make choices regarding ocean use.

References and Notes

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- ²⁰ J. C. Day, *Ocean Coastal Manage.* 45, 139 (2002).
- ²¹ Supported by the National Center for Ecological Analysis and Synthesis, University of California at Santa Barbara; Working Group on Ocean Ecosystem Management; the David and Lucile Packard Foundation; the Gordon and Betty Moore Foundation; and the Center for Marine Conservation, Nicholas School of the Environment and Earth Sciences, Duke University, Beaufort, NC 28516, USA.

Senator SUNUNU. Thank you very much. We will begin the questioning with Senator Boxer.

Senator BOXER. Thanks, Mr. Chairman. I have two questions that I will combine into one. I'm going to ask Admiral Lautenbacher and the Hon. Leon Panetta to comment on them. Congressman Panetta referenced a series that has been done by the *Los Angeles Times* on the state of the oceans and Mr. Chairman, I would ask unanimous consent that I could place that series in this record.*

Senator SUNUNU. Without objection.

Senator BOXER. Mr. Chairman, I'm going to just read from this one part. This is really almost a prize-winning series, I think. It's called, *Dark Tides, Altered Oceans*. "With sickening regularity, toxic algae blooms are invading coastal waters. They kill sea life and send poisons ashore on the breeze, forcing residents to flee." Now, I'll just read a little bit of this. "All Susan Laden has to do is stick her head outside and take a breath of sea air. She can tell if her 10-year-old son is about to get sick. They thought they found a paradise a decade ago," and it goes on. "Now they fear the sea has turned on them. The dread takes hold whenever purplish red algae stain the crystal waters of Florida's gulf coast. The blooms send waves of stinking dead fish ashore and insult every nostril on the island with something worse. The algae produce an arsenal of toxins carried ashore by the sea breeze." She says, "I have to pull my shirt up over my mouth or I'll be coughing and hacking." Her husband, a 46-year-old building contractor, said the wind off the gulf can make him feel like he spent too much time in an over-chlorinated pool. His chest tightens and he grows short of breath. His throat feels scratchy, his eyes burn and his head throbs. Their symptoms are mild compared to those of their son, also named Richard. He suffers from asthma and recurring sinus infections.

*The information referred to can be found online at <http://www.latimes.com/news/local/oceans/la-oceans-series,0,7842752.special>.

When the toxic breeze blows, he keeps himself and his parents up all night, coughing until he vomits. It goes on to say they have to leave the area and goes on to say that once this was a freak of nature and it is commonplace, red tides, and it goes on from there. So I have a very important question for you, Admiral Lautenbacher. In 2004, this Congress passed a law called the Harmful Algal Bloom and Hypoxia Research and Control Act and you were required, your Administration, to come in with reports that were due last December. Where are these reports?

Admiral LAUTENBACHER. I will have to check on them. I'm not familiar with it. I'll get back on the record with an answer to that. I don't know where the reports are.

Senator BOXER. And Mr. Panetta, are you aware of this particular bill that we passed?

Mr. PANETTA. I am aware of the bill and aware of the fact that reports were due but I don't know the status of those reports.

Senator BOXER. Well, I didn't expect you to but sir—I mean, I would hope, since this is, I believe, under your jurisdiction of your department, that you would get back to me ASAP with when we can expect these reports. And my final question for both of you is that we've just put back those funding cuts. Admiral Lautenbacher, you also made a beautiful speech to us and I'm wondering if you support these cuts?

Admiral LAUTENBACHER. You have to realize how that comes about. We have a budget cycle that is dysfunctional in the way we deal with this issue. So I am right now building the Fiscal Year 2008 budget on the basis of the Fiscal Year 2007 input. You are still working on the Fiscal Year 2007 input. So we have national programs that go on from year to year and we have—

Senator BOXER. OK, but I didn't ask you to comment on the process. Do you support these cuts here? Do you support eliminating the Marine Debris Program, eliminating the Oceans and Health Program, eliminating Coastal and Estuarine Land Program and cutting the Marine Mammals and Marine Aquaculture Program. It is just a simple yes or no. Do you support?

Admiral LAUTENBACHER. I support the President's budget.

Senator BOXER. You do?

Admiral LAUTENBACHER. For the best that we could do with the funding that we have to provide for all of the issues that we have to for our oceans.

Senator BOXER. OK. Well, I know that Senator Lautenberg will follow-up. Mr. Panetta, could you—I mean, I remember when you were the head of the whole budgetary process, so this answer—I support the President's budget, given the money. Don't you think it is the role—I mean, without being super critical, you and I know that when we sit around the table, the people who are supposed to have control of these budgets have to fight for the budgets. You don't sit back and let OMB just cut the heck out of it and I just wonder if you could comment.

Mr. PANETTA. I raised this issue with the Committee that was established within the Administration because of our concern that at the same time, that we've identified all of these needs for additional funding that the Administration was presenting a budget that in fact, cut many of these programs and I think Admiral

Lautenbacher is not going say it but I think he shares the same concern with regard to these budgets. You can't—all we're talking about in terms of the ocean—we cannot deal with these issues. We can't establish reserves. We can't deal with acidification. We can't deal with the issues related to any kind of ocean policy without science, without research. We just can't do it. And we are in a situation, where as I said, less than 6 percent of our research budget is dedicated to the oceans and that is an area that is twice the size of our land mass, that we have under our territory. One interesting figure is something like 1,500 people have made their way to the top of Mount Everest, something like 300 people have walked on—or have gone into space and about 12, I guess, have walked on the Moon. Only two people have gone to the deepest part of our oceans. Only two people. We have just have to properly invest in that area and if we are serious about doing anything on ocean policy, you're going to have to, like everything else, back it up with resources. I might commend, by the way, Senators Mikulski and Thad Cochran and others who are on the Appropriations Committee, who have, in fact, restored funding because we are getting a double whammy here. We not only get cut by the Administration but then the House cuts it even lower. The Senate then faces a huge task of trying to restore that funding and they've done a good job.

[Laughter.]

Senator BOXER. Well, thank you for commending them and yes, it is pretty hard to cut it more than eliminate it.

Senator SUNUNU. Before I turn it over to Senator Lautenberg, I do want to make a general observation. I'm not familiar with these programs and we all appreciate the position that Admiral Lautenbacher is in, to put together a budget, given whatever resource constraints there are, they try to allocate the funding as effectively as possible and of course, defend those priorities. But I think if we look at the overall budget, where it was or is in Fiscal Year 2006, which is at about \$3.9 billion . And we compare that to where it was 5 or 6 years ago, which was a level of about \$2.5 billion, a little bit less than that, in Fiscal Year 2000. That is a 60 percent increase in resources over 6 years. So I think we need to appreciate that we have made good strides, very significant strides, a 60 percent increase in funding over that 6-year period. But that doesn't change the fact that we have the priorities that we've heard the panel raise. We have areas of the oceans that are in crisis, that need to be dealt with. But it would be a mistake to lose sight of the global concerns, the global considerations and the global commitment to resources by focusing too narrowly on one particular program, which we might agree should be funded and might not have received funding in the President's budget. And it does bear repeating that this Senate Appropriation bill does provide funding, even in excess of that \$3.9 billion level, which was the 2006 level. Senator Lautenberg?

Senator LAUTENBERG. Thanks very much for your testimonies. I have to kind of bounce off of Senator Boxer's inquiry, Admiral. I pronounce my name Lautenberg, you pronounce yours Lautenbacher, or is that Lautenbacher?

Admiral LAUTENBACHER. Lautenbacher.

Senator LAUTENBERG. I know we are kinfolk someplace.

[Laughter.]

Senator LAUTENBERG. But the place that we leave our kinfolk relationship—I was a Corporal in my 3 years in the Army. It took me a fair amount of time to get through that, too. So I was accustomed to just taking orders and just marching on. If they told me to pick up the butts, I did. If they told me to climb the poles, I did, whatever I had to do. You sir, of substantial rank, I recognize for your service. In response to the question about whether or not these programs deserve elimination, you responded by saying, well in the budgetary climate in which we are, that—forgive me, is not your assignment. Is there no heart in addition to some head that you give this post? Do you do any analysis about the value of these things? How tough is your fight to say, yes, I would like to see a little more here, a little more there or just stand by, salute and say, “OK, Commander-In-Chief. I get you. That’s what we’ll do.” Are you concerned about these programs that are eliminated?

Admiral LAUTENBACHER. I am concerned about them. I am very concerned about them and I do fight for resources every year. I am an enthusiastic advocate for the ocean community. I think the gentlemen here at the table will attest to that and I work hard to try to get a balance in what we do with other programs and you can talk to my boss about that if you want, if you don’t think that I am pushing forward for programs that I think are important. I have submitted—I have built an analytical process inside of NOAA to try to look at all of these things, to look at the benefits, to rack them up so when I go forward with the rationale, I can have the best possible rationale that will convince the Administration as well as convince you and I will keep working as hard as I can to make that happen.

Senator LAUTENBERG. So I then I take that is, a no. You don’t agree with the elimination of these programs.

[Laughter.]

Senator LAUTENBERG. The Chairman here, he is a bright fellow and works hard and he told us about how lucky we are to get a 60 percent increase in the budget, from the budget that got us to where we are. From the budget that was inadequate at the time and that permitted the whitening of the coral reef, that permitted the decline in species of fish going from codfish and Mr. Panetta, that’s bacalao. I mean, it’s serious stuff that we’re talking about. We have our own language but the decline in these species, the things that this person wrote about in the *Los Angeles Times*. So our budget has got us to this point. Maybe it would have been even worse had we not gotten these increases but the fact is, it is a foul-smelling situation that we’ve got and it’s frustrating as the devil. I would ask the Admiral, the recent studies from NOAA and elsewhere show that global warming is making our oceans more acidic. A change in the chemistry of our oceans could harm corals, plankton, fish, it could place a larger part of the ocean food chain at risk. I would ask if you’ve had an opportunity to discuss global warming threats and what the effects on our oceans might be. Have you had a chance to talk to the President or anyone else at the White House about these problems?

Admiral LAUTENBACHER. I talked with the Chairman of the Environmental Quality Council, Jim Connaughton and his staff and we

provide information and we work with them on the effects and the assessments of the issues that are assigned or coming out of the climate change research, obviously the acidification of the oceans is a very important one. Those papers were generated in great part by NOAA scientists and it is a very important work-in-progress at this point.

Senator LAUTENBERG. Yes, do you think that global warming—do you have any evidence that global warming is part of the cause of the acidification of the ocean?

Admiral LAUTENBACHER. People use the word global warming in sort of—to encompass all sorts of sins and broad issues but the issue is, is that there is increased carbon dioxide in the atmosphere and it is being absorbed in the oceans and the oceans are experiencing the effect of that. It is making it harder for invertebrates that use calcium-based systems, skeletal systems, to support them to grow, which means an effect on the food chain. So I believe that carbon dioxide in the atmosphere is making a change to the ocean acidification. So let me put it in those more specific terms, sir.

Senator LAUTENBERG. Dr. Orbach, how do you—do you see the impact of global warming, even though you are on the human side? I suggest that you don't really get into the other areas that we talking about. What do you think about global warming and its effect on the acidification?

Dr. ORBACH. Yes, certainly there is a role and again, remember you are talking to a cultural anthropologist here, but I do keep up on the other areas in cross-disciplinary work. That's what we do at the Marine Laboratory and we have some of the top experts in the world on this topic at our related labs. There is definitely a contribution although the exact extent of the effects are not well understood. I think the other thing that is important to note, is that it is not just the effect of changes in the atmosphere on the ocean that are of concern but also the effects of changes in the ocean on the atmosphere. So if we don't understand, for example, enough about the thermo-haline circulation of the ocean as well as the carbon exchange from the atmosphere to the ocean, much of which is driven by the ocean and changes we're making in the ocean itself, we won't be able to address the issues we need to address in the future. So yes, there is an effect and the thing to remember is, it goes both ways, not just top down.

Senator LAUTENBERG. Thanks. The one I quote for this comment, because I sit on the Environment and Public Works Committee as well and the Chairman there made public statements about global warming being one of the great hoaxes perpetrated on the American public. I think he said the greatest hoax perpetrated on the public, so we don't really—it's not as hot out there as you think. Come on!

[Laughter.]

Senator LAUTENBERG. Thanks very much, Mr. Chairman.

Senator SUNUNU. Thank you, Senator Lautenberg. I do want to be clear notwithstanding Senator Lautenberg's comments. I don't think we are lucky to have \$3.9 billion as opposed to \$2.5 billion. It is not a matter of luck and it certainly would be wrong to describe \$3.9 billion as being adequate if there are needs that are going unmet. But the point is, we need to understand where we are

relative to past years so that we can at least have an honest assessment of whether or not there has been a reasonable commitment to keep up some of these budget line items with what those anticipated needs are. I think it is also important to recognize that whether what we're spending today is \$3.5 billion or \$4.5 billion or \$20 billion, many of the problems that have been outlined here dealing with fisheries management or reef protection or invasive species require Congress to act and we have a responsibility to develop legislative solutions to many of these problems regardless of the absolute budget levels and all the money in the world won't solve the problem if we don't have good legislative policy, good regulatory policy in place. And of course, funding and resources to implement those policies will be required. But the problem that I've heard come very clearly through today's witnesses and others, is that we do not yet have a regulatory framework, a statutory framework for dealing with these issues. Let me ask a few questions about some of the legislation and the policy that was mentioned by our witnesses. Admiral, you mentioned an Organic Act and I think this was also mentioned in the Commissions reports, to establish a statutory language that describes NOAA's responsibility and mission. Congressman Vern Ehlers of Michigan has introduced legislation to streamline NOAA's six line offices into three; weather service, operations, and research. Could you talk about both of these pieces of legislation, whether they are at odds with one another or whether they can be viewed as complementary? I would ask Admiral Lautenbacher and also Congressman Panetta to respond.

Admiral LAUTENBACHER. I think they can be viewed as complementary. We have submitted a views letter. Essentially, what we think would be more prudent is a bill that is less prescriptive in the exact organization because it might need to be changed in a year so you would have to have another Act and another Act. We believe that the Organic Act, as it exists for all of the other parts of the government, should be couched in terms which set forward the mission and the requirements and the authorities and the responsibilities of the agency that it has to Congress and to the President and to the public and that individual changes could be made, should be made through authorization bills each year, if you want to have a deputy for this and a deputy for that and a report at the end of the month for this. Those are things that should be part of the normal business of Congress. So we support what is going on in the House very much. This is the first time it has proceeded as far as it has. We love to work with everybody to try to produce an Organic Act that we could all live with.

Senator SUNUNU. Mr. Panetta?

Mr. PANETTA. Chairman, we've sat down with Congressmen on the House side and have commended them for the work on trying to move a NOAA Organic Act over there and we would strongly urge that the Senate do the same. I think—I mean, I understand the Administration's position is basically codify what is in existence today and don't make any additional changes. My experience in the Congress is that you ought to take advantage of the opportunity, if you're going to codify and if you are going to pass anything, you ought to try to provide the additional authorities that are needed dealing with ecosystem, dealing with a national policy on oceans,

dealing with some of the other strengthening features that I think have to be done with regards to NOAA. I would do that and as a matter of fact, last year, I think there was a NOAA bill that actually passed—that came out of Committee. Senator Hollings was very involved in that. I think you ought to look at that model and try to work from something like that because I do think that if you have the opportunity not only to codify NOAA but to, in fact, strengthen it, do it.

Senator SUNUNU. If we enact an Organic Act that establishes NOAA as a lead agency on ocean policy, how does that affect the other Federal agencies like the EPA or Interior? Is it appropriate to remove some authority there to avoid redundancy and duplication and conflict between differing regulatory structures?

Mr. PANETTA. Mr. Chairman, I fall back on my Congressional experience more than someone who worked on the Executive side and my sense is that—I mean, I would think it would be well to try to coordinate, better coordinate the management of ocean issues and that, obviously, in the best of all worlds, it would mean moving some authorities not only from EPA and Interior and other areas to NOAA but it would mean, obviously, better coordination of those policies through NOAA's authority. I think because of the turf wars you'd run into and because of the jurisdictional wars you'd run into, I would say I would be hesitate to jump into that at this point and it depends a great deal upon your ability to move legislation as quickly as possible without having those kinds of conflicts.

Senator SUNUNU. Secretary Chrisman, we've done work in this Subcommittee on invasive species and I'd be interested to hear of your assessment of the work we've done and also any thoughts or concerns you might have about this issue, given the impact it's had on California's bays.

Mr. CHRISMAN. A big issue for us, a big issue for the states, obviously a big issue nationally. We have recognized this. My comments—I spoke to the creation of our Ocean Protection Council in overarching ocean management effort in California, bringing myself, the Head of California Environmental Protection Agency and the Chair of the State Lands and a couple of members, *ex officio* Members of the legislature together to begin this process of taking a look at these overarching issues and invasive species is clearly close to the top of the list in the efforts that we are working on. If you look at our efforts in the Sacramento-San Joaquin area and the San Francisco Bay, you look at our efforts down in Los Angeles. We've got a ways to go in terms of our efforts, in terms of how we interdict the invasives as they come in through our border stations, through our ports, working with our partners in the State Department of Food and Agriculture and the United States Department of Food of Agriculture, Plant and Animal Health, and Industry groups. For us, we're always behind the curve when it comes to dealing with invasive and we've teed this up on our Ocean Action Plan as a critical effort. We are putting some dollars into it through the work of our Ocean Protection Council to address that. And again, from our perspective, I'd like to—we'd like to urge working closely with this committee and working closely with Members of Congress to enhance that at the Federal level, if we could.

