

CHANGING OCEANS, CHANGING WORLD

OCEAN PRIORITIES FOR THE OBAMA
ADMINISTRATION AND CONGRESS

RECOMMENDATIONS FROM THE
JOINT OCEAN COMMISSION INITIATIVE

April 2009

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EXECUTIVE SUMMARY

Our nation is in the midst of a crucial transition that involves the reevaluation of core principles guiding our economic and environmental policies. As our national leaders steer the nation through this process, it is critical for them to recognize that our oceans, coasts, and Great Lakes play a key role in maintaining a strong economy and high quality of life for all Americans. Unfortunately, the lack of a rational management strategy and a substantially weakened ocean science enterprise have resulted in sharp declines of the valuable goods and services that our oceans, coasts, and Great Lakes have traditionally provided. These declines are causing a sense of urgency among elected leaders, resource managers, and citizens around the nation who understand that the declining health of these resources has enormous impacts on people, communities, the economy, and our quality of life. Many of the serious challenges we face in maintaining the health of ocean, coastal, and Great Lakes ecosystems and economies stem from a fundamental mismatch between the way natural systems work and the way we manage the activities that affect them.

This report presents recommendations to the Obama Administration and the 111th Congress for improving human well-being, creating wealth, and providing responsible stewardship of ocean, coastal, and Great Lakes resources. It is presented by the Joint Ocean Commission Initiative, with broad endorsement from organizations interested in the management, use, and conservation of our oceans. It embodies analyses by organizations and thought leaders representing a diversity of interests, including ocean and coastal related industries, environmental advocacy groups, science and education organizations, and local, state, and federal government partners.

The recommendations in this report focus on specific actions the Obama Administration and Congress should take within a two to four year time frame to improve ocean and coastal policy and management, bolster international leadership, strengthen ocean science, and adequately fund ocean and coastal management and science. The proposed reforms respond to urgent challenges, including climate change and its impacts, development of a comprehensive energy policy that includes ocean-based energy resources, and stimulation of the national economy, a significant portion of which is dependent on ocean and coastal activities and resources.

Summary of Specific Actions

What follows is a summary of the recommendations presented in this report. For the full text of the Joint Ocean Commission Initiative's recommendations along with accompanying narrative, please consult the full body of this document.

Improving Ocean and Coastal Policy and Management

1. **The Administration and Congress should establish a national ocean policy**, specifically that it is the policy of the United States to protect, maintain, and restore the health of ocean, coastal, and Great Lakes ecosystems and enhance the sustainability of ocean and coastal economies. Further, it should require that federal agencies administer U.S. policies and laws to the fullest extent possible consistent with this national policy.
2. **Congress should codify and strengthen the National Oceanic and Atmospheric Administration (NOAA)** to enhance its mission, improve its structure, and better enable it to carry out new and existing responsibilities. NOAA should be codified either pursuant to a stand-alone organic act or as part of a comprehensive ocean policy act.
3. **The Administration and Congress should support regional, ecosystem-based approaches** to the management of ocean, coastal, and Great Lakes resources and support ecosystem-scale scientific research to support these efforts.
4. **Congress should strengthen and reauthorize the Coastal Zone Management Act** to enhance coastal management and to serve as a key mechanism to enable coastal communities to prepare for and adapt to climate change impacts.
5. **Congress should strengthen the Clean Water Act** by establishing a national goal of substantially reducing water pollution from nonpoint sources with measurable objectives to meet water quality standards.
6. **The Administration should support expedited implementation of the Magnuson-Stevens Fishery Conservation and Management Act**, with Congress ensuring that NOAA has the necessary funding to effectively implement the Act's provisions.
7. **The Administration and Congress should actively encourage the use of innovative, science-based approaches** that take into account important ecosystem dynamics that affect the health of our nation's marine ecosystems as a whole and, in particular, its fisheries.

Bolstering International Leadership

8. **The United States Senate should provide its advice and consent to U.S. accession to the Convention on the Law of the Sea by the end of 2009.**
9. **The Administration should work to ensure that the Arctic Ocean is managed in a comprehensive, integrated, and science-based manner.**
10. **The Administration should implement a strong scientific research program in the Arctic.**
11. **The Administration should fully implement the illegal, unregulated, and unreported (IUU) fishing provisions of the Magnuson-Stevens Act and require all executive offices that represent the United States internationally to support NOAA's efforts and recommendations on management, enforcement, and coordinated technical assistance for nations engaging in IUU fishing.**
12. **The Administration and Congress should support ongoing U.S. efforts in the World Trade Organization negotiations calling for an end to fishing subsidies that promote overcapitalization and global depletion of fish stocks.**