Senator SUNUNU. Thank you. And again, I want to thank all of our witnesses. We do have a vote ongoing. I appreciate the time and effort each of you has put into your work and your testimony today. We will have some additional questions submitted for the record. I know Senator Boxer had a number of additional questions that she wanted to include and we look forward to working with you on an ongoing basis on invasive species and fisheries management and reef protection, the issues that have been mentioned here but I think there are also issues where the Senate and this Subcommittee have made some real contributions today. The hearing is adjourned.

[Whereupon, at 11:22 a.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. DANIEL K. INOUE, U.S. SENATOR FROM HAWAII

Mr. Chairman, thank you for calling attention to this issue. As you know, the health of our oceans is particularly important to me. I am pleased that the Committee will take a close look at our progress to date, as well as actions we still must take, to ensure that future generations have access to healthy and productive oceans.

I am proud of the Committee's accomplishments toward implementing the recommendations of the Ocean Commissions reports. In the first session of the 109th Congress, the Senate approved 6 bills on key Ocean Commissions recommendations, and the Committee has approved another 3 that are awaiting Senate consideration.

Four Senate bills currently awaiting action in the House are particularly important to me, and we would like to see the House take these up soon:

- S. 50, the Tsunami Preparedness Act;
- S. 362, the Marine Debris Research, Prevention, and Reduction Act;
- S. 2012, the reauthorization of the Magnuson-Stevens Act; and
- S. 1390, the Coral Reef Conservation Amendments Act of 2005.

I urge House leaders to move these bills forward as they play a vital role in our Nation's ability to respond to and reduce threats to our safety and the safety of our resources.

I would like to comment specifically on the international provisions of S. 2012, which provide a complement to the impressive conservation and management program we have established under the Magnuson-Stevens Act here at home. These provisions would strengthen U.S. leadership in international conservation, and put teeth into our efforts to end illegal, unregulated, and unreported fishing as well as the bycatch of protected living marine resources on the high seas.

This problem is particularly important in the Western Pacific, where increasing pressure from other high seas fishing nations has resulted in our bigeye tuna stocks being overfished, as well as in uncontrolled bycatch of endangered sea turtles. Without addressing this problem internationally, both our tuna stocks and our sea turtles will continue to decline, which harms both our fishermen and our ecosystems.

I look forward to enactment of these essential provisions this Congress, as well as Senate action on our other priorities, including S. 363, the Ballast Water Management Act of 2005.

We share the Commissions' dedication to keeping national attention on oceans. I was dismayed that oceans were entirely ignored in the President's new science initiative. However, I am pleased that the Committee's technology bill included provisions to promote ocean science and education.

I also look forward to discussing with Chairman Stevens how we may move forward on legislation that strengthens NOAA and its missions, as we did in the 108th Congress.

I am disappointed that the President continues to request funding well below the levels that are required to implement key Ocean Commissions recommendations. The President's FY 2007 budget request is \$227 million, or 6 percent, below the FY 2006 appropriated level of \$3.91 billion, which is still half of the level recommended by the Ocean Commissions and only one quarter of the amount devoted to space exploration.

The Administration has even failed to request funds for its "Ocean Action Plan" priorities, including areas that the Commerce Committee has acted on, such as Oceans and Human Health, Marine Debris, and Ocean Observing Systems. I call on this Administration to fully fund these important programs and make protecting and managing our ocean, coastal, and Great Lakes resources a true priority.

I am proud of the progress this Committee has made, starting with the legislation in 2000 that created the U.S. Commission on Ocean Policy. Yet without like-minded partners, we cannot fully succeed. We must continue to remind everyone that oceans

sustain the life of all Americans, wherever they live. We will not give up our stalwart effort to make oceans a priority, and we hope others will join us this year.

PREPARED STATEMENT OF HON. SAM FARR, U.S. REPRESENTATIVE FROM CALIFORNIA

Chairman Sununu, Ranking Member Boxer, and members of the Subcommittee: I would like to thank you for including my testimony in your hearing records, and I want to commend you for having this discussion on the *State of the Oceans*. This is one of many recent initiatives to bring oceans to the forefront of the legislative agenda. Making oceans more of a priority in Congress has been one of my top goals during my tenure. As a founding Co-Chair of the House Oceans Caucus and a member of the Congressional Coastal Caucus, I have been very engaged in ocean policy and marine science issues. I was also one of the lead authors of H.R. 2939: Ocean Conservation, Education, and National Strategy for the 21st Century Act (OCEANS-21), which encompasses many of the legislative priorities included in the U.S. Commission on Ocean Policy (USCOP) 2004 report (*An Ocean Blueprint*) and the recent report (*From Sea to Shining Sea*) from the Joint Ocean Commission Initiative (JOCI). These priorities highlight some of the many steps we can take to improve the “failing grade” the Nation received on JOCI’s U.S. Ocean Policy Report Card.

As a native of the Central Coast of California, one of the most beautiful stretches of coastline in the world, I have had a lifelong love for the ocean. Now, as a Member of Congress representing the area, I remain intimately connected to and an advocate for the oceans. Several ocean-related programs abound in my district and help make it one of the most dynamic coastal destinations in the country. For instance, it includes the Monterey Bay National Marine Sanctuary—the Nation’s largest and highest profile marine sanctuary—the Monterey Bay Aquarium, and NOAA’s National Marine Protected Area Center and Science Institute. In addition, it houses several top ocean research laboratories and education institutions (*e.g.*, University of California at Santa Cruz, Moss Landing Marine Lab, California State University at Monterey Bay, Monterey Bay Aquarium Research Institute), where key studies/programs are conducted related to highly migratory species like sharks and tuna, protected species like salmon, ocean observing/exploration, data collections on fish stocks and ocean economics, and various others.

It is undeniable that our oceans and coasts are among our Nation’s greatest natural resources, and the direct and indirect impacts they have on our lives and livelihoods are paramount. Over half of the U.S. population live in coastal states. Coastal and marine waters support over 2.8 million jobs and produce one-third of the Nation’s GDP. The culture, economy, and security of our Nation depend on the health and sustainability of these assets. In addition, they impact human health, climate variability/stability, social dynamics, and more.

Despite the many benefits we can and do reap from our oceans and coasts, we are not sufficiently managing and protecting them. For far too long, we have considered the marine and coastal resources to be inexhaustible, but we are finally starting to realize that we are pushing them to their very limit. Despite this realization, we are, as a Nation, letting time continue to pass without making effective changes to slow or reverse this degradation. Therefore, an increased and sustained investment in the protection and understanding of our largest public trust is urgently needed and will enhance future benefits. The longer we wait to make oceans more of a priority, however, the greater and more irreparable the losses will be.

I cannot emphasize enough the need to show stewardship for our oceans, so we can turn the tide on the dire consequences facing them—and us by extension. The time to do so is now! So, again, I greatly appreciate your efforts to take action for the sake of our oceans—not only our Nation’s most valuable resource, but the life-support of our only planet.

THE SAD STATE OF OUR OCEANS: REP. SAM FARR’S CALL FOR NATIONAL ACTION

Our oceans are this country’s *largest public trust resource*, covering an area 23 percent larger than the Nation’s land area (about one and a half times the size of the continental U.S.), and *we must start treating them as such*.

Every American depends, *directly and indirectly*, on the oceans—for food, jobs, scientific knowledge, recreation, spiritual reflection, and other reasons.

Many Americans desire to be near an ocean. In fact, coastal watershed counties account for less than 25 percent of the Nation’s land area but are home to more than *50 percent of the U.S. population*.

Our oceans and coastal areas contribute *over \$1 trillion per year* to our economy. If we don't change our course, we won't continue to see this economic benefit.

2 major reports document the *urgent need* for improved management of U.S. ocean resources:

- The Pew Oceans Commission Report (2003)—private sector bipartisan group.
- The U.S. Commission on Ocean Policy's Report (2004)—based on Oceans Act of 2000; Presidential appointees.

Both reports stress that our *current system of oceans governance is inadequate or has failed*. It is fragmented, both institutionally and geographically, with over 10 Federal departments and 20 Federal agencies implementing over 140 laws.

These 2 reports are very similar. *They do not differ on assessment of the crises* facing the oceans; they only differ slightly on the details of how we should affect positive change.

Ocean crises resulting from human activities:

- *Polluted waters:* In 2001, 23 percent of the Nation's coastal areas were unsuited for swimming, fishing, or supporting marine life and more than 80 of our coastal areas suffered from the negative consequences of nutrient overloading, such as toxic algal blooms.
- *Compromised fisheries:* Only 8.6 percent of federally-managed fish populations are known to be healthy while over $\frac{1}{3}$ of the Nation's assessed fish stocks are overfished or experiencing overfishing.
- *Other ocean perils:* Irreversible loss of coral reefs; destruction of essential habitat; and staggering rates of marine mammal, sea turtle, sea bird, and non-target species bycatch in fisheries.

How we correct these crises? Congress should pass a comprehensive bill that:

- *Employs an ecosystem-based management approach:* This type of approach transcends political boundaries and recognizes complex interactions between living and nonliving components of the systems.
- *Improves national governance:* We desperately need a *national oceans policy*—one that states the *national goal is to protect and maintain healthy marine ecosystems* and, where needed, to *restore the health of degraded marine systems*. At the heart of a new system of national governance is a *strengthened National Oceanic and Atmospheric Administration (NOAA)*.
- *Creates strong regional governance:* Based on large marine ecosystems.
- *Promotes an ocean stewardship ethic:* Based on a *long-term vision* of protecting, restoring, and maintaining healthy marine ecosystems.
- *Invests in the future:* By strengthening marine science research and education.

PREPARED STATEMENT OF HON. OLYMPIA J. SNOWE, U.S. SENATOR FROM MAINE

Thank you, Mr. Chairman. As Chair of the Subcommittee on Fisheries and Coast Guard, I am especially pleased to be here today to discuss the status of the United States' ocean policy. Two years have passed since the U.S. Commission on Ocean Policy published its eagerly anticipated, Congressionally-mandated report on the state of our Nation's oceans and coasts. The Commission is to be commended for its comprehensiveness and for sparking debate and discussions—like the one taking place here today—that can lead to implementation of its recommendations. Its report assigned numerous tasks to Congress, and here in the Senate, my colleagues and I are making great efforts to answer the Commission's call to action.

However, discussion is not enough. I wholeheartedly agree with the Commission that Congress must act, and act swiftly. The world's population is more dependent than ever on the benefits of a healthy ocean. According to the United Nations, approximately three billion people, half the world's population, live within 100 miles of a coastline. The average population density in coastal areas is about 160 persons per square mile, twice the global average. In the United States alone, activities on our oceans contribute *hundreds of billions* of to our economy every year, and directly support more than 2 million jobs. Never in history have so many relied on the ocean for so much of their livelihood.

In response to one of the Commission's cornerstone recommendations, I pushed out of the Senate, S. 361 the Ocean and Coastal Observation bill. Establishing a national and global ocean observation network will provide scientists an unprecedented amount of information that will allow them to protect our oceans and mitigate the impacts of its systems on human health, life, and property. In my own

state, the Gulf of Maine Ocean Observation Network has had practical, positive impacts notifying mariners of dangerous weather offshore and assisting the Coast Guard in its search and rescue missions. The network gathers information that was once unobtainable and paints a more complete picture of the physical and chemical characteristics of the Gulf of Maine.

Last Congress I also succeeded in implementing another of the Commission's recommendations with the passage of my Harmful Algal Bloom legislation. NOAA estimates the annual average cost of harmful algal blooms to the U.S. economy is \$49 million in lost revenues, with individual events—such as the recent red tide outbreak in New England—often surpassing that total in a matter of months or even weeks. In order to relieve the financial and ecological burden of harmful algal blooms, my bill focuses on increasing our understanding of the causes of these events and improving methods to predict their occurrence.

Of course, legislation and new programs are only part of the solution. New funding is critical to the success of improved oceans management. In the past, I have supported the concept of using revenues from oil and gas leases on the outer continental shelf to fund oceanographic research and management. If we as a country are serious about moving forward with any of the recommendations of the Commission, we must take a hard look at this approach once more. If our only responses to the Commission's report are unfunded mandates, then we in Congress have not done our job. We must give our ocean managers and researchers the ability to make meaningful strides toward responsible, forward-thinking management of our invaluable marine resources.

Thank you, Mr. Chairman.

PREPARED STATEMENT OF JOHN CONNELLY, PRESIDENT,
NATIONAL FISHERIES INSTITUTE

I would like to thank Chairman John Sununu, Ranking Member Barbara Boxer and the members of the Subcommittee on National Ocean Policy Study for giving me the opportunity to submit a written statement for the Committee record on the very important issue of the status of our Nation's oceans.

The National Fisheries Institute (NFI) is the Nation's leading advocacy organization for the seafood industry. Its member companies represent every element of the industry from the family fisherman at sea to the national seafood restaurant chains. This water-to-table diversity allows NFI to speak with authority to decisionmakers in Washington, D.C., and impact public policy that will help secure a healthy future for all Americans.

NFI and its members are committed to sustainable management of our oceans and being stewards of our environment by endorsing the United Nations' Principles for Responsible Fisheries. Our members recognize the value of ensuring our industry does not adversely affect surrounding ecosystems or damage native species. Our investment in our oceans today will provide our children and future generations the health benefits of a plentiful supply of fish and seafood tomorrow.

From responsible aquaculture, to a marketplace supporting free and fair trade, to ensuring consumers have the facts on the health benefits of fish and shellfish, NFI and its members support and promote sound public policy based on hard science. The informed, educated, and involved consumer will sustain the seafood industry and its products well into the future.

Today's hearing is timely and necessary to continue an earnest discussion of the many issues, both real and perceived, facing our Nation's oceans and the Americans whose health and livelihoods rely on the ocean's vast resources. From a nutrition standpoint, seafood is an important part of a healthy, balanced diet and Americans should feel comfortable and confident knowing that the seafood they consume is harvested in a sustainable manner and that the fish they serve their families is healthy and safe. NFI sees the dissemination of this health message as one of our most important objectives.

Numerous health and nutrition experts, including the American Heart Association and the Federal Government in its most recent dietary guidelines, recommend Americans consume at least two servings of fish per week, specifically mentioning the health benefits from Omega-3 fatty acids that can "reduce the risk of mortality from cardiovascular disease," the leading cause of death for both men and women. These conclusions are substantiated by a vast body of scientific evidence.

Joint advice from the U.S. Food and Drug Administration and U.S. Environmental Protection Agency, indicates that certain groups of the population—women who are pregnant, planning to become pregnant or nursing, and young children—

can choose fish species that are likely to be lower in mercury content as a precaution, while continuing to take advantage of these health benefits.

The general public should not let undue concerns about whether or not our fisheries are sustainably managed prevent them from enjoying the proven health and nutritional benefits of regular fish consumption. Fortunately, the most recent government reports indicate that U.S. fisheries are, on the whole, sustainable and well-managed.

On the matter of the state of our country's fisheries management, I would like to draw the Committee's attention to a very positive report recently issued by the National Oceanic and Atmospheric Administration (NOAA), the "*Status of Fisheries of the United States*." This report on U.S. fish stocks indicates that the vast majority of U.S. fisheries are sustainably managed. Specifically, 81 percent of fish stocks assessed for 2005 are sustainably managed and one stock in the Pacific Northwest, lingcod, has been fully rebuilt 3 years ahead of schedule. This report is an excellent illustration of the positive steps forward the U.S. fishing community is making toward the goal of ensuring our products will be available to American consumers for years to come.

Of the 206 stocks assessed this year, about three-quarters of those stocks are healthy. Six fish stocks with previously low populations are now rebuilt and considered sustainable. Stocks that have been assessed with a low sustainable population will undergo a rebuilding plan developed by the regional fishery management councils to restore the fish to sustainable levels. As in the past, this year's findings demonstrate the continued effort by NOAA Fisheries, along with commercial and recreational fishermen, to support sustainable harvesting of this nutritious and affordable protein source. The bottom line is that if the species of fish is in the store or on the menu, the stock is available to meet consumer demand.

While NOAA's most recent Status of the Stocks report indicates a very positive trend in fisheries management, there is still much work for Congress to undertake in order for us to build upon these successes. I would like to now turn my focus to three key policy issues that the seafood community sees as necessary and primed for Congressional action. These issues are: (1) reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act; (2) passage of an offshore aquaculture act; and (3) increased Congressional attention to the agencies that conduct oceans research and the agencies that ensure the safety of our Nation's food supply.

It has been 10 years since Congress last authorized the Magnuson-Stevens Act (MSA), placing much greater emphasis on conservation, the social and economic impacts of fishery regulations, and fish habitat. In 2004, the U.S. Commission on Ocean Policy made several recommendations to improve fisheries conservation and management as part of a larger set of recommendations to improve ocean resource management. Since then, the Senate has passed one version of a MSA reauthorization, S. 2012, and the House Resources Committee has marked-up their version, H.R. 5018, the American Fisheries Management and Marine Life Enhancement Act.

H.R. 5018, a bipartisan bill sponsored by House Resources Committee Chairman Richard Pombo (R-CA) and Rep. Barney Frank (D-MA), strikes a good balance between addressing the need to conserve fish stocks and habitat and the need to feed American families. The bill protects livelihoods and culture of tens of thousands of fishermen and the communities that depend on their economic support. H.R. 5018 will strengthen conservation and the role of science in regional fisheries decision-making and protect our ability to provide a healthy product to today's consumers by maintaining strong regional control over management decisions.

More specifically, under the MSA, our country's fishing areas are managed by a system of eight regional councils, each consisting of conservationists, fishing industry experts, government officials, scientists, and community representatives who have the greatest understanding of local fishing issues and management challenges. Both S. 2012 and H.R. 5018 ensure that the regionally-based management structure is strengthened and that individuals most familiar with local waters can continue to make the decisions for their region.

The two primary MSA reauthorization measures, S. 2012 and H.R. 5018, build on current best practices and improve the role that science plays in conserving fish and marine ecosystems. By making available the latest science and statistics, local management decisions can be made in real-time, ensuring fishermen limit harvests and leave enough fish in the water so that they are able to replenish for generations to come.

And there's proof this system works: the principles based in the reauthorization bills are based on a fisheries management model in Alaska, where more than half of our Nation's fish are caught. Alaska pollock, the country's largest fishery, has been healthy for decades and is certified by an international environmental organization, the Marine Stewardship Council. That's because Alaska's fishermen listen to

advice from conservation scientists and take measures to protect marine animals and habitats.

At this time, the House and Senate have a unique opportunity to make great strides forward to ensure a reliable supply of seafood for Americans now and into the future. I would encourage the Committee to weigh in with House and Senate Leadership to help expedite complete consideration of a Magnuson-Stevens Act reauthorization before the 109th Congress adjourns.

Another pending legislative opportunity that I would encourage Congress to address for the future of oceans management is the enactment of legislation to establish a regulatory framework for offshore aquaculture operations in U.S. waters. The Committee has already heard from me on the broader issue of aquaculture as I submitted written testimony for the Subcommittee on Ocean Policy Study hearing held on April 6th. However, I believe that message is one worth repeating since Congress still has yet to move forward on this important matter.

The Senate has pending before it now one of the key outcomes of last year's U.S. Oceans Action Plan: a proposal for establishing the regulatory infrastructure for a national offshore aquaculture program. S. 1195, the National Offshore Aquaculture Act, would create a framework for the Department of Commerce to issue permits for offshore aquaculture. This legislation would streamline the permitting process and allow permits to be granted to build fish farms in certain geographic areas and for certain types of fish. The permits would be renewable. Finally, the permitting process would take into the account the views of states, other Federal agencies, and other impacted parties (such as fishing vessels operators and offshore oil drilling companies).

A number of nations are already engaged in offshore aquaculture. This kind of cutting-edge technology will become essential to meet the ever-growing demand for seafood around the world. The U.S. has the advantage of being able to rapidly develop the high technology systems that would be required to commercialize offshore aquaculture. What is missing is the regulatory system to develop this business.

The National Offshore Aquaculture Act is just the beginning of the dialogue. The bill's sponsors, Senators Ted Stevens (Alaska) and Daniel Inouye (Hawaii), and Congress on the whole will examine these recommendations and undoubtedly alter the initial language as part of the legislative process.

Many in Congress clearly recognize that we will be unable to sustain our level of consumption or expected increases in the future by solely relying on wild capture. The 80 million metric ton difference estimated by the U.N. Food and Agriculture Organization (FAO), or "aquaculture gap," between our global wild harvest and the world's demand for healthy seafood needs to be met.

Farm-raised products are sustainable sources of food that help retailers and restaurants meet the ever-growing demand for seafood across our Nation and around the world. Aquacultural practices—traditional and marine alike—should be viewed in the public eye as a "relief valve" for wild capture fisheries, not a replacement for them.

Furthermore, aquaculture products are often a cost-effective alternative for the producer. That benefit can be passed along to consumers by expanding the kinds of fish available and reducing prices. Five of the top ten kinds of fish Americans eat are at least partially farmed, including shrimp, salmon, catfish, tilapia, and clams.

Once again, in order for consumers to reap the healthful rewards of frequent seafood consumption, the Federal Government must work to ensure that we have the ability to meet the increased demand. This bill will strengthen that ability while striking a delicate balance with our environment.

Finally, I would like to call the Committee's attention to an issue that many here feel strongly about and that is an increased commitment from Congress and the Administration to support and more adequately fund the National Oceanic and Atmospheric Administration. In the most specific of terms, NFI would recommend that Congress appropriate at least \$4.5 billion to NOAA in FY 2007.

As you know, NOAA is one of the premier science agencies within our government and the data, products and services that they provide help to protect our Nation's economy, security, environment and quality-of-life. While the National Marine Fisheries Service, or NOAA Fisheries, is but one aspect of the agency's broad network, the Nation's seafood community absolutely depends on the statistics, mapping, data and management tools they provide. For example, it was NOAA that provided accurate and timely information regarding the impending landfall of the devastating hurricanes of 2005 which allowed thousands of residents and visitors adequate time to evacuate the regions where the storms made landfall. In addition, in the wake of the hurricanes, NOAA deployed its leadership staff and personnel immediately to the most affected areas in order to gather information and begin working with

the fishing communities on the development of a recovery plan. The Gulf seafood community, which was absolutely overwhelmed and crippled after Katrina and Rita hit, has finally seen financial relief for the oyster and shrimp industry as a result of Emergency Supplemental Appropriations Congress passed this spring. However, had NOAA been provided with more adequate funding tools prior to the hurricanes we believe that much of the devastation could have been mitigated or prevented beforehand.

In addition to fisheries disaster mitigation efforts, another specific example of the beneficial work NFI sees ongoing at NOAA is the Sea Grant Program, most specifically within the seafood science and technology theme of the program. Our Nation's seafood industry faces many challenges as well as opportunities in the coming decades. These challenges include an increasingly competitive global marketplace, complex trade policies, strict regulations, rising energy costs and limited seafood supply. While the U.S. demand for seafood continues to grow, our country's fish harvesters and processors require continued investment in the research and technologies needed to help meet our Nation's demands.

A programmatic set-aside for Sea Grant's seafood science and technology theme programs would be used to rebuild the Nation's university-based seafood technology infrastructure, including supporting new research faculty and graduate students, and expanding Sea Grant extension capabilities. Funds also would support cutting-edge research and development activities through competitive, peer-reviewed grant processes. The Sea Grant network is poised to help the industry increase quality and safety, add value, lower costs, and expand seafood supplies and markets, and this funding would be crucial to helping achieve these goals.

NFI is especially supportive of this initiative because, in addition to helping the safety of seafood for the American consumer, this additional funding would help many small seafood businesses that derive productivity and competition benefits from university-based research that they are unable to do themselves due to the high costs. With that, I would ask that the Committee express support to the appropriators for a programmatic set-aside for the seafood science and technology theme within NOAA's Sea Grant program.

Finally, President Bush requested \$4.5 billion for NOAA in his FY 2007 budget request and NFI believes that Congress must meet this broader request for the agency to fully meet its mandate. While we understand that there are many funding priorities on the table at this time, the research, data collection and oceans management tools underway and in development at NOAA are an imperative investment for now and for the future.

We at NFI look forward to working with the Congress and with your Committee on the National Aquaculture Act, reauthorization of the Magnuson-Stevens Act, and on procuring additional funds for NOAA, all of which are necessary steps to helping ensure a sustainable and environmentally-sound ocean resource for future generations. I appreciate the opportunity to testify here today, and look forward to working with you on these important initiatives in the coming weeks and months.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BARBARA BOXER TO
VADM CONRAD C. LAUTENBACHER, JR.

Question 1. Does the Administration believe that our oceans are in crisis?

Answer. As stated in the 2004 report of the U.S. Commission on Ocean Policy, our oceans, coasts, and Great Lakes are critical to the existence and well-being of our Nation and its people; they are also vulnerable to human activities. The Bush Administration is focused on achieving meaningful results—making our oceans, coasts, and Great Lakes cleaner, healthier, and more productive. A key challenge is developing management strategies that ensure continued conservation of coastal and marine habitats and living resources, while at the same time ensuring the American public enjoys and benefits from those same resources. To advance the next generation of ocean, coastal, and Great Lakes policy, we have developed a U.S. Ocean Action Plan that supports sound management of these important resources.

Question 2. As you well know, NOAA's authority currently comes from numerous statutes—it is quite a tangled and bureaucratic web. Given that the Ocean Commissions have called for an Organic Act establishing a more organized and efficient approach to oceans governance, what path would you recommend? How should NOAA be strengthened and improved?

Answer. In its report, the U.S. Commission on Ocean Policy recommended immediate Congressional action on an Organic Act to enhance NOAA's ability to conduct operations consistent with the principles of ecosystem-based management and with

its primary functions. The Administration concurs fully and transmitted an Administration proposal for a NOAA Organic Act to the Congress on June 10, 2004.

A NOAA Organic Act would provide a unified, coherent charter to define NOAA's future service to the United States. The Administration's proposed bill would greatly strengthen NOAA's ability to undertake research activities, to disseminate information, to manage ocean and coastal areas, and to provide stewardship of living marine resources by codifying in one place its core administrative authorities. While NOAA has many of these authorities under statutes for specific programs, or under the Department's general authorities, the Administration's proposed bill provides clear authorities on a NOAA-wide basis, and places the NOAA authorities together in one public law. This would clarify NOAA's existing authorities and would enhance interagency cooperation. Furthermore, passage of a NOAA Organic Act would demonstrate Congressional support for the agency and its missions by providing NOAA with a clear and unified legislative mandate.

Question 3. The Administration's Ocean Action Plan calls for taking a regional ecosystem-based approach to managing ocean resources. What steps has the Administration taken toward implementing this goal?

Answer. In response to the U.S. Commission on Ocean Policy's recommendation, the Administration committed to continue working toward an ecosystem-approach in making decisions related to water, land, and resource management in ways that do not erode local and state authorities and are flexible to address local conditions. Accordingly, NOAA is committed to executing its stewardship responsibilities for ocean resources by employing an ecosystem-based approach to management. An ecosystem approach to management is one that provides a comprehensive framework for living resource decisionmaking. In contrast to individual species or single issue management, an ecosystem approach to management considers a wider range of relevant ecological, environmental, and human factors bearing on societal choices regarding resource use. This approach involves both organizing governance institutions (Federal, state, tribal and local) to work across traditional "sectors" (e.g., fishing, energy exploration and extraction, marine commerce and shipping), and by understanding how various physical and biological components interact.

To achieve more coordination of NOAA's various mandates, NOAA commissioned a FACA panel, the External Ecosystem Task Team, to look carefully at all its ecosystem-related programs and make recommendations about how these programs can work more closely at the regional ecosystem scale (large marine ecosystems), and to provide data and analysis products that can serve many sectors at once. The report of the External Ecosystem Task Team (available at http://www.sab.noaa.gov/Reports/eETT_Final_1006.pdf) is now at NOAA for appropriate action. As part of this exercise, NOAA scientists collaborated on a series of "white papers" to envision what ecosystem-related capabilities NOAA (and other appropriate agencies) would need to develop over the next 15 years (by 2020) in order to fully support a variety of ecosystem-based issues (e.g. impacts of climate variability, management of living resources in an ecosystem context, fresh water issues, social benefits).

NOAA and other agencies, under the auspices of the Joint Subcommittee on Ocean Science and Technology, have developed priorities within the Administration's draft "Ocean Research Priorities Plan." The Administration's priorities directly relate to the national responsibilities to support ecosystem-based management in order to work across Federal agencies and with the state and local governments. Additionally, the Subcommittee on Integrated Management of Ocean Resources has created several items in its work plan for the current year to conduct a series of planning workshops to develop interagency approaches to ecosystem-based management.

The President's U.S. Ocean Action Plan also charged the Department of the Interior and NOAA to coordinate and better integrate the existing network of National Parks, National Wildlife Refuges, National Marine Sanctuaries and National Estuarine Research Reserves. Many of these sites adjoin and overlap with each other across various ecosystems to conserve a rich assemblage of coastal, ocean, and Great Lakes resources. On August 21, 2006, the Department of the Interior and NOAA signed an interagency agreement to increase the coordination of these programs. In FY 2007, the four programs are identifying regional and local level opportunities to enhance scientific understanding and conservation of coastal and marine ecosystems at these sites.

On the international scene the U.S. Department of State, representing all Federal agencies, participated in the 7th meeting of the U.N. Open-ended Informal Consultative process on Oceans and the Law of the Sea, and successfully negotiated language for establishing principles supporting ecosystem approaches to management. In addition, NOAA is working with the Global Environmental Facility in over 75 countries to adopt regional ecosystem approaches to collaborative science and man-

agement, especially in the developing world under its Large Marine Ecosystem program.

In addition to these efforts, the Administration has supported stronger language supporting ecosystem approaches to management in the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act.

Question 4. Admiral Lautenbacher, you acknowledged there are budget disconnects, and that you have been trying to deal with them through your requirements-based “Planning, Programming, Budgeting and Execution System” (PPBES) process.

Ideally does PPBES identify the agency’s fiscal requirements to meet its missions? If not, what exactly is it supposed to identify? How does the amount identified initially as “requirements” by NOAA for FY 2007 compare to what is in the PPBES request for FY 2007? Please provide these figures.

Answer. PPBES is an integrated, requirements-based planning, programming, budgeting and execution system that serves two fundamental purposes: (1) it uses NOAA’s strategic vision and goals to drive annual investment and management priorities, programmatic and policy choices, and budget development; and (2) it provides a systematic approach to allocating resources optimally and maximizing programmatic impact. Requirements are central to the entire PPBES system: all of NOAA’s programs derive from validated requirement drivers (such as statutes or Executive Orders), and all investment decisions are assessed in terms of programmatic requirements. Through the PPBES system, NOAA systematically adjusts its priorities and corresponding budget requests to respond to external environmental changes, scientific and technical trends, Congressional and Administration priorities, and other factors that shape the demand for NOAA’s mission functions. NOAA has proposed a fiscally prudent FY 2007 budget that focuses resources on NOAA’s highest impact and most urgent programmatic requirements and adheres to the Administration’s policy priorities.

Question 4a. Admiral, as well as Mr. Panetta, can you explain where in the system of clearances in the Administration budget process are reductions from requirement-driven proposed levels taken—and be specific (e.g., NOAA line offices, NOAA HQ, DOC, OMB)? In your experience, at each level of review, what types of considerations would result in reductions to funding of a program identified as an agency requirement? For example: Lack of authorization (whether a subject-specific Act or an organic Act)? Lack of scientific consensus? Failure to be highlighted as an Administration priority or by expert reports (such as in the Ocean Action Plan and the report of the U.S. Commission on Ocean Policy)?

Answer. NOAA is provided fiscal guidance in order to prepare the budget submission; the budget request is shaped to meet those constraints. The budget request is then continually refined at each stage of the process: line office, NOAA headquarters, DOC, and OMB. These refinements can be increases, reductions, or re-allocations. Fiscal constraints and policy considerations at each stage, combined with the priorities established through the PPBES process, determine the appropriate levels requested in the President’s budget. NOAA fully supports the funding levels put forth in the President’s budget.

Question 4b. None of these categories seems to explain why the Oceans and Human Health and Marine Debris lines were defunded, and yet they were. Can you explain how that happened? Is it likely to happen again in the FY 08 request? What considerations would place them in danger of being zeroed out yet again?

Answer. What you will see in the FY 2008 President’s budget represents NOAA and the Administration’s priorities. Within a constrained budget environment, items of lower priority are not requested. For FY 2008, NOAA’s highest priority is sustaining mission-critical operations. Other priorities include advancing key Presidential policy priorities such as: Magnuson-Stevens reauthorization, the President’s Ocean Action Plan, the Global Earth Observation System of Systems, the Climate Change Science Plan, and the President’s Management Agenda.

Question 5. How can we improve the situation so that real-life budgets reflect real-life needs? Would an independent budgeting authority such as the one proposed in the Hollings National Ocean Policy and Leadership Act (which is included in my National Oceans Protection Act, S. 1224) be helpful in this regard? What other changes in the budget process would be helpful?

Answer. The PPBES process allows NOAA to systematically adjust its priorities and corresponding budget requests to respond to external environmental changes, scientific and technical trends, Congressional and Administration priorities, and other factors that shape the demand for NOAA’s mission functions. In this manner, within the budget environment, the budget reflects current needs and priorities. The proposal in S. 1224 to remove NOAA from the Department of Commerce, and thus

its budget oversight, would not be helpful. Changes in the budget process such as the President's proposed line item veto legislation and earmarking reform would be helpful.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUE TO
VADM CONRAD C. LAUTENBACHER, JR.

Competitiveness and Education

Question 1. Currently, innovation and competitiveness initiatives are being pursued as a result of recommendations from a National Academies report, *Rising above the Gathering Storm*. As you know, ocean and atmospheric science and education were not explicitly mentioned in the report. However, the U.S. Commission on Ocean Policy and other experts have identified ocean and atmospheric research as key to improving America's science education and competitiveness. That is why we include a section on ocean and atmospheric science in the Committee's American Innovation and Competitiveness bill. What benefits do you believe ocean and atmospheric research and education have for U.S. scientific advancement, education, and competitiveness?

Answer. America's economic strength and global leadership depend in large measure on our Nation's ability to generate and harness the latest in scientific and technological developments and to apply these developments to real world problems. These applications are fueled by scientific research, a strong education system that equips our workforce with the skills necessary to transform those ideas into goods and services, and an environment that encourages entrepreneurship, risk taking, and innovative thinking.

NOAA is not included in the President's *American Competitiveness Initiative*. The three agencies named in the initiative (the National Science Foundation, the Department of Energy's Office of Science, and the National Institute for Standards and Technology within the Department of Commerce) were chosen because they support the largest proportion of basic research in physical sciences and engineering—two areas that were determined by the Administration to need additional support. These fields are high-leverage fields and produce both the fundamental research results and new research tools that support all of the sciences.

NOAA's primary contributions to American competitiveness exist through providing an infrastructure of environmental observations, research and information services, and resource management that support efficient commerce, reduce business uncertainty and directly benefit the economy and society. We believe investments in oceanic and atmospheric research and education are essential to America's economic strength and global leadership. NOAA's impacts in these areas are particularly pronounced in weather- and climate-sensitive industries, the energy sector and energy-intensive industries, maritime-based industries, and the transportation sector.