Strengthening Ocean Science

13. **The Administration should strengthen and Congress should codify, where appropriate, the federal ocean science governance regime to more closely align ocean and coastal science priorities with the needs of policy makers and managers.**
14. **The Administration and Congress should enhance the integration of ocean and coastal science into the broader climate initiative, recognizing that many of the limitations in climate change science result from an inadequate understanding of ocean-related processes and their interactions with land and atmosphere.**
15. **The Administration and Congress should secure the availability of ocean-related information, products, and services critical to the operations of key sectors of the U.S. economy, drawing on the resources and expertise of the broader ocean and coastal community.**
16. **The Committee on Ocean Policy and the Office of Science and Technology Policy should take the lead in developing a comprehensive strategy to guide marine-related, ecosystem-focused research, assessment, and management.**
17. **The Administration should initiate an effort among governmental, academic, and private stakeholders engaged in ocean science to prioritize competing demands within the ocean and coastal science community.**

Funding Ocean and Coastal Policies and Programs

18. **The Administration and Congress should establish an Ocean Investment Fund**, using a significant portion of the resource rents generated by private commercial activities occurring in federal waters on the Outer Continental Shelf. This fund should be dedicated to providing financial support for national, regional, and coastal state and local programs related to understanding and managing our oceans, coasts, and Great Lakes.
19. **As the Administration and Congress craft proposals to address climate change, a portion of any funds generated by the sale of carbon credits pursuant to a cap and trade or tax system should be dedicated to protecting, maintaining, and restoring ocean and coastal ecosystems**, as well as promoting greater scientific understanding of the relationship between the oceans and climate change.
20. **The Administration should develop an integrated federal coastal and ocean budget** that identifies ocean and coastal science and management programs and funding levels to use as a baseline and evaluation tool for assessing past, current, and future funding trends and needs in ocean and coastal science and management.

Investment Needed for Healthy Oceans and Coasts

To effectively implement the specific actions recommended in this report, significant new resources are urgently needed. One of the biggest impediments to achieving healthy ocean and coastal ecosystems and economies is the lack of sufficient and sustained funding to support core programs and important new initiatives. While Congress has proposed increased funding for ocean programs in the past few years in an attempt to begin addressing this problem, flat budgets have endured for most federal ocean and coastal programs. At a time when recognition of the challenges to our oceans and coasts have become significantly more urgent—and growing public awareness of the impacts of climate change has increased our potential to successfully address them—this flat funding for ocean programs has severely hampered our capacity to better understand the causes and impacts of the problems threatening our oceans and coasts and our progress in implementing solutions to resolve them.

At the end of this report, the Joint Initiative estimates funding levels that will be needed to begin implementation of its recommendations. These estimates reflect immediate funding needs, with the recognition that funding levels for some actions will likely need to increase over time to reach and maintain full implementation. It is important to note that the intent of these estimates is not to serve as a comprehensive budget analysis but instead to provide a frame of reference to give an idea of the degree of fiscal need across the range of priority actions called for in this report. The Joint Initiative anticipates the need for further discussions to develop more specific funding requests and stands ready to engage Congress and the Administration in an ongoing discussion about how to most effectively and efficiently apply limited fiscal resources to advancing ocean and coastal priority actions recommended in the report.

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CRITICAL RESOURCES AT STAKE

Healthy oceans and coasts provide Americans with significant and tangible benefits, including food, minerals and energy, recreation and tourism opportunities, and an important means of transportation, trade, and security. Our oceans and coasts play a critical role in maintaining a strong economy and high quality of life for all Americans. For example:

- Ocean-dependent industries generate approximately \$138 billion for the United States every year, 2.5 times more than the agriculture industry. In 2004, the coastal leisure and hospitality sector contributed \$340 billion and 10 million jobs to the U.S. economy. The coastal trade, transportation, and utilities sector generated an additional \$950 billion.
- Counties within coastal watersheds contribute approximately 50 percent of the nation's Gross Domestic Product or \$4.5 trillion. According to the National Ocean Economics Project, 30 U.S. coastal states accounted for 82 percent of our total population and 81 percent of our jobs in 2006.
- Coastal wetlands in the United States provide \$23.2 billion in storm protection services each year.

In addition, the oceans host enormous biological diversity with vast medical potential and are a frontier for exploration and education. The oceans are the key source of clouds and precipitation that bring water to our fields and aquifers, while drifting microscopic plants in the sea generate much of the oxygen we breathe. Ocean currents and interactions with the atmosphere impact weather patterns, agricultural production, and transportation activities. Finally, ocean currents play a defining role in the functioning of our planet's climate and our ability to respond successfully to global climate change, arguably the greatest challenge of our time.