For example, total losses for the 2005 hurricane season in Louisiana, Mississippi, and Alabama have been estimated at \$140 billion, of which \$40 to \$67 billion were insured. NOAA's ability to observe, model, forecast and warn of environmental events is dependent on maintaining operational requirements for NOAA's platforms such as geostationary and polar satellites, data collecting buoys, and wind and weather missions on P-3 and G-IV aircraft. In the transportation sector, waterborne cargo alone contributes more than \$742 billion to the U.S. GDP and creates employment for more than 13 million citizens. NOAA's technical information services are essential to the safe and efficient transport of people and goods at sea, in the air, and on land and waterways.

Question 1a. What programs does NOAA have that will advance national innovation and competitiveness?

Answer. With continued support from Congress, NOAA is in a strong position to improve the science base for environmental decisionmaking, improve environmental education, and transition science to operations, generating broad benefits for the America's economy.

NOAA's highest technical priority is to build integrated, global Earth observations. To address the growing requirements for environmental data on national and global scales, NOAA, the National Aeronautics and Space Administration (NASA), and the Office of Science and Technology Policy are co-leading the implementation of the *Strategic Plan for the U.S. Integrated Earth Observation System*. The U.S. Integrated Earth Observation System is an essential component of the Global Earth Observation System of Systems, or GEOSS, which is a global Earth data collection and dissemination initiative to benefit worldwide stakeholders and decisionmakers. GEOSS will allow users to share, compare and analyze a diverse array of datasets,

providing the information necessary to mitigate the impacts of natural hazards. GEOSS will provide the global information required to understand the interactions between Earth processes and, thereby, improve the forecasting skills of a wide range of natural phenomena. GEOSS will also promote improved decision-making in various sectors, including natural resource management, public health, agriculture and transportation. NOAA's environmental satellite systems and the Integrated Ocean Observing System (IOOS) are among the critical components of the GEOSS initiative.

The Office of Ocean Exploration is devoted exclusively to the critical mission of exploring the still largely unknown ocean. The ocean exploration program focuses on discovery of new ocean resources for societal and economic benefits, serves as an effective means to promote ocean education and ocean literacy, and enables NOAA to become aware of ocean issues that may become the basis for future NOAA missions. NOAA's Undersea Research Program, NURP, harnesses the academic community to focus on NOAA's undersea research needs. NURP currently supports NOAA's mission by providing undersea scientists inside and outside NOAA with advanced technologies, such as an underwater laboratory, submersibles and remotely-operated vehicles, and the expertise needed to work in the undersea environment. NURP has a proven record of providing the advanced technologies and infrastructure necessary to support undersea research and exploration operations for both the academic community and NOAA.

NOAA's environmental literacy programs are working to improve educational systems that will equip our workforce with the skills necessary to transform research results to goods and services that improve our lives and provide our Nation with the researchers of the future. Our formal and informal activities include the Ernest F. Hollings and Nancy Foster scholarship programs and Educational Partnership Program, including both undergraduate and graduate science fellowships. In 2005, NOAA provided scholarship and internship opportunities to over 150 undergraduate students and 57 graduate scholarship opportunities. In 2005, 28 teachers participated in NOAA's Teacher at Sea Program. NOAA's education investment is also geared toward hiring students trained through these scholarship and internship opportunities. Through June 15th, NOAA had hired 31 students trained through its Graduate Sciences Program.

NOAA is committed to maximizing the value of its research and ensuring successful transition of research to application. Application of the best available, most cost-effective science and technology is essential to meeting the NOAA vision and mission, as well as improving America's competitiveness. NOAA reviews all of its research annually to assess readiness for transition, transition plans are developed and approved, and the oversight of all transition projects is conducted by a senior board within NOAA. Implementation of these procedures is underway with 45 transition projects identified. NOAA regularly transfers research projects into operations for the economic and social benefit of society. Pertinent examples include:

- Air quality forecast research which is being used to predict ground-level ozone,
- Harmful Algal Bloom (HAB) Ecological Forecasting research which is being used to understand the HAB dynamics and to provide products that help mitigate and reduce the impacts of HABs,
- Deep-ocean Assessment and Reporting of Tsunami (DART) buoys used to detect tsunamis,
- Geophysical Fluid Dynamics Laboratory (GFDL) hurricane model which improved prediction of the paths of hurricanes, and
- Tropical Atmosphere Ocean (TAO) array used to track El Niño and La Niña.

Question 1b. Are these programs fully funded?

Answer. Within Congressional appropriations, NOAA works hard to maintain its strong position to improve the science base for environmental decision-making and generate broad benefits for the economy and society. NOAA has proposed a fiscally prudent FY 2007 budget that focuses resources on NOAA's highest impact and most urgent programmatic requirements and adheres to the Administration's policy priorities.

Question 1c. What programs do states have?

Answer. While NOAA has a number of important cooperative research initiatives and transition projects with states, we are not in a position to provide a comprehensive description of state initiatives in competitiveness.

Ocean Funding

Question 2. The Ocean Commission originally recommended increasing spending by \$3.9 billion annually, and a new report by the Joint Ocean Commission Initiative

proposes an increase for this year of \$747 million above the FY 2006 levels for specific government-wide programs. How much of the recommended budget increase is necessary for NOAA to carry out its core missions?

Answer. NOAA has requested the following amounts in FY 2007 to carry out core mission requirements of the U.S. Ocean Action Plan: for the National Ocean Service, \$382.9M; for the National Marine Fisheries Service, \$736.9M; for Oceanic and Atmospheric Research, \$117.11M; for the National Weather Service, \$71.09M; for the Office of Marine and Aviation Operations, \$131.7M; for the National Environmental Satellite, Data, and Information Service, \$175.81M; and for Program Support, \$97.81M.

Question 2a. How much would be needed for NOAA to fully implement the recommendations in Ocean Commission report?

Answer. The U.S. Commission on Ocean Policy recognized that at the Federal level, 11 of the 15 Cabinet-level departments and four independent agencies play important roles in the development of ocean, coastal and Great Lakes policy. These agencies interact with one another and with state, territorial, tribal, and local authorities, and others to find the balance between conservation of ocean resources and ensuring that the American public enjoys the multiple benefits of its resources. As a result the Commission, in its report released on September 20, 2004 provided the Administration, Congress and the Nation's Governors with 212 recommendations to make the oceans better and cleaner. In response to the Commission's recommendations, on December 17, 2004, the President issued Executive Order 13366 establishing the Cabinet-level Committee on Ocean Policy and directed the heads of executive departments and agencies to coordinate activities regarding ocean-related matters in an integrated and effective manner to advance the environmental, economic, and security interests of present and future generations of Americans. The Executive Order further directs the members of the Committee to facilitate, as appropriate, coordination and consultation regarding ocean-related matters among Federal, state, tribal, and local governments, the private sector, foreign governments, and international organizations.

In conjunction with the Executive Order, the President released the U.S. Ocean Action Plan outlining fundamental components, both in response to the Commission's report as well as recent action, which together provide the foundation to advance the next generation of ocean, coastal, and Great Lakes policy. The U.S. Ocean Action Plan also recognizes the challenges in developing management strategies to ensure continued conservation of coastal and marine habitats and living resources, while at the same time ensuring that the American public enjoys and benefits from those same resources. There are adequate funds in the NOAA budget to support the U.S. Ocean Action Plan. Furthermore, NOAA is actively collaborating with several Federal agencies, states and nongovernmental organizations on other areas highlighted in the U.S. Ocean Action Plan and by working together effectively and efficiently, more can be accomplished.

Northwestern Hawaiian Islands National Marine Monument

Question 3. I am concerned that the President's decision to declare the area around the Northwestern Hawaiian Islands as a National Monument may have been hasty. The Administration has created a 139,796 square mile Monument with no firm commitments on budget, no clear legal authorities for management, and an undefined role for NOAA's expertise.

Why was the Sanctuary designation process stopped despite clear direction from Congress in 2000 to establish it as a National Marine Sanctuary?

Answer. The National Marine Sanctuaries Amendments Act of 2000 and Executive Order 13178 directed the Secretary of Commerce to initiate the Sanctuary designation process for the region encompassed by the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. The ultimate determination as to whether designation would occur was left to the managing agency, and the Department of Commerce, through NOAA, satisfied the statutory requirement once it initiated the process. To that end, the Department did conduct public scoping and develop a range of alternatives, consistent with the requirements of the National Marine Sanctuaries Act and the National Environmental Policy Act. Prior to completion of the process, however, administrative action was taken to designate the region as the Northwestern Hawaiian Islands Marine National Monument. This designation provides protection for the region's resources and has built upon the public input provided through the sanctuary designation process.

Question 3a. Do you have a cost assessment to implement the Monument?

Answer. Since the President's announcement, we have been developing a cost assessment for the Monument and identifying the resources needed to implement the Presidential proclamation.

Question 3b. Does the President's FY 2007 budget request include the necessary funds to begin implementation based on the expedited process and announcement?

Answer. No, the President's budget proposal was transmitted to the Congress on February 6, 2006. The President did not create the Northwestern Hawaiian Islands Monument until June 15, 2006. Until specific funds can be considered through the President's Budget process, we will continue to fund the highest priority basic management needs out of existing resources.

Question 3c. This is the time of the Fiscal Year that NOAA is making determinations regarding its FY 2008 budget needs. What are NOAA's FY 2008 budget estimates currently for the Northwestern Hawaiian Islands? Is the President's Office of Management and Budget responsive to these additional needs or are they making NOAA shift resources internally?

Answer. The FY 2008 NOAA budget request is in the process of development. The President's FY 2008 budget proposal will be transmitted to the Congress the first week in February 2007.

Question 3d. The President has decided to end future fishing in the NWHI for the 8 vessels remaining in the bottomfish fishery. While making a striking decision with respect to these families' futures, he has done nothing to address the resulting economic dislocation. In fact, I see that private organizations are announcing that they are negotiating payments with families that are affected by this closure. Does the President endorse or support this approach, and is the Administration involved? Is he planning to propose any Federal funding? What mechanism ensures that any of these families would receive fair compensation for their businesses? Unless the Federal Government is involved, how do you ensure that this process does not take advantage of fishermen, who are not experienced negotiators?

Answer. Following a 5-year process with broad stakeholder input to develop the appropriate level of conservation around the Northwestern Hawaiian Islands, a decision was made not to renew permits for commercial groundfish fishing after a 5-year period. A 5-year period was selected to allow the 8 remaining fishermen time to plan for the expiration of their permits to this portion of the Pacific Ocean. The decision not to renew permits for the Northwestern Hawaiian Islands does not preclude the fishermen from fishing in other fisheries where they are permitted.

We are aware that a private organization was offering the 8 remaining fishermen a financial incentive to end fishing even earlier than the 5-year period after which permits would not be renewed. The Federal Government was not involved in those discussions. We understand that many of the fishermen refused to accept the offer and, as a result, the offer was recently withdrawn.

NOAA remains committed to working with the NWHI fishermen during this transition period. In response to a request from Senator Inouye, Bill Hogarth, Assistant Administrator for Fisheries, met with a small group of stakeholders and industry leaders to discuss issues related to this fishery.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. FRANK R. LAUTENBERG TO
VADM CONRAD C. LAUTENBACHER, JR.

Question 1. I am very concerned about NOAA's proposal to eliminate funding for the Mid-Atlantic Undersea Research Center at Rutgers University, including its technology programs, which are a lynchpin in increasing knowledge of coastal conditions. As you know, the Center houses the "LEO-15" observatory, which is conducting valuable ocean and coastal research. Why is NOAA proposing to eliminate funding for the Mid-Atlantic Center?

Answer. Under the President's FY 2007 budget, none of the National Undersea Research Centers will be eliminated. The FY 2006 enacted budget provided no funding for the National Undersea Research Program centers on the East Coast. NOAA redirected a small amount of internal funds to preserve essential personnel and facilities at the East Coast centers, including the Mid-Atlantic Undersea Research Center at Rutgers University. The President's FY 2007 budget provides funding consistent with this FY 2006 redirection to enable the preservation of core expertise and to maintain key operational facilities at the East Coast regional centers, including the Mid-Atlantic Undersea Research Center, as NURP develops a plan to restructure and to merge with the Office of Ocean Exploration.

As part of this restructuring, LEO-15 will be transitioned out of the National Undersea Research Program in FY 2007. LEO-15 incorporated the most advanced cabled ocean observatory technology when it was installed in 1996, and served as a successful proof of concept for coastal ocean observation and research needs. The observatory currently serves a wide range of operational functions including observations, education, and research support. In light of the subsequent advancements in

observation platforms and remote communications technology, NOAA intends to transition support for LEO-15 consistent with its Policy for Transition from Research to Application.

Question 2. As we consider the state of our oceans, and their future, how important is it to strengthen and expand our ocean education programs for all grade levels?

Answer. NOAA believes it is essential to strengthen and expand ocean education for all grade levels. Understanding the world's ocean is essential to comprehending the planet we live in. More and more, our lives have been affected by ocean-related events—from disasters like the devastating December 2004 Tsunami in the Pacific to Hurricane Katrina in the United States—and concerns about global climate change. Society is largely ocean illiterate and a basic understanding of the key concepts needed for sound decisionmaking on matters related to sustainability, management, and preservation is lacking. The need for ocean literacy has been recognized by the U.S. Ocean Action Plan which encourages not only efforts in formal education (*i.e.*, K-12, colleges, and universities) but also teaching and learning about the ocean by students of all ages. Ocean literacy has been recognized as a need at national, regional, and local levels.

Question 3. I believe some of my colleagues are skeptical of having NOAA take a lead role in ocean education, preferring it to be done by the Department of Education, or just leaving it to the states. Do you agree with me that providing NOAA with a clear mandate to lead our Federal ocean education efforts is the right approach?

Answer. As a Federal science agency, the primary purpose of NOAA's science activities is to serve the public need for relevant information to promote social and economic prosperity. NOAA's vision: "*An informed society that uses a comprehensive understanding of the role of the oceans, coasts, and atmosphere in the global ecosystem to make the best social and economic decisions*" recognizes that this responsibility requires more than accurate and precise scientific information; it also requires a public sufficiently empowered to understand and apply our information for the benefit of our Nation. NOAA's education programs are focused on science areas where NOAA has unique expertise and responsibility, and where public responsiveness to warnings, forecasts, and stewardship efforts is essential for meeting our mission.

Assessments of NOAA activities during Hurricane Isabel in 2003 demonstrated that our responsibility to society requires more than accurate and timely science information. The lack of appropriate public and civic responses was attributed to a fundamental lack of understanding of storm surge and an inability to interpret predictions. Education and outreach were identified among the most important actions NOAA could take to reduce future loss of life and property associated with similar storms.

As one of our Nation's premier ocean agencies, responsible for serving the public need for relevant marine and coastal science information, NOAA believes it has a unique role to ensure an integral connection between ocean science and activities to promote ocean literacy. The availability of information in today's technology-demanding society is quickly elevating this role to a critical obligation. Timely access to accurate, life-relevant information through the Internet is resulting in less dependence on traditional static sources of educational material, such as textbooks, and is building an ever increasing demand for current data and information to teach inquiry-based science. As the demand for such information expands, so does the public expectation that the agencies federally-funded to collect this information will anticipate and act to fill this need. This expectation was articulated in *Blueprint for Change: Report from the National Conference on the Revolution in Earth and Space Science Education* (Barstow, 2002): "NASA, USGS, NOAA and other agencies have . . . [a] treasure trove of satellite imagery, animations, interactive maps and other visualizations for ready access by schools and the general public. The Internet helps students see how Earth's forces affect their daily lives and provides . . . links for further exploration. Such efforts should be continued and expanded, including developing related educational materials to help teachers and students take better advantage of these resources."

This characterization of a need for relevant resources for science education defines a leadership role for science agencies that serves as an essential complement to the efforts of states and the Federal departments of education. NOAA recognizes the authority of state and local entities as the sole providers of "direction, supervision, or control over the curriculum program of instruction, administration, or personnel of any educational institution, school, or school system." However, with the establishment of the Department of Education, Congress recognized a role for Federal in-

volvement to supplement and complement efforts at the state and local level. In support of this role, the Department of Education focuses on four major types of activities: overseeing Federal education financial aid; tracking and disseminating education data and research; formulating and implementing broad Federal policy on education reform; and enforcing civil rights statutes to ensure equal education opportunity. This leaves an appropriate role for Federal science agencies to assist in promoting educational excellence by leading efforts to improve availability and access to valid, relevant science content. As one of our Nation's premier ocean agencies, NOAA is uniquely qualified to complement the activities of state and Federal departments of education by integrating timely, real-life ocean science and education to promote ocean literacy.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BARBARA BOXER TO
HON. LEON E. PANETTA

Question 1. You have called for an Organic Act for NOAA, and you outline elements that you think should be included. It is my understanding that NOAA's responsibilities are spread out over dozens of separate statutes.

Can you elaborate on why you think passage of an Organic Act should be a priority for this Committee and for Congress?

Answer. At a time when our oceans are in crisis, our Nation needs the only civilian agency with an ocean-focused mission to function effectively and efficiently. However, NOAA currently suffers from programmatic and functional overlaps, disconnects among current line offices, and changing organizational principles. These problems are attributable to many reasons, arising, in part, because the agency has never been established in law and so lacks a clearly defined mission and the organizational structure to fully carry out that mission. By codifying and more importantly, strengthening NOAA, Congress could enhance its mission, improve its structure, and better enable it to carry out existing and new responsibilities in a more effective manner that is consistent with ecosystem-based management.

There is considerable concern within the ocean community regarding NOAA's capability to fulfill its expanding mission. As our understanding of the complex and interrelated processes that drive ocean and coastal ecosystems improve, along with our awareness of the negative effects of cumulative impacts associated with human activities on these processes and the health of ocean-related resources, it is abundantly clear that major advances in science, management and education are needed to address the situation. The fact that NOAA's structure has not changed significantly since its establishment in 1970, notwithstanding advances in knowledge and recognition of the inadequacies of the current governance regime, is evidence of the need for Congress to exercise its authority to restructure NOAA's institutional organization.

Such reorganization would also provide Congress and the Administration an opportunity to revisit NOAA's budget structure and funding priorities. The extensive compilation of individual line items included in NOAA's budget is a reflection of the inadequacies of the existing budget structure, which in turn has perpetuated a lack of confidence in the agency's capacity to fulfill its missions. The recommendations of the U.S. Commission on Ocean Policy, as well as internal evaluations, such as the NOAA Science Board's Ecosystem Research Review Team, clearly identify the need for the realignment of the agency's organization and resources. The benefits of providing additional resources to NOAA would be significantly enhanced by also granting the agency greater discretion in the use of existing and new resources. Such action would allow the agency to be more responsive to unanticipated needs and expand its reliance on partnerships with other Federal agencies, state agencies, and nongovernmental entities.

Question 1a. How would it help NOAA better accomplish its mission of protecting and restoring our oceans and coasts?

Answer. NOAA's mission is to understand and predict changes in the Earth's environment and to conserve and manage ocean and coastal resources to meet the Nation's economic, social, and environmental needs. The agency's responsibilities have been spread across five line offices: the National Ocean Service; the National Marine Fisheries Service; the National Weather Service; the Environmental Satellite, Data, and Information Service; and the Office of Oceanic and Atmospheric Research.

While NOAA has made significant strides in many of its mission areas, the current structure leads to significant programmatic and functional overlap, as well as frequent disagreements and disconnects among line offices. A sixth line office, the Office of Program Planning and Integration was established recently in order to improve horizontal integration among NOAA line offices. However, this change is only

one of several steps needed to strengthen NOAA's performance. NOAA needs to manage its current activities more effectively and be prepared to respond to a growing suite of new responsibilities. A stronger, more effective, science-based, and service-oriented ocean agency is needed.

A strong Organic Act for NOAA should orient the agency's structure, leadership, and staff to support the exercise of its core functions. NOAA's primary functions can be categorized as:

- Assessment, prediction, and operations.
- Marine resource and area management.
- Scientific research and education.

An Organic Act should encourage improved interaction within and among these categories such that NOAA's functions complement and support each other.

If NOAA were established as the lead civilian ocean agency and restructured along functional lines, it would mark the first step in the important process of re-evaluating how the multitude of Federal agencies with ocean-related responsibilities coordinate and integrate their respective activities. This in turn would set the stage for Congress and the Administration to take a measured and thoughtful approach to eventually realigning ocean programs that are currently spread throughout various Federal agencies.

Question 1b. What are the key elements of an effective Organic Act for NOAA?

Answer. An effective Organic Act for NOAA will strengthen the agency, enhance its mission, improve its structure, and better enable it to carry out existing and new responsibilities. An effective Organic Act for NOAA should:

- Establish NOAA as the lead civilian ocean agency by statute.
- Set forth core missions of: assessment, prediction, and operations; ecosystem-based management of ocean and coastal areas and resources; and science, research, and education.
- Call for reorganization of the agency along functional lines to better equip it to carry out its core mission and remain science-based, but with its management programs better connected to make use of that science in decisionmaking.
- Establish leadership roles and accountability mechanisms for implementation of major elements of the agency's mission.

Question 2. Oceans do not follow state political lines. Unfortunately, however, decisions in some states can negatively impact the ocean waters and coasts of other states. To address this problem, and better manage the ocean, the Ocean Commissions recommended a regional approach to ocean management.

How would regional ocean governance work, and how do you react to fears expressed that such a structure will bring unnecessary bureaucracy?

Answer. Regional ocean governance as envisioned by the U.S. Commission on Ocean Policy is a system of voluntary cooperative and collaborative approaches to realizing opportunities and addressing concerns at the regional level. Currently, several states have shown initiative in developing these regional structures to address ocean and coastal problems, proving that they can and desire to make progress on ocean management reform. However, both ocean commissions recommended the establishment of a more coordinated and effective regional ocean governance system and found that additional tools and support from the Federal Government are needed.

In 2004, the Administration created the Cabinet-level Committee on Ocean Policy and its Subcommittee on Integrated Management of Ocean Resources (SIMOR) and Joint Subcommittee on Ocean Science and Technology (JSOST). Responsibilities of these interagency committees include providing support for regional approaches to ocean management and improving coordination of the ocean activities of Federal agencies. While this is an important step, much more should be done at the Federal level to help regions solve important ocean and coastal problems.

A more robust national framework is needed to enable coordinated, integrated, ecosystem-based management that builds on existing regional and ecosystem-based efforts. This framework should allow sufficient flexibility for states to shape regional initiatives according to their particular situations, while encouraging all regional approaches to possess key characteristics, such as diverse membership from the state and Federal level, a meaningful process for receiving input from citizens, and an effective procedure for developing regional ocean strategic plans. Under a regional ocean governance system, the Federal Government would assist regions in the development of compatible and coordinated plans and processes that would facilitate

the development of regional goals and priorities, improve responses to regional needs, and develop and disseminate regionally-significant research and information.

A national framework should also include a strong national ocean policy that acknowledges in legislation the importance of oceans to the Nation's economic and ecological health. It should include increased authority for a high-level national body to provide leadership and support for the national ocean policy and to work with a broad range of stakeholders to develop a process for regional ocean governance.

The framework recommended by the Joint Initiative would not add unnecessary layers of bureaucracy. While enhanced authority for a national coordinating body would be necessary for better regional-level coordination of Federal ocean activities and for development of a Federal system to assist regions in the development and implementation of regional ocean management plans, it would not by default establish new agencies. In many cases, enhanced authority could be given to an existing body.

An important component of effective regional ocean governance that is currently lacking is a coordinated offshore management regime to increase our understanding of offshore areas and resources, prioritize uses, and ensure that activities in a given area are compatible. Where a proposed activity will occupy ocean space to the exclusion of other uses, it is the Federal Government's responsibility to determine where the activity can take place, by whom, in what manner, and for what length of time. Wise decisions on such questions cannot be made in isolation; agencies administering different activities must be aware of one another's actions, as well as activities occurring in adjacent state waters. To this end, coordination should be immediately improved among single-activity management programs that regulate offshore activities. In addition, coordination of the management of *all* offshore activities is necessary, including those not tied to a specific geographic location. Regional initiatives that enjoy strong support from the Federal Government in the development of regional ocean management initiatives can provide the opportunity for a broad dialogue among stakeholders at all levels on a more coordinated and deliberate approach to managing activities in offshore areas.

Developing an effective coordinated offshore management regime will take time. Fortunately, there are several important and immediate actions that Congress can take to assist state and Federal agencies in their progress on regional efforts:

- Congress should call upon the Federal agencies to identify opportunities to further coordinate existing programs and activities at the regional level and to develop guidelines that enable improved coordination and analysis to assist in the transition toward an integrated management approach that considers the entire ecosystem.
- Congress should require regional ecosystem assessments to guide management decisions and improve the process mandated under NEPA.
- Congress should expressly acknowledge that management of all marine resources should be carried out with an ecosystem-based approach by including such language as part of the reauthorization of ocean, coastal, and water laws.

Question 3. Admiral Lautenbacher acknowledged there are budget disconnects, and that he has been trying to deal with them through his requirements-based "Planning, Programming, Budgeting and Execution System" (PBBES) process.

Mr. Panetta, can you explain where in the system of clearances in the Administration budget process are reductions from requirement-driven proposed levels taken—and be specific (*e.g.*, NOAA line offices, NOAA HQ, DOC, OMB)? In your experience, at each level of review, what types of considerations would result in reductions to funding of a program identified as an agency requirement? For example: Lack of authorization (whether a subject-specific Act or an organic Act)? Lack of scientific consensus? Failure to be highlighted as an Administration priority or by expert reports (such as in the Ocean Action Plan and the report of the U.S. Commission on Ocean Policy)?

Answer. Reductions in Federal budgets are made at all stages of the budget formulation process as managers in the line offices, NOAA headquarters, Department of Commerce (DOC), and Office of Management and Budget (OMB) attempt to reconcile the agency's mission requirements within the given year's funding limitations. Presuming NOAA is given a budget cap by the DOC, its budget request must be very close to this cap or it risks having DOC and/or OMB modify the agency's budget to fit within the cap. Opportunities for securing funds above the cap are limited given that these additional funds would have to be taken from the budgets of other DOC or Federal agencies. It is unclear what input or opportunity NOAA has to influence either the initial budget allocation provided to DOC by OMB, or the allocation by DOC among its agencies. General guidance for government-wide science priorities is provided in an annual guidance memo distributed by the Director of

OMB and the President's Science Advisor. However, in recent years, this guidance memo, which has only recently included ocean-related issues, has been distributed very late in the budget formulation process, significantly discounting its usefulness to the agencies.

Perhaps the most significant disconnect in the NOAA budget process is associated with the agency's alignment with the DOC and the General Government Program directorate of the OMB. As a stewardship-oriented agency that represents approximately 60 percent of the DOC's budget, NOAA is placed in an awkward position of competing with eight commerce-oriented agencies whose funding priorities have limited relationship with those of NOAA. It is very difficult for senior administrators within DOC to balance their commerce and trade mission with the stewardship-oriented mission of NOAA. This difficulty of highlighting NOAA funding priorities is further exacerbated at the OMB level where the NOAA budget competes with other DOC programs, but also with programs from the Departments of Housing, Treasury, Transportation, and Justice, as well. All of the other Federal science and resource agencies—Department of the Interior, Environmental Protection Agency, U.S. Department of Agriculture, National Aeronautics and Space Administration, National Science Foundation, and U.S. Army Corps of Engineers—are housed under the Natural Resources Programs directorate at OMB.

Evidence of the difficulty NOAA faces in securing additional funding within the Administration's budget formulation process is clearly demonstrated by the limited increase in the President's budget request for NOAA despite the recommendations of the Pew Oceans Commission and the U.S. Commission on Ocean Policy, whose members were appointed by President Bush. There is clear scientific and policy consensus that our oceans, coasts, and Great Lakes are in poor health and that ocean-related science, management, and education programs have been significantly under-funded despite the modest growth in the agency's budget. As noted in responses to other questions submitted for the record and in its Final Report, the U.S. Commission on Ocean Policy recommended an additional \$4 billion be provided to support ocean-related programs throughout the Federal Government, as well as in the states (see Chapter 30 and Appendix G of *An Ocean Blueprint for the 21st Century*, the Final Report of the U.S. Commission on Ocean Policy). The recommendations contained in the report reflect and are supplemented by numerous reports issued by the National Academies, highlighting general consensus and support for these funding initiatives within the scientific and policy community. In its June 2006 report to the U.S. Senate, *From Sea to Shining Sea*, the Joint Ocean Commission Initiative identified \$747 million in very high priority funding that is needed immediately to put the Nation on a path to restoring the health of our oceans and coasts.

Unfortunately, the failure of the Administration to submit a comprehensive ocean funding request for NOAA and the many other agencies that share responsibility for managing and studying oceans and coasts has resulted in Congress adding programs to NOAA's budget during the appropriations process. The resulting patchwork of programs and activities not formally requested by the Administration is subsequently terminated (or funding is substantially reduced) by the Administration in the next budget formulation process. Until the Administration and Congress come to agreement on the programs that constitute NOAA's "base" budget, energy and resources that should be directed toward identifying and supporting new high-priority funding initiatives will be lost in the struggle to secure funding to maintain and enhance core programs. NOAA could more easily justify budget increases provided by Congress were the additional funding incorporated in the discretionary budgets of key programs instead of being identified as individual line items. This approach will require Congress, the Administration, and NOAA, to come to agreement on the scope of activities supported by the new funding and the expectations for the agency to partner with nongovernmental entities that have the expertise to support these activities, fully recognizing the competitive nature of the granting process.

Finally, the opportunity to justify increased budgetary support for NOAA would be greatly enhanced were Congress to pass an Organic Act for the agency. NOAA's role as the Nation's lead civilian ocean agency would be significantly strengthened if such legislation reorganized the agency in a manner described in our response to Senator Boxer's first question. Reorganization along the functional lines described above would allow Congress and the Administration to retool NOAA's budget in a manner that would provide the agency with greater flexibility and discretion to direct its resources toward high priority programs and activities.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUE TO
HON. LEON E. PANETTA

Competitiveness and Education

Question 1. Currently, innovation and competitiveness initiatives are being pursued as a result of recommendations from a National Academies report, *Rising above the Gathering Storm*. As you know, ocean and atmospheric science and education were not explicitly mentioned in the report. However, the U.S. Commission on Ocean Policy and other experts have identified ocean and atmospheric research as key to improving America's science education and competitiveness. That is why we include a section on ocean and atmospheric science in the Committee's American Innovation and Competitiveness bill.

What benefits do you believe ocean and atmospheric research and education have for U.S. scientific advancement, education, and competitiveness?

Answer. Ocean and coastal research, science, and education are vital contributors to our Nation's intellectual and competitive edge. They are critical to our economy and to our ability to tackle serious environmental problems such as climate change, resource depletion, harmful algal blooms, invasive species, and non-point source water pollution, to name just a few.

Our oceans host great biological diversity and are a frontier for exciting exploration and effective education. Our oceans are rich in energy resources, marine biotechnology is a rapidly growing industry that is capitalizing on the vast biological and genetic diversity of marine life, and advanced underwater vehicles are opening up an era of ocean exploration that has captured the imagination of a new generation of school-aged children. Cutting-edge research using massive oceanic and atmospheric data sets and a new focus on promoting multi-disciplinary studies in support of ocean science are laying the groundwork for technological advances and a sophisticated workforce that will allow our Nation to be a leader in the global shift toward a service sector that provides environmentally-sensitive technologies and policies.

The Joint Ocean Commission Initiative has identified several key ocean science projects that can help our Nation to maintain its position at the forefront of science and innovation. These include a renewed commitment to:

- Implementation of an International Ocean Observing System (IOOS), a critical missing link in the Administration's plan for a Global Earth Observation System of Systems.
- Investment in ocean exploration, which can marry curiosity-driven basic research with more practical applied research needs, providing for the discovery of new species, drugs, or geological processes, along with information that provides important societal benefits, such as improved understanding of the impacts of climate change on all marine ecosystems.
- Establishing an "ecosystem research initiative" that would integrate ongoing basic and applied ecosystem research across the spectrum of Federal agencies doing such research and provide information critical in the transition toward ecosystem-based management.

Ocean science is also highly relevant for:

- Our predictive capabilities.
- Climate modeling.
- Forcing functions—*e.g.*, predicting the impact of storms.
- Cyber-enabled discovery and innovation.
- Fishery resource management.
- Energy development.

The interdisciplinary nature of ocean issues is driving an increasing number of students toward multidisciplinary studies, which provides them with the tools and perspectives to address problems on an ecosystem level. This capacity to reach across scientific disciplines, as well as to marry policy and science, is a crucial skill that will help guide the technological advances that are driving national economies forward so that they do not come at the expense of the natural environment.

Question 2. What programs does NOAA have that will advance national innovation and competitiveness?

Answer. NOAA is in a strong position to improve the scientific base for environmental decision-making, enhance scientific and environmental literacy, and transition scientific theory to real-world operations, all of which generate broad benefits for the U.S. economy.

NOAA's highest technical priority is to build integrated, global Earth observation systems. To address the growing requirements for environmental data on national and global scales, NOAA, the National Aeronautics and Space Administration (NASA), and the Office of Science and Technology Policy are co-leading the implementation of the Strategic Plan for the U.S. Integrated Earth Observation System. The U.S. Integrated Earth Observation System is an essential component of the Global Earth Observation System of Systems, or GEOSS, which is a global Earth data collection and dissemination initiative. GEOSS will allow users to share, compare and analyze a diverse array of datasets, providing the information necessary to mitigate the impacts of natural hazards. It will also provide the global information required to understand the interactions between Earth processes and thereby improve our ability to forecast a wide range of natural phenomena, including natural disasters. It will promote improved decision-making in various sectors, including natural resource management, public health, agriculture and transportation. NOAA's environmental satellite systems and NASA's integrated global Earth system science satellite constellation are among the critical components of the GEOSS initiative.

NOAA's Office of Ocean Exploration is devoted exclusively to the critical mission of exploring the still largely unknown ocean. The ocean exploration program focuses on discovery of new ocean resources for societal and economic benefits, serves as an effective means to promote ocean education and ocean literacy, and enables NOAA to become aware of ocean issues that may become the basis for future NOAA missions. NOAA's Undersea Research Program, NURP, harnesses the academic community to focus on NOAA's undersea research needs. NURP currently supports NOAA's mission by providing undersea scientists inside and outside NOAA with advanced technologies, such as an underwater laboratory, submersibles and remotely-operated vehicles, and the expertise needed to work in the undersea environment. NURP has a proven record of providing the advanced technologies and infrastructure necessary to support undersea research and exploration operations for both the academic community and NOAA.

NOAA's environmental literacy programs are working to improve educational systems that will equip our workforce with the skills necessary to transform research results to goods and services that improve our lives and provide our Nation with the researchers of the future. NOAA's formal and informal activities include the Ernest F. Hollings and Nancy Foster scholarship programs and the Educational Partnership Program, which includes both undergraduate and graduate science fellowships. In 2005, NOAA provided scholarship and internship opportunities to over 150 undergraduate students and 57 graduate scholarship opportunities. In 2005, 28 teachers participated in NOAA's Teacher at Sea Program. NOAA's education investment is also geared toward hiring students trained through these scholarship and internship opportunities. Through June 15th, NOAA had hired 31 students trained through its Graduate Sciences Program.