"Oceans are crucial to the earth's ecosystem and to all Americans because they drive global weather patterns, feed our people, and are a major source of employment for fisheries and recreation. As president, I will commit my administration to develop the kind of strong, integrated, well managed program of ocean stewardship that is essential to sustain a healthy marine environment."

—Presidential Candidate Barack Obama,
sciencedebate2008.com

Oceans in Crisis

Unfortunately, the goods and services that healthy coasts and oceans provide are declining sharply in response to the impacts of certain human activities. These declines are causing a sense of urgency among elected leaders, coastal and ocean managers, and citizens in regions around the nation who understand that the deterioration of these goods and services that ocean and coastal ecosystems provide have enormous effects on people. Impacts on coastal communities include increasing coastal hazards such as sea level rise, flooding, erosion, and coastal storms, all of which are being exacerbated by climate change, as well as declining fisheries and fishing economies, and degraded coastal water quality.

Oceans and Climate Change: A Two-way Street

Functioning as a reservoir and conduit for carbon dioxide and heat, oceans both influence and are affected by climate change. This means that at the same time that the oceans are affecting climate processes, they are under stress from climate change impacts and a range of other human activities. Two fundamental climate-driven changes in the oceans are of paramount concern: increasing temperatures and increasing acidity of ocean waters. These changes are affecting both the health of marine ecosystems and the human communities and economies that rely on them. For example, shifts in ocean circulation patterns affect rainfall patterns and agricultural production, while record melting of glaciers and warming ocean temperatures are accelerating the rate of sea level rise and associated coastal flooding and habitat loss. In addition, there is increasing scientific evidence that the intensity of coastal storms will be amplified as a result of global warming, threatening public and private infrastructure along our coasts. These dramatic changes to our oceans and coasts and the important role that oceans play in regulating our planet's climate must move to the forefront of our national debate about how to mitigate and adapt to the impacts of climate change. Our oceans are an essential piece of the puzzle, and overlooking the critical links between our oceans and climate change would be to the great detriment of our nation.

Declining Fisheries and Fishing Economies

Declines of many fish populations are leading to decreases in catch, access, and the viability of commercial and recreational fishing fleets and associated industries across the globe and the United States. In fact, fish stocks are currently approaching or exceeding maximum catch levels worldwide. This poses a significant threat to an important source of food, income, enjoyment, and cultural heritage for many, particularly as human populations continue to grow. In addition, when fisheries are closed or restricted, the cost to local and regional economies is great, including loss of thousands of well-paying jobs and hundreds of millions of dollars in revenue. The effects of declining fisheries on wildlife, including marine mammals and seabirds that depend on fish for food, can be dramatic and disastrous as well. This all-too-common tragic loss of fisheries is caused by a combination of human activities, including pollution, overfishing and other destructive fishing practices, diversions

and obstructions of freshwater flows into rivers and estuaries, and habitat degradation. Continued management by separate agencies at various levels of governments, and without clear goals for ecosystem health and productivity, means that our fishery resources and many other benefits our oceans provide will remain in jeopardy. Fortunately, through strengthened management practices and additional resources to support fisheries science and research, many depleted fisheries still have the potential for recovery.

Water Quality: A Critical Land-sea Connection

Coastal water quality around the nation is threatened by pollution, compromising the health of humans and marine life, leading to beach advisories and closures due to the presence of disease-causing microbes, and contributing to the increasing occurrences and severity of dead zones and harmful and even toxic algal blooms that cause serious illness in humans and kill and contaminate marine life, including valuable shellfish and fishery resources. These impacts affect our health and well-being, as well as the economic vitality of coastal areas, many of which rely on tourism and the harvesting of seafood for jobs and economic growth. The main sources of pollution in many coastal areas are contaminated runoff from urban areas (e.g., roads, buildings, and parking lots); deteriorating and outdated wastewater treatment systems (both septic and sewer); plastic trash that washes from the land and fishing gear that is abandoned at sea; direct discharges from power plants and other industrial facilities; oil and other chemical spills; and nonpoint sources of runoff from both adjacent and far-upstream agricultural operations. In addition, an influx of highly damaging invasive species is wreaking particular havoc in our nation's estuaries and Great Lakes. New and emerging uses of the coast, such as coastal aquaculture and desalinization facilities, have the potential to exacerbate these existing problems. Coordinated and integrated action by federal and state agencies, with support and engagement from private citizens, nongovernmental organizations, industries, and international organizations, is required to effectively address these issues.