NOAA is committed to maximizing the value of its research and ensuring successful transition of research to application. Application of the best available, most cost-effective science and technology is essential to meeting the NOAA vision and mission, as well as improving America's competitiveness. NOAA reviews all of its research annually to assess readiness for transition, transition of research findings into real-world applications that would bring economic and social benefits. Transition plans are developed and approved, and the oversight of all transition projects is conducted by a senior board within NOAA. Implementation of these procedures is underway with 45 transition projects identified. Pertinent examples include:

- Air quality forecast research used to predict ground-level ozone.
- Harmful Algal Bloom (HAB) Ecological Forecasting research to understand HAB dynamics and to provide products that help mitigate and reduce the impacts of HABs.
- Deep-ocean Assessment and Reporting of Tsunami (DART) buoys used to detect tsunamis.
- Geophysical Fluid Dynamics Laboratory (GFDL) hurricane model which improved the prediction of the paths of hurricanes.
- Tropical Atmosphere Ocean (TAO) array used to track El Niño and La Niña.

Question 2a. Are these programs fully funded?

Answer. NOAA programs would need significant resource enhancements to immediately and fully satisfy all of their requirements. Recognizing the limitation associated with the current budget environment, Congress should incorporate NOAA into its funding initiative supporting the President's American Competitiveness Initia-

tive, providing the agency with additional resources commensurate with those being directed to the Department of Energy, National Science Foundation, and National Institute of Standards and Technology.

Question 2b. What programs do states have?

Answer. Coastal states engage in numerous activities that contribute to American competitiveness and the success of the U.S. economy. According to the U.S. Commission on Ocean Policy, coastal watershed counties generate over \$6.1 trillion, nearly half of the Nation's GDP, and state coastal management programs, universities, and state Sea Grant programs perform critical roles in ocean science and education. While there is much that states are doing on their own, they cannot reach their potential without additional help from the Federal Government. For this reason, Congress should take actions that build the capacity of states to further participate in enhancing American competitiveness through ocean-related research, science, and education. In addition, Congress should support the Administration's *Ocean Research Priorities Plan and Implementation Strategy*, an important step toward enhancing coordination, collaboration, and synergies among various sectors and levels of government with regard to the planning and execution of critical ocean science endeavors.

Ocean Funding

Question 3. The Ocean Commission originally recommended increasing spending by \$3.9 billion annually, and a new report by the Joint Ocean Commission Initiative proposes an increase for this year of \$747 million above the FY 2006 levels for specific government wide programs.

How much of the recommended budget increase is necessary for NOAA to carry out its core missions?

Answer. The funding recommendations made by the U.S. Commission on Ocean Policy and the Joint Ocean Commission Initiative did not focus solely on the needs of NOAA. They reflected the needs associated with programs throughout the Federal Government, as well as in the states. Neither the U.S. Commission on Ocean Policy nor the Joint Ocean Commission Initiative attempted to separate and identify NOAA "core" missions *versus* collateral missions. However, an analysis of the Joint Initiative's report indicates that approximately \$500 million in additional funding is applicable to activities supported by NOAA. This represents \$500 million *above* the \$3.9 billion Congress appropriated for NOAA in FY 2006. This funding recommendation is intended to represent the first installment of a much larger funding initiative recommended by both the U.S. Commission on Ocean Policy and the Pew Oceans Commission.

The Joint Ocean Commission Initiative would like to reiterate its strong support for the establishment of an Ocean Trust Fund in the U.S. Treasury based on a dedicated source of revenue for the improved management and understanding of ocean and coastal resources at the Federal and state level.

Question 3a. How much would be needed for NOAA to fully implement the recommendations in the Ocean Commissions report?

Answer. Chapter 30 and Appendix G of the U.S. Commission on Ocean Policy's final report *An Ocean Blueprint for the 21st Century* attempt to quantify the cost associated with each of the Commission's recommendations, where applicable. The U.S. Commission on Ocean Policy arrived at \$3.9 billion as the total increase in *annual* funding needed to carry out its recommendations. Again, this figure represents funding needs of *all* Federal agencies with ocean-related responsibilities, including \$1 billion to coastal states.

It is not clear how much of the \$2.9 billion in additional funding for Federal programs and activities would need to be directed exclusively to NOAA, though it would be a significant share. Overall, the majority of the cost estimates offered by the U.S. Commission are not connected with large, visible, new projects, but with less tangible (yet equally important) everyday improvements in existing ocean and coastal management programs. The U.S. Commission's final report also acknowledges that there are many other important activities with significant implications for oceans and coasts whose costs, even if known, are not included in the total provided. Examples include: upgrading wastewater and drinking water infrastructure; ongoing flagship projects, such as the restoration of the Florida Everglades, Chesapeake Bay, coastal Louisiana, and San Francisco Bay; maintenance and improvements to Federal offices, laboratories, and other facilities; and renewing the U.S. Coast Guard fleet.

Given the short- and long-term implications associated with climate change, ocean acidification, endocrine disrupters, and continued habitat loss, it is clear that NOAA's budget, as well as those of its sister agencies, is inadequate to meet these and other emerging challenges facing our Nation's oceans, coasts, and Great Lakes.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. FRANK R. LAUTENBERG TO
HON. LEON E. PANETTA

Question 1. Our understanding of ocean acidification due to global warming is very recent, and was not covered in the two Oceans reports.

Will the Joint Ocean Commission Initiative address the threat global warming poses to our oceans, and will it make it a priority?

Answer. Climate change has serious implications for the health of our oceans. The specter of abrupt climate change and a growing awareness of the impacts that more gradual climate change can have on coastal development, ecosystems, and human health call for significant improvement in climate research, monitoring, assessment, and prediction capabilities. Understanding the role of the oceans in climate is an area in need of particular attention. For this reason, we continue to support the creation of an Integrated Ocean Observing System and other programs that further our understanding of the link between atmospheric and marine processes.

Given the direct role the oceans play in climate processes, the Joint Ocean Commission Initiative will continue to push for enhanced funding not only to better understand the implications of climate change, such as ocean acidification, but also to implement policies and measures to mitigate its impacts on ocean and coastal resources.

Question 2. As we consider the state of our oceans, and their future, how important is it to strengthen and expand our ocean education programs for all grade levels?

Answer. Numerous studies, and most recently the National Academies report, *Rising above the Gathering Storm*, indicate that the United States is not preparing its citizens to sustain and build on the Nation's past scientific and technological accomplishments and compete successfully in an increasingly complex world. At the same time, the lack of public awareness about the importance of the ocean hampers efforts to develop a balanced approach to the use and conservation of marine resources.

Evidence has shown that integration of environment-based programs into the overall education system can increase student academic achievement in a number of critical areas. Therefore, we support incorporating ocean-based learning experiences into K-12 education in the belief that it can redress alarming deficiencies in both technical and scientific achievement and basic understanding of the critical role the oceans play in our world.

Question 3. I believe some of my colleagues are skeptical of having NOAA take a lead role in ocean education, preferring it to be done by the Department of Education, or just leaving it to the states.

Do you agree with me that providing NOAA with a clear mandate to lead our Federal ocean education efforts is the right approach?

Answer. There are growing numbers of ocean-related education and outreach activities occurring at all levels of government and within the nongovernmental sector. The lack of a coherent strategy for aligning these activities is compromising their effectiveness and limiting their capacity to generate additional funding support. Therefore, we encourage Congress to mandate the development of a national ocean education and outreach strategy that coalesces and integrates the existing array of independently conceived and implemented education and outreach programs and activities.

Congress should work with the President to establish a governing body responsible for developing a national ocean education and outreach strategy. The strategy should enhance educational achievement in the natural and social sciences, increase ocean awareness, include a five-year plan for formal and informal activities, and facilitate links among Federal, state, local, and nongovernmental programs. We believe that NOAA and NSF should be given the lead for this activity, and Congress should look for opportunities to increase support for successful programs within these and other agencies, such as the NSF Centers for Ocean Science Education Excellence.

THE MARINE MAMMAL CENTER
Sausalito, CA, August 2, 2006

Hon. BARBARA BOXER,
Senate Committee on Commerce, Science, and Transportation,
Washington, DC.

Dear Senator Boxer,

The Marine Mammal Center enthusiastically supports your initiative to implement recommendations of the Pew Oceans Commission and the U.S. Commission on Ocean Policy. As you know, we do research on marine mammal health through the opportunity offered by our work along 600 miles of California coastline in rescuing and rehabilitating thousands of seals, sea lions, dolphins, whales, and sea otters. Because animals in our care offer us a unique opportunity to do blood and tissue analysis, we have discovered conditions that bear upon the work of the two Commissions regarding the health of the ocean.

Recent findings that show disturbing trends bearing directly on your hearing on August 3 include the following:

Cancer in California sea lions—About 18 percent of the adult sea lions that die at The Marine Mammal Center have cancer in the urinary tract area. Research suggests that this tumor is caused by a combination of Polychlorinated Biphenyls (PCBs) acquired through their diet, a herpes virus, and genetics. Persistent contaminants, like PCBs, are still present in sea lions' diets and in food also eaten by humans.

Antibiotic resistance in marine mammals—Research at The Marine Mammal Center has shown that marine mammals admitted to The Center have bacteria with resistance of up to eight kinds of antibiotics, showing that these drugs used to treat humans and pets are finding their way into our oceans.

Domoic acid poisoning—In 1998, The Marine Mammal Center identified an algal bloom as the source of domoic acid poisoning in California sea lions. The condition causes brain damage in the animals after eating fish that have fed on the algae. The sea lions are admitted exhibiting violent seizures. Subsequent research is indicating that the long-term survival of the California sea lion is very questionable after they are poisoned. We have also found that transmission of the poison via the placenta in affected pregnant females does affect unborn pups and cause miscarriages.

In the past 3 years, we have also found that domoic acid poisoning is affecting species other than the California sea lion. We have discovered it in a harbor seal, gray and humpback whales, and in southern sea otters.

Reasons for the increase in domoic acid producing algal blooms off the California coast are unclear, but possible factors include increases in agricultural run-off, over-fishing and global warming.

The increasing concern about this issue is highlighted by the *Los Angeles Times* Series, entitled "*Altered Oceans*," which began July 29. We have enclosed the second article in that series (July 31) about The Marine Mammal Center and its pioneering work investigating domoic acid poisoning.

The diseases affecting marine mammals along the California coastline are of great concern to the global scientific community. Our veterinarians have presented at several symposia, such as the American Association for the Advancement of Science in February of this year. Enclosed is an article appearing in the June edition of *Bio-Science*, entitled "*Sea Sickness: The Upsurge in Marine Diseases*," which discusses The Marine Mammal Center's research into domoic acid toxicity and cancer in sea lions.

As always, we are pleased to be able to answer questions and provide further information with respect to the knowledge we have gained through our marine mammal hospital work. Thank you for your support of this vast and precious resource—our oceans and coastal environment.

Sincerely,

B.J. GRIFFIN,
Executive Director.

ATTACHMENT

The Marine Mammal Center Participates in National Scientific Symposium
Dr. Frances Gulland To Speak About Domoic Acid Intoxication of California Sea Lions

(Sausalito, Calif.—February 17, 2006)—Dr. Frances Gulland, Director of Veterinary Science at The Marine Mammal Center in Sausalito, California, will speak at

the American Association for the Advancement of Science (AAAS) Annual Meeting in St. Louis, Missouri on February 17. In this symposium entitled: *Rising Tide of Ocean Plagues*, Dr. Gulland will present a look at domoic acid intoxication in California sea lions and the concern over the increasing numbers of harmful algal blooms that negatively impact sentinel species like sea lions as well as the potential impacts these blooms have on human health.

The first recognized outbreak of domoic acid toxicity in humans happened in Canada in 1987. Approximately 150 people were reported ill with neurological and gastrointestinal symptoms after ingesting contaminated cultivated blue mussels. In 1998, the first confirmed domoic acid poisoning of marine mammals occurred on the California coast. During a month long period, 70 California sea lions stranded along the central California coast near San Luis Obispo—all suffered from the clinical symptoms of the poisoning, which include head weaving, tremors and convulsions. The majority of the affected animals were adult females of which 50 percent were pregnant. No adult males were affected. Two years later a similar outbreak occurred in the same region—this time 187 sea lions stranded with the poisoning. More than half of the sea lions affected with the biotoxin in both of those years died. Outbreaks continue in southern and central California waters with nearly 1,000 sea lions affected in 2005.

The origin of the domoic acid responsible for this mortality event was a bloom of *P. australis* that developed in Monterey Bay in May 1998. Anchovies collected during the peak of the bloom had high levels of domoic acid in tissues. “California sea lions are high level predators, feeding on species that often enter the human seafood market such as anchovies, sardines, salmon and squid,” said Dr. Frances Gulland. “These sub-lethal effects of domoic acid on California sea lions are likely to be similar to effects that could occur in humans if they were to be exposed to similar levels of this toxin by eating contaminated seafood.”

Since 1994, Dr. Gulland has provided medical care for thousands of seals and sea lions at The Marine Mammal Center, has published over 100 peer-reviewed articles, and is coeditor of the *CRC Handbook of Marine Mammal Medicine*. She chaired the working group on Marine Mammal Unusual Mortality Events for 6 years, sits on Recovery Teams for the Hawaiian monk seal and southern sea otter programs, and is a member of the committee of scientific advisors to the Marine Mammal Commission.

The Marine Mammal Center is a nonprofit hospital headquartered in Sausalito, California. Staff and volunteers are dedicated to the rescue and rehabilitation of ill and injured marine mammals, to research about their health and diseases and to public education about marine mammals. Since 1975, more than 11,000 California sea lions, elephant seals, porpoises, and other marine life have been treated, rescued along 600 miles of coastline from Mendocino County to San Luis Obispo County. Staff and volunteers uniquely combine rehabilitation with scientific discovery and education programs to advance the understanding of marine mammal health, ocean health and conservation. On the Web: www.marinemammalcenter.org.

Herpes, Genes and PCBs Are Factors in Cancer in California Sea Lions

Dr. Frances Gulland To Speak at National Scientific Symposium

(Sausalito, Calif.—February 18, 2006)—Dr. Frances Gulland, Director of Veterinary Science at The Marine Mammal Center in Sausalito, California, will speak at the American Association for the Advancement of Science (AAAS) Annual Meeting in St. Louis, Missouri on February 18. In a symposium entitled: *Marine Mammals on the Front Line: Indicators for Ocean and Human Health*, Dr. Gulland will present a look at cancer in California sea lions and in particular, she will explain how PCB contaminants, herpes and genes play a role in cancer development and how this trio interaction is a model for neoplasia in other marine mammals including humans.

California sea lions are abundant on the Pacific Coast and feed high on the marine food web shared by humans. Post-mortem examinations conducted by The Marine Mammal Center of adult California sea lions following stranding along the central California coast revealed an 18 percent prevalence of cancerous tissue, which is extremely high for a wild animal. The predominant abnormal growth was a poorly differentiated carcinoma of urogenital origin, occurring in sexually mature animals of both sexes. In addition, tumor tissue samples revealed that there is a direct correlation between the otarine herpesvirus-1 (OtHV-1), genetics and polychlorinated biphenyl.

“What we’ve learned in examining the tumors of these sea lions is that PCBs are one factor that influences carcinoma development and that these PCBs are acquired in the sea lions’ diet—a diet that is similar to humans,” said Dr. Gulland. “This is

significant because the sea lions are providing us with an early warning of toxic compounds in our food chain.”

The Center collaborated with researchers from University of St. Andrews, Scotland, National Marine Fisheries Service in Seattle and the Institute of Zoology, London, U.K.

Since 1994, Dr. Gulland has provided medical care for thousands of seals and sea lions at The Marine Mammal Center, has published over 100 peer-reviewed articles, and is coeditor of the *CRC Handbook of Marine Mammal Medicine*. She chaired the working group on Marine Mammal Unusual Mortality Events for 6 years, sits on Recovery Teams for the Hawaiian monk seal and southern sea otter programs, and is a member of the committee of scientific advisors to the Marine Mammal Commission.

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ATTACHMENT

Los Angeles Times, July 31, 2006

PART TWO—ALTERED OCEANS: SENTINELS UNDER ATTACK

TOXIC ALGAE THAT POISON THE BRAIN HAVE CAUSED STRANDINGS AND MASS DIE-OFFS OF MARINE MAMMALS—BAROMETERS OF THE SEA'S HEALTH

By Kenneth R. Weiss

After the last patient of the day walked out the front of Raytel Medical Imaging clinic, veterinarian Frances Gulland slipped an oversized animal crate through the back door.

Inside was a California sea lion. The animal was emaciated, disoriented and suffering from seizures.

A female with silky, caramel-colored fur, wide-set eyes and long whiskers, she was named Neuschwander, after the lifeguard who had found her 6 weeks earlier, comatose and trembling under a pier at Avila Beach near San Luis Obispo.

Taken to The Marine Mammal Center near Sausalito, Neuschwander showed signs of recovery at first. Her eyes began to clear and focus. She frolicked in the small pool in her chain-link enclosure and wolfed down mackerel at feedings. Then she relapsed.

She quit eating and lost 40 pounds. Her sunken eyes darted around, as if tracking a phantom just outside the cage. Her head bobbed and weaved in erratic figure eights.

Neuschwander was loaded into a crate at the nonprofit center, the world's busiest hospital dedicated to the care of wild marine mammals, and trucked across the Golden Gate Bridge. Gulland, the Center's Director of Veterinary Science, wanted to scan Neuschwander's brain at the imaging clinic.

After sedating the sea lion, Gulland and four assistants lifted the animal onto a gurney. They inserted a breathing tube into her throat and rolled the gurney into the great thrumming MRI machine.

Gulland, an upbeat, 46-year-old native of Britain, took a last look at Neuschwander as the machine closed around her. She hoped the sea lion could be saved.

Neuschwander was exhibiting the classic symptoms of domoic acid poisoning, a condition that scrambles the brains of marine mammals and causes them to wash ashore in California as predictably as the spring tides.

They pick up the acid by eating anchovies and sardines that have fed on toxic algae. Although the algae have been around for eons, they have bloomed with extraordinary intensity along the Pacific Coast for the last 8 years.

The blooms are part of a worldwide pattern of oceanic changes that scientists attribute to warming waters, excessive fishing, and a torrent of nutrients unleashed by farming, deforestation and urban development.

The explosion of harmful algae has caused toxins to move through the food chain and concentrate in the dietary staples of marine mammals.

For the last 25 years, the Federal Government has tracked a steady upswing in beach strandings and mass die-offs of whales, dolphins and other ocean mammals on U.S. coasts.

More than 14,000 seals, sea lions and dolphins have landed sick or dead along the California shoreline in the last decade. So have more than 650 gray whales along the West Coast.

In Maine 2 years ago, 800 harbor seals, all adults with no obvious injuries, washed up dead, and in Florida the carcasses of hundreds of manatees have been found in mangrove forests and on beaches.

The surge in mortality has coincided with what Florida wildlife pathologist Greg Bossart calls a “pandemic” of algae and bacteria. Although some of the deaths defy easy explanation, telltale biotoxins have turned up in urine, blood, brains and other tissue.

Sometimes the toxins kill animals outright, such as the manatees found dead in Florida, blood streaming from their noses.

In other cases, they kill slowly by promoting tumor growth or compromising immune systems, leaving marine mammals vulnerable to parasites, viruses or bacteria. Scientists believe the episodic die-offs of bottlenose dolphins along the Atlantic and Gulf Coasts that began in the late 1980s may stem from toxic algae that weaken the animals and enable a virus related to canine distemper to attack the lungs and brain.

Sea turtles in Hawaii have been found with fist-sized tumors growing out of their eyes and mouths and behind their flippers. Scientists say the growths are the result of a papilloma virus and an ancient microorganism called *Lyngbya majuscula*, which appears as a hairy weed that has been spreading in tropical and subtropical waters. The tumors doom the turtles by inhibiting their ability to see, eat or swim.

As they watch the oceans disgorge more dead and dying creatures, scientists have come to a disquieting realization: The proliferation of algae, bacteria and other microbes is making the oceans less hospitable to advanced forms of life—those animals most like humans.

“Marine mammals share our waters, eat some of the food we eat and get some of the same diseases we get,” said Paul Sandifer, Chief Scientist for the Oceans and Human Health Initiative of the National Oceanic and Atmospheric Administration.

“If environmental conditions are not good for these sentinels of the sea, you can believe it won’t be good for us either,” Sandifer said. “What we allow to flow into the sea will come back to bite us. You can bet on it.”

Marine algae, or phytoplankton, occur naturally and make up the first link in the oceanic food chain. A quart of seawater typically contains hundreds of thousands of phytoplankton and millions of bacteria, viruses and protozoans, all in concentrations that keep each other in check.

That equilibrium can be upset when certain types of algae overwhelm their competitors. The change is most pronounced in coastal waters, and scientists believe it is tied to nutrient pollution from a variety of human activities.

Toxic algae thrive on the same elements that turn lawns green and make crops grow—nitrogen, phosphorus and iron.

California, the Nation’s most populous state with more than 36 million people, sends billions of gallons of partially treated human waste into the ocean every day. Sewage treatment cuts down on disease-causing bacteria but does little to remove nutrients.

Seasonal rains carry enormous loads of urban and agricultural runoff into the ocean, much of it down drainage canals and rivers from the dairies, orchards and farms that make California the Nation’s largest agricultural producer.

The destruction of coastal wetlands, which filter nitrogen and other nutrients, also plays a role, as does over-harvesting of shellfish and sardines, menhaden and other algae-eating fish.

Climate change is another factor. Warmer seawater speeds up microbial growth and allows aggressive algae and bacteria to move into areas once too cold for them. Commercial ships can help the spread, transporting the algae in ballast water.

The type of algae that poisoned Neuschwander began blooming riotously in California waters in 1998.

It has the tongue-twisting name *Pseudo-nitzschia* (SUE-doh NICH-e-yah). A fraction of the thickness of a human hair, this javelin-shaped, single-cell organism slides through seawater on a coating of mucus and churns out domoic acid, a neurotoxin.

Pseudo-nitzschia blooms all along the West Coast, especially around bays and estuaries fed by major rivers. Unlike some other toxic blooms, which are often called red tides, these aren’t visible because their greenish-brown coloring blends into the seawater.

Researchers studying *Pseudo-nitzschia* off the mouth of the Mississippi River have unearthed evidence in the seafloor that agricultural runoff from the Nation's heartland triggers the outbreaks.

Scrutinizing core samples from five locations in the Gulf of Mexico, they found thick layers of microscopic silica shells of *Pseudo-nitzschia* that coincided with a deposit of nitrates and sediment that had flowed down the Mississippi.

The evidence is preserved in strata that resemble a layer cake. It shows that *Pseudo-nitzschia* didn't proliferate until the 1950s, when grain farmers began widespread use of chemical fertilizers.

In contrast to the Mississippi Delta, such telltale clues cannot be seen in marine sediments off the Pacific Coast because the seafloor is constantly being churned up.

As a result, West Coast scientists have been looking for chemical signatures that would directly link river discharges to the toxic blooms.

For the last 3 years, USC researchers David A. Caron and Astrid Schnetzer have focused on a "hot zone" of *Pseudo-nitzschia* spanning 155 square miles of coastal waters off the mouths of the Los Angeles and San Gabriel rivers.

The researchers are still looking for the link. But one thing is clear, said Caron, a biological oceanographer: "There is a big dose of nutrients."

Knowing about the effects of domoic acid, scientists wonder whether algae blooms explain the freakish behavior of coastal wildlife observed periodically over the years.

Some speculate that *Pseudo-nitzschia* caused the onslaught of crazed seabirds near Capitola, Calif., in 1961 that inspired Alfred Hitchcock's movie "*The Birds*." Hitchcock, who was living in nearby Scotts Valley, read a newspaper story about sooty shearwaters "wailing and crying like babies," crashing into streetlights and windows, nipping at people and vomiting up anchovies.

In 1998, sailors in Monterey Bay began bumping into dark objects in the water. They thought they were floating logs. They weren't. They were the bodies of sea lions.

That year, more than 400 washed ashore, dead or dying, victims of neurotoxic poisoning.

California's five marine mammal rehabilitation centers were overwhelmed. Every year since, they have been crowded with sea lions trembling with seizures.

This spring, the Marine Mammal Care Center at Ft. MacArthur in San Pedro was often as busy as an inner-city emergency room. Ailing sea lions were packed into chain-link cages. Rescue workers kept bringing in new patients in pickup trucks. The animals needed injections of anti-seizure medicine or had to be hooked up to saline drips to flush the neurotoxin from their systems.

On one typical day, listless sea lions were flopped on their sides, flippers tucked in, too exhausted to lift their heads. One was agitated, head weaving to and fro, grunting and snorting. Another chewed obsessively on a flipper.

All were females found comatose or acting strangely on the beach. Many were pregnant and had seizures just after giving birth.

"A California sea lion has as warm and strong of a maternal instinct with a newborn as you can see in any animal," said Robert DeLong, a government ecologist who has studied sea lions in their Channel Islands rookeries for 35 years.

Domoic acid can destroy that maternal bond.

Sea lions suffering from neurotoxic poisoning usually show no interest in their young. Some that previously cared for their pups shun them after suffering seizures or even attack them when they try to suckle.

"I came in 1 day and pieces of the pup were everywhere," said Jennifer Collins, a veterinarian who worked at the Marine Mammal Care Center in San Pedro. "We initially thought someone had broken in and macerated one of the animals. Then we pieced it together and realized that a mother had done it to her own pup."

Scientists first became aware of domoic acid and its toxicity in 1987, when three people died and at least 100 others were sickened after eating contaminated mussels from Prince Edward Island in Canada. Nineteen people were hospitalized with seizures, comas and unstable blood pressure.

Many of the patients never recovered gaps in their memory, lending this malady a new name: amnesic shellfish poisoning. An examination of brain tissue from the three people who died showed severe loss of nerve cells, mostly in the hippocampus, a part of the temporal lobe that resembles a seahorse and plays a key role in memory and navigation.

Reported cases of the illness are rare in North America because health authorities closely monitor shellfish for toxins and because such seafood makes up a tiny fraction of most people's diets. But for animals that consume little else, domoic acid is a recurring danger.

The acid mimics a neurotransmitter, overstimulating neurons that retain memory. The acid prompts nerve cells to fire continuously until they swell and die.

During spring and summer, when *Pseudo-nitzschia* blooms off the California Coast, male sea lions don't eat. They are too busy guarding their breeding territory on the Channel Islands, where females mate soon after delivering pups.

The females, in contrast, are ravenous feeders while pregnant and while nursing. They gorge on anchovies and sardines that have fed on toxic algae. Domoic acid doesn't appear to affect the fish, but sea lions eat anchovies in such quantities that they accumulate a toxic load.

Frances Gulland and other researchers have been collecting miscarried sea lion fetuses and stillborn pups on San Miguel Island. To their surprise, domoic acid has turned up in the urine of these pups.

The neurotoxin is typically flushed from an animal in about 4 hours. But Gulland found that domoic acid can penetrate the placenta, bathing a developing fetus in the neurotoxin for days.

California sea lions have a keen sense of direction. Although their habitat ranges from British Columbia to Baja California, they return to the same breeding beaches on the same islands year after year.

But after attaching satellite transmitters to the animals, Gulland and other researchers found that many victims of domoic acid poisoning—even those that appeared fully recovered—lost their way.

Some swam hundreds of miles out to sea and were never seen again, bizarre behavior for creatures that spend their lives in coastal waters.

Others washed up again on beaches, too addled to make it on their own. One swam in tight circles up the Salinas River.

Neuschwander was one of those who could not find their bearings.

After spending a month at The Marine Mammal Center near Sausalito last summer, the sea lion was eating voraciously and seemed so vigorous that Gulland thought she was ready to fend for herself again. She was released back into the ocean in San Mateo County.

A week later, Neuschwander was found stranded again. This time, she was more than 100 miles inland from her natural home along the coast. She had traveled up rivers and drainage canals and ended up on a hillside near Sacramento International Airport.

She had an enormous gash running from her chest to her back, possibly from a run-in with a barbed-wire fence. She snapped at anyone who came close.

Back at The Marine Mammal Center, Neuschwander wouldn't eat and began weaving her head again in endless figure eights.

Gulland and her staff shaved a wide band of fur off the sea lion's head, attached a dozen electrodes and hooked them to an electroencephalogram to measure brain activity. The needle jumped up and down, a sign that Neuschwander was continuing to have seizures, though there were no visible tremors.

"The damage to the hippocampuses will help trigger seizures, and further seizures will cause further cell damage," Gulland said. "You get into this whole vicious cycle."

So Neuschwander was driven across San Francisco Bay and put into the MRI machine at Raytel Medical Imaging, a clinic near UC San Francisco Medical Center. After the magnets whirled, a computer screen displayed cross-section images of her brain.

Dr. Jerome A. Barakos, a Clinical Professor and Director of neuro-imaging at the clinic, appeared in his white coat. He was there to interpret the 250 images that spooled out of the machine.

"The anatomy of a sea lion is not too dissimilar to the human anatomy," Barakos said. He confirmed Gulland's fear. On the right side of Neuschwander's brain, the hippocampus was severely atrophied. It looked less like a seahorse than like a withered tail.

Gulland paced around the lab, then pulled aside one of her assistants, Michelle Caudle.

"So do we euthanize her? Do we take her home and see how she does?" Gulland asked.

The two women shifted uncomfortably, arms folded across their chests. They talked about how the animal was losing weight and drifting in and out of delirium.

At 140 pounds, Neuschwander was 60 to 80 pounds lighter than a healthy adult female.

Caudle recalled how she wouldn't eat the "happy fish," laced with sedatives, that sea lions normally gulp down. Neuschwander shredded it, then spat it out.

"She looks terrible," Gulland said. "I didn't realize how thin she was. I mean, how much do we make her go through?"

Gulland got a faraway look in her eyes. Her face drooped.

"I'm OK with it," Caudle said.

"I am too. That's why we do it, right?"

To end the suffering.

Gulland blinked back tears. She took a deep breath and rejoined the group to announce the decision.

The team took five vials of blood for future studies. Then Gulland filled an enormous syringe with clear pink liquid, pressed the plunger and shot 15 ccs of sodium pentobarbitone, an overdose of the anesthetic, into a neck vein.

Neuschwander let out one last, rasping breath.

Gulland laid her hands on the sea lion's body. The heart fluttered for a long 2 minutes.

Then it stopped.

ATTACHMENT

BioScience Magazine, June 2006—Vol. 56 No. 6

SEA SICKNESS: THE UPSURGE IN MARINE DISEASES

by Yvonne Baskin

Most visitors to salt marshes along the Southern California coast will spot Caspian terns, plovers, and sandpipers feasting on snails, crabs, and killifish at low tide. Only Kevin Lafferty and a few like-minded colleagues look at the same scene and envision packets of parasites and pathogens on the move. Yet calculations by Lafferty and Armand Kuris show the biomass of trematode parasites alone—flatworms such as flukes—contained within the visible creatures may exceed that of the birds in a healthy estuary.

"Parasites and pathogens are everywhere, and that's a normal state of nature," says Lafferty, a U.S. Geological Survey Marine Ecologist at the University of California—Santa Barbara. "Ecologists have been slow to truly recognize this because there's not a tradition of looking inside organisms. Yet parasitism is the most popular lifestyle among animals."

Nowhere is that truer than in the oceans, where both host and parasite diversity exceed that on land. Marine parasites (including disease-causing pathogens) are not just weighty and numerous, they also play powerful roles in orchestrating the make-up, diversity, and health of natural marine communities. In the marshes that Lafferty studies, for instance, trematodes manipulate the behavior and reproductive success of their multiple hosts: The worms castrate the snails they infect and use them to produce hordes of free-swimming trematode larvae; when the larvae burrow into the tissues of killifish, they form cysts in the brain that cause the fish to flash on their sides at the water's surface, where they are much more likely to be eaten by birds, in whose guts the worms complete their life cycle. Parasites also influence the physical habitat. Trematodes prevent infected cockles from burrowing in the mud, leaving shells exposed as hard surfaces where sessile organisms can attach. Just offshore, periodic bacterial disease outbreaks depress populations of kelp-grazing sea urchins and allow kelp forests to rebound.

"I think the general statement that parasites are embedded in and dominate food webs is true everywhere," Lafferty says. "They're important because they're regulators. They tend to knock back common species, and that provides opportunities for biodiversity."

Increasingly, however, human activities are disturbing marine ecosystems and changing the dynamics of parasitism and disease in the oceans. Lafferty and Jessica Ward, of Cornell University, have found evidence that disease outbreaks are becoming more common in several key groups of marine animals, including mammals, turtles, corals, mollusks, and urchins, and many of these diseases are linked to human impacts on the oceans. Paradoxically, the most alarming finding of the study, Lafferty says, is a decline in reports of disease outbreaks in fishes. He attributes this to over-harvesting, which may have left many fish populations too sparse for infectious diseases to be transmitted between individuals.

"We've all seen increasing signs that the world's oceans are sick, and in some cases dying," says Andrew Dobson, of Princeton University. "These signs vary from increased disease outbreaks in marine mammals and corals to the sudden disappearance of once-common species. These things are occurring because humans are increasingly treating the oceans as an all-purpose toilet and garbage dump. By putting all this extra stuff in the oceans, we're creating problems not only for species that live in the oceans but ultimately for ourselves."

Stresses that can alter the emergence, spread, and impacts of diseases in the oceans include discharges of human sewage and agricultural runoff, windborne dust

and pollution, introduction of exotic species, destruction of coastal habitat, harvesting of fish and shellfish, and rising global temperatures. These stresses interact in complex ways with pathogen distribution and virulence, host resistance, and other aspects of disease dynamics that researchers are just beginning to explore.

Sewage and Pathogen Pollution

A major source of emerging diseases on land and in the sea is “pathogen pollution,” the introduction of novel pathogens to a community. Ships taking on and discharging ballast water in coastal areas worldwide are undoubtedly spreading microbes and invertebrate parasites to new regions, but little effort has been made to document such introductions. A much more noticeable impact is coming from sewage, freshwater runoff, and windborne contaminants that bring land-based pathogens into contact with ocean creatures.

California sea otters, hunted to near extinction for their fur in the 1800s, have been federally protected for almost 30 years, but their rebound has been slowed by a high death rate. Nearly 40 percent of otter deaths are caused by disease, including some new to the oceans. One of the greatest challenges facing otters, says University of California—Davis Parasitologist Patricia Conrad, is a protozoan parasite, *Toxoplasma gondii*, found in domestic cat feces; *T. gondii* can cause brain lesions, tremors, and seizures in otters. (The parasite infects humans and many other animals but can reproduce only in cats.) Toxoplasmosis is responsible for 17 percent of otter deaths and renders other otters more vulnerable to shark attack. Conrad has found antibodies indicating *T. gondii* exposure in 52 percent of dead otters and 38 percent of live ones. The infection risk triples for otters living near heavy freshwater outflows, which presumably carry cat feces washed from lawns, streets, and discarded kitty litter. Other assaults from the land facing sea otters include the brain parasite *Sarcocystis neurona*, carried in opossum feces, and valley fever caused by spores of the fungus *Coccidioides immitis* transported in wind-blown dust and eroded soil.

In the Florida Keys, nearly 90 percent of the massive elkhorn coral—the most common reef-building coral in the Caribbean—has been lost since the mid-1990s, largely to a bacterial disease called white pox. The known pox pathogen is *Serratia marcescens*, a fecal gut bacterium of humans and animals. Marine Ecologist Kathryn Sutherland, of Rollins College in Winter Park, Florida, and microbiologist Erin Lipp, of the University of Georgia, screened water and sewage samples with molecular techniques and found that although the bacterium is rare in marine environments, it is common in human sewage and in nearshore waters contaminated by leaks from septic systems and injection wells. Using DNA fingerprinting techniques, they have matched one strain of the bacterium isolated from coral lesions to an isolate from human sewage, but they are still hunting down a definitive source for the known coral-killing strain.

David Kline, of the Smithsonian Tropical Research Institute in Panama, points out that less than 10 percent of the sewage in Central America and the Caribbean receives any treatment at all before being dumped into the ocean. Sewage is “turning our oceans into a giant petri dish that supports the rapid growth of bacteria that can kill corals,” Kline says. His focus is not on novel pathogens in the sewage but instead on its role in spurring the normally beneficial bacteria on reefs to burgeon out of control and cause coral disease and death. Healthy corals live in a bacterial soup, coated with mucus or slime containing a distinct bacterial community whose growth is normally tightly regulated by the corals. Kline cultured bacteria from coral mucus and found that in high numbers they can kill their host. To find out what could spur such growth, he set up an experimental seawater system and tested individual runoff contaminants on live corals. Surprisingly, it was not the usual fertilizer nutrients, nitrate or phosphate, but instead simple sugars (dissolved organic carbon)—a component seldom measured in water quality tests—that allowed bacteria to overcome the coral’s tight controls, grow aggressively, and cause disease. Not only do the sugars in runoff fuel the bacteria directly, but the nutrients also encourage the growth of algae.

“It’s a positive feedback loop,” Kline says. “The bacterial disease kills coral and makes more room for algae to grow, and the algae make and release glucose during photosynthesis, spurring more bacterial growth and perhaps altering the pathogenicity of some of them.”

Toxic Algal Blooms

The frequency of harmful algal blooms that produce toxins damaging to human and animal health appears to be increasing worldwide, and the suspected culprits include nutrient-laden runoff, eutrophication, over-harvesting of algae-grazing fish, and perhaps climate warming. Several unusual die-offs of marine mammals have

been linked to exposure to algal biotoxins: humpback whales to saxitoxin, Hawaiian monk seals to ciguatoxin, California sea lions to domoic acid, and bottlenose dolphins and Florida manatees to brevetoxin.

Red tides—blooms of the dinoflagellate *Karenia brevis*—are becoming increasingly common along the Florida coast, and the brevetoxins they produce helped make 2005 the second deadliest year on record for endangered manatees, according to Gregory Bossart, a Marine Mammal Veterinarian and Pathologist at the Harbor Branch Oceanographic Institution in Fort Pierce, Florida. Manatees can literally be “gassed to death” by brevetoxin that has been aerosolized by wind and wave action, or poisoned while grazing on sea grasses, even weeks after the algal bloom has dissipated, Bossart notes. He attributes 17 percent of annual manatee deaths to red tides.

Humans likewise can suffer neurotoxic shellfish poisoning from eating contaminated seafood or respiratory distress from inhaling brevetoxins. Bossart and his colleagues recently correlated frequent red tides off Florida’s western coast with a 54 percent increase in emergency room admissions for pneumonia, asthma attacks, and other respiratory illnesses. He also suspects that chronic, repeated brevetoxin exposure can suppress the immune systems of manatees—and perhaps humans—making them more susceptible to infectious diseases. As a sentinel species, Bossart says, the manatee is “Florida’s 2000-pound canary.”

Off the California coast, deaths of sea lions and other marine mammals due to domoic acid poisoning are increasing, along with the frequency of blooms of diatoms in the genus *Pseudo nitzschia*.

“Over the years, we’ve treated more than 10,000 seals and sea lions,” recounts veterinarian Frances Gulland of The Marine Mammal Center in Sausalito. “But on Memorial Day weekend 1998, we saw something we’d never seen before—over 70 big fat adult female sea lions stranded along the beaches of Monterey Bay having convulsions and seizures. Over half died within hours.”

The sea lions had eaten anchovies and sardines that grazed on the toxin-producing algae. Since 1998, there have been repeated poisonings of sea lions by domoic acid, and more than 1,000 animals have died.

Most recently, Gulland and her colleagues have learned that even sea lions that are not killed can suffer miscarriages and chronic, irreversible brain damage from repeated exposure to lower levels of domoic acid. As their brains decay, animals often chew their tails obsessively or become stranded or confused. Sick sea lions have wandered into farm fields and airports, and even onto the hood of a parked highway patrol cruiser. The toxin also crosses the placenta and damages the fetus, causing pregnant females to abort. “We’ve now found domoic acid in aborted sea lion fetuses,” she says.

“These aren’t just abstract concerns for ocean health,” Gulland points out. “These sea lions that are washing up along the coast are getting poisoned from a diet they share with us.” Indeed, domoic acid’s toxicity was first noted 20 years ago when people who ate contaminated mussels suffered what came to be called “amnesic shellfish poisoning.” “We now call Caesar salad [with its anchovy-based dressing] ‘seizure salad,’” she quips.

Pollutant-Pathogen Synergy

The accumulation of persistent organic pollutants, heavy metals, and other land-derived contaminants in the marine food chain can also alter interactions between parasites and hosts in complex ways. Particularly for predatory fish and marine mammals at the top of the food chain, pollutants may weaken disease resistance.

Among the sea lions that strand and die on California beaches, 18 percent of adults have urogenital carcinomas, an extremely high cancer prevalence for a wild mammal, Gulland says. The general adult population also has a relatively high incidence of a sexually transmitted herpes virus infection: 22 percent among females and 43 percent among males. Virtually all of the animals with carcinomas also have herpes infections, and their blubber contains much higher concentrations of organic pollutants (PCBs and DDT) than that of animals without cancers. Gulland believes that development of these cancers requires an interaction between herpes infection, pollutant exposure, and probably genetic factors.

“Herpes in sea lions is relatively benign,” notes Dobson, who is collaborating with Gulland and others to model the interaction. “Unfortunately, if you’re also exposed to relatively common organic pollutants, then this benign pathogen can become much more damaging, causing very aggressive carcinomas.”

He modeled the expected dynamics of the sea lion population with herpes infection alone, with pollution alone, and with the two together. The results are counterintuitive: Pollutant-exposed females that get infected with herpes develop aggressive carcinomas, die more quickly, and have less chance of passing on the infection.

“Ironically, this is working to wash the disease [herpes] out of the system,” Dobson concludes. “We know very little about synergisms between pollutants and other benign pathogens, but we think this might be the first well-documented example of many similar phenomena.”

Dobson and Bernd Sures, of the University of Karlsruhe, Germany, have also examined an interaction, however, that illustrates how some parasites “play major beneficial roles in ecosystems” by helping to protect their hosts from toxicants. In particular, parasites such as acanthocephalid worms that feed on substances in the guts of fish may literally suck lead, cadmium, and other heavy metals out of their hosts, building up much higher concentrations of toxicants than the hosts. Modeling indicates that “fish can stand a much more polluted environment if they’re infected by worms,” Dobson notes. “So the worms are performing a significant and unexpected ecosystem service that we’ll lose if eutrophication or other factors knock out parasites.”

Fish Farm Spillover

Global transport of infected fish, shrimp, and shellfish for aquaculture and the spillover of parasites from fish farms to wild stocks also alter the dynamics of disease in coastal waters. Sea lice, for example (actually a crustacean, *Lepeophtheirus salmonis*), are emerging pathogens of wild juvenile salmon in the Pacific Northwest. Canada’s British Columbia coast hosts 131 salmon farms holding 60 million captive Atlantic salmon, and lice infection levels are higher closer to the pens. Yet the link between the farms and lice infections in wild fish remains controversial.

Mathematical biologist Mark Lewis and doctoral student Martin Krkosek, of the University of Alberta, and colleague John Volpe, of the University of Victoria, used field experiments and models to document the transfer and spreading pattern of sea lice from a fish farm to 12,000 juvenile wild chum and pink salmon as they approached, passed, and migrated into the sea 60 kilometers beyond the farm. Near the farm, Krkosek says, the rate of sea lice infections of the wild fish was 73 times higher than the rate from ambient levels, and infections continued to exceed ambient levels for 30 kilometers of the migration route.

The researchers are still working to calculate direct louse-induced mortality and examine how it interacts with other sources of mortality to affect the wild salmon population. But their data are already having an impact on farm management decisions. At least one major fish farming company has agreed to move its adult salmon pens to a site further away from a major wild salmon migration route, Lewis says.

Marine Disease Dynamics

Understanding the changing dynamics of disease in the oceans is vital for managing fisheries, siting and managing marine reserves, protecting native species, and monitoring the health of marine ecosystems. Yet little baseline information exists on the origins, mechanisms, rates of spread, or frequency of disease in the oceans. In the past it has been difficult even to isolate the causative agent in disease outbreaks, although molecular biology is providing a powerful array of new diagnostic tools. Few studies have systematically tracked diseases over time, much less documented population- or community-level impacts in the sea. This is a situation, Dobson says, that calls for models.

“When you have little information, the most powerful things you have are models that allow you to explore ‘what if’ scenarios and what types of phenomena could create the patterns you’re seeing,” he says. “We use models as a kind of microscope to try to see the bigger picture of what’s going on, to understand the patterns we’re seeing, and to try to point the finger at what is causing a particular problem.”

Epidemiological models developed to help understanding and control of disease in humans and terrestrial wildlife populations, however, are ill suited to analyzing disease in marine systems. Ecologists have come up with a list of fundamental differences between land and sea that they believe must be considered in developing a new generation of models for use in understanding and managing marine disease:

The ocean harbors greater host and pathogen diversity. Only 9 of the 34 phyla of animals on Earth are found on land, and the greater diversity of life forms, body plans, and life histories in the oceans offers a greater potential for novel host-parasite relationships. Also, more classes of organisms have adopted parasitic lifestyles in the oceans.

The ocean has more “modular colonial” animal hosts. Colonies of genetically-uniform animals such as corals, sponges, and bryozoans are unique to the oceans and may be more vulnerable to virulent disease epidemics. Since relatively short-lived invertebrates are the predominant hosts in the ocean, epidemiological models based on humans or other animals with lifetime immunity to a disease after exposure may not apply.

Potential rates of disease spread are much faster in the ocean. The ocean is generally a more open system with fewer barriers to long-distance dispersal, and it offers more potential for pathogens to survive long periods outside a host or in secondary hosts.

The record for documented spread of a disease was set by a herpes virus epidemic in pilchards in 1995 that spread along the southern coast of Western Australia, against the prevailing currents, at more than 10,000 kilometers a year. The origin of that epidemic remains in dispute, but the chief suspect is frozen pilchard imported from Thailand to feed penned bluefin tuna.

"That one is so fast, it's hard to explain using almost any of the standard epidemiological models," says Hamish McCallum of the University of Queensland. "The virus is so infectious it has proved impossible to maintain the pilchards in culture, so it's hard to do lab investigations on the disease." Despite several other examples of rapid pathogen spread in the ocean, he says, "it's surprisingly frustrating when you try to find general patterns because remarkably few cases have been documented."

McCallum has used models to try to gain insight into the impact that marine protected areas might have on disease dynamics, since the goal of most reserves is to increase population densities of exploited species, and denser populations can sustain more parasites and pathogens. "We know that fish farms have enormous disease problems that do spill over into the environment, so are reserves anything like that?" he asks. Unlike fish farms, however, a reserve would only enable fish densities—and those of native pathogens—to return to natural preharvesting levels. "I think the bottom line is that concern for pathogens is not an argument against reserves. It's most unlikely a reserve is going to cause an old disease to reemerge, although we need to be wary of highly virulent exotic pathogens getting into reserves," McCallum says.

Lafferty says the return of natural parasite and pathogen levels in protected areas should be viewed as a good thing: "I would hope to see an increase in native parasites in reserves. I think it would be a mark of their success. Pristine marshes have twice the abundance of parasites as degraded marshes."

The greater concern is what human pressures are doing to disease dynamics in the oceans at large. "The oceans aren't as safe as they were when we all grew up," Dobson says. "We used to see the ocean as a source of healthy food, healthy recreation. But if you're going to have a beach full of sick marine mammals, do you really want to go there for vacation? And you may think twice about sushi for lunch. The only way to deal with it is proper upstream legislation to reduce dumping of substances that are pouring into the world's oceans."

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BARBARA BOXER TO
MIKE CHRISMAN

Question 1. We commend California and several other states that have taken positive steps to develop and begin to implement more coordinated approaches to regional concerns. Would it be beneficial to advance Federal legislation, inclusive of the state perspective, that establishes a national framework to help guide and advance the development and implementation of regional ocean governance plans? How would regional ocean governance work, and how do you react to fears expressed that such a structure will bring unnecessary bureaucracy?

Answer. The need to pursue regional ocean governance was a major focus of the U.S. Commission on Ocean Policy. California already has several processes in place within the state that use regional governance approaches. Examples include the regional approaches being taken for our Southern California Wetlands Recovery Project, the Marine Life Protection Act, and our approach to offshore observation systems. California, and other states, have made advancements through the use of sound regional approaches. In other areas of the country such as the Gulf Coast, the Great Lakes and the Chesapeake Bay, regional approaches between states are ongoing. As you know, California, Oregon, and Washington just established the West Coast Governors' Agreement on Ocean Health to pursue regional actions that the three states can take together to address ocean and coastal policy.

With regard to legislation, the Coastal States Organization just held a workshop at their September meeting in La Conner, Washington, to determine whether Federal legislation would help and what the critical elements of that legislation should be. California, as chair of the Coastal States Organization, plans to work closely with the other 35 coastal states, territories, and commonwealths to move this ball forward. This will not be a process to add bureaucracy, but rather an approach to

use the most effective and efficient methods to address issues that affect not just individual states, but regions involving multiple states. This cannot be done absent enhanced coordination with Federal agencies and technical support and funding from the Federal Government.

Question 2. California has always led the way on ocean and coastal protection. How can we help California and other coastal states continue to lead the effort of protecting our ocean resources?

Answer. We want to continue the dialogue at the Federal level. California and other states are moving forward, but it is clear that more support from the Federal Government will be necessary. The Coastal States Organization will be working with Congress this year to help advance initiatives such as the need for regional ocean governance, but also for the reauthorization of critical Federal states and the need for adequate and sustained Federal funding for these efforts.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. DANIEL K. INOUE TO
MIKE CHRISMAN

Question. Currently, innovation and competitiveness initiatives are being pursued as a result of recommendations from a National Academies report, *Rising above the Gathering Storm*. As you know, ocean and atmospheric science and education were not explicitly mentioned in the report. However, the U.S. Commission on Ocean Policy and other experts have identified ocean and atmospheric research as key to improving America's science education and competitiveness. That is why we include a section on ocean and atmospheric science in the Committee's American Innovation and Competitiveness bill. What benefits do you believe ocean and atmospheric research and education have for U.S. scientific advancement, education, and competitiveness? What programs do states have?

Answer. This question involves two issues: science-research and education. I'll address science-research first and then discuss education. Governor Schwarzenegger's Ocean Action Plan makes a clear commitment to pursuing science and research to support our ocean and coastal management decisions. Our ocean-dependent economy is over \$45 billion a year and we cannot maintain our tourism, ports, fishing, or other ocean-dependent industries without the science to guide us. Of course the maintenance of our environment would be impossible absent that data. The Governor called on us to create an Information, Research, and Outreach strategy for the state. That document is complete and was cited as a national example by Admiral James Watkins and Leon Panetta (former Co-Chairs of the U.S. and Pew Ocean Commissions). We followed up by beginning to fund research identified in that plan through the activities of our recently formed Ocean Protection Council. We are also using it to guide our comments on the national ocean and coastal research plan being developed by the Joint Subcommittee on Ocean Science and Technology. Our coast and ocean environment and economy cannot be maintained absent this type of applied science.

The Governor and our Ocean Protection Council are also making ocean and coastal education a priority. This is occurring through new educational standards being developed in the K-12 system in coordination with a statewide educational initiative. Of course we also encourage this by funding research and education at the University level. One thing the Governor emphasized in his ocean action plan was the need to bring average members of the public to the table. In response to this, California has just released the "Thank You Ocean" campaign in cooperation with the National Oceanic and Atmospheric Administration. The idea of this campaign is to reach the average citizen through all media forms (television, billboards, Internet) and tell them what they can do for the ocean and coastal environment and where they can get information. This campaign was released at the International conference "California and the World Ocean 2006" where we convened 1,100 people from all over the world to educate one another about the science and policy challenges for maintaining a vibrant ocean environment and economy.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. FRANK R. LAUTENBERG TO
MIKE CHRISMAN

Question 1. As we consider the state of our oceans, and their future, how important is it to strengthen and expand our ocean education programs for all grade levels?

Answer. This is quite important and it is being pursued in California. We are currently undertaking a revision to our K-12 standards to incorporate ocean and coast-

al programs. Please see our response to Senator Inouye which goes into this issue in some detail.

Question 2. I believe some of my colleagues are skeptical of having NOAA take a lead role in ocean education, preferring it to be done by the Department of Education, or just leaving it to the states. Do you agree with me that providing NOAA with a clear mandate to lead our Federal ocean education efforts is the right approach?

Answer. We believe that this should be a partnership involving both Federal entities and the states. Put simply, the Department of Education is and should be the lead for K-12 education. It is in all of our best interests for coastal and ocean issues to be incorporated into their programs. NOAA is our Federal leader in ocean and coastal protection and management, and education is and should be a big part of that mandate because they should be the source of the majority of this information to be conveyed. The states are the ones on the ground and need to be part of the team. Our efforts in California to adjust the K-12 curricula involve all these parties in a partnership that is ultimately administered by states through their local school programs.