An Ocean of Opportunity

Our oceans provide an abundance of wealth resulting from numerous activities. Many of these activities are vital to our economy, national security, and ecosystem health. Current and emerging uses include, among others, commercial and recreational fishing, ocean aquaculture, shipping, boating and numerous other recreational and tourism activities, conventional and alternative energy production, marine protected areas and monuments, and military activities. In many cases, the effects of these activities on ocean ecosystems and on one another are poorly understood and governed by a range of laws, rules, and agencies in a piecemeal and uncoordinated fashion. This results in conflicts among agencies, industries, ocean conservation interests, and citizens over the use and protection of ocean space and limited resources. As uses of the ocean expand, particularly with regard to traditional and renewable energy production and ocean aquaculture, the urgent need for a goal-oriented integrated management regime for offshore areas is becoming ever more apparent.

Looking Back to Move Forward

The ideas presented in this report build on decades of efforts by leaders in the governmental, academic, business, and environmental communities to advance ocean and coastal science, management, and conservation. In 1998, during the Year of the Ocean, groundwork was laid to establish the independent Pew Oceans Commission in 2000 and the congressionally mandated U.S. Commission on Ocean Policy in 2001. The final recommendations of these two independent groups of experts, which were released in 2003 and 2004 respectively and were substantially similar in key areas, have been carried forward by many organizations, including the Joint Ocean Commission Initiative.

There have been some important successes during the period following the release of the Ocean Commissions' reports. The Bush Administration created an interagency Committee on Ocean Policy and tasked it with implementing the Administration's U.S. Ocean Action Plan, including development of the first National Ocean Research Priorities Plan. President Bush also designated marine national monuments along the Northwest Hawaiian Islands and in the Western Pacific, an unprecedented area of protection. In addition, Congress reauthorized and improved the Magnuson-Stevens Fishery Conservation and Management Act.

Despite these efforts, progress has been limited and much has been left unaddressed. The Administration and Congress have failed to act on most of the core recommendations of the Commissions, including the establishment of a national ocean policy, securing Senate support for U.S. accession to the Convention on the Law of the Sea, codifying and reorganizing the National Oceanic and Atmospheric Administration (NOAA), significantly increasing federal support for regional coordination efforts, and addressing chronic underfunding of ocean and coastal science, management, and conservation. Action on these recommendations is essential if we are to begin the transition toward a more integrated and ecosystem-based approach to management, one that more fully reflects the natural capital or value inherent in a healthy ecosystem, and its long-term benefits to the health and economic viability of our nation and its citizens.

The Joint Ocean Commission Initiative has gauged the degree of progress made through the release of annual report cards in 2005, 2006, and 2007. These report cards graded the nation's progress, or lack thereof, in the following categories: National Governance Reform; Regional and State Governance Reform; International Leadership; Research, Science, and Education; Fisheries Management Reform; New Funding for Ocean Policy and Programs; and in 2007, Links Between Oceans and Climate Change. For 2008, the Joint Ocean Commission Initiative will not issue a formal report card, but instead takes the opportunity presented by the transition to a new Administration and the start of a new Congress to refine and update the baseline that will be used to evaluate future progress toward key ocean and coastal policy goals.

The Joint Initiative sees great opportunity in growing awareness of the linkage between our economy and our environment, and believes that the ocean science and policy community is well positioned to contribute to the transition to a “green economy.” Major national ocean policy legislation has been debated in Congress over the past few sessions, and an interagency structure and collaboration process has been in operation within the federal structure since 2005. In addition, states have been working collectively on a regional scale to focus attention on high priority needs and issues, committing personnel and resources.

A catalyst is now needed to take this effort to the next level, and it must come in the form of leadership by the Administration and Congress. Specifically, legislation is needed to identify the goals and objectives of a national ocean policy, and the responsibilities of NOAA must be updated and the agency’s structure reorganized to realize its full potential. There must also be a coherent federal strategy for working with the states and regions, whose work is often stymied by confusion and conflict at the federal level. Oceans and coasts must be fully integrated into national climate and energy strategies, and the United States must reassert international leadership by acceding to the Law of the Sea Convention.

If these critical steps are taken, and are followed by the implementation of the remainder of the recommendations offered in this report, it is the firm belief of the Joint Ocean Commission Initiative and its partners that the nation will have made a significant step toward the green economy that will include a blue legacy for our nation.

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PRIORITY ACTIONS FOR THE OBAMA ADMINISTRATION AND CONGRESS

Improving Ocean and Coastal Policy and Management

Many of the serious challenges we face in maintaining the health of ocean, coastal, and Great Lakes ecosystems and economies stem from a fundamental mismatch between the way natural systems work and the way we manage the activities that affect them. These challenges will require strong political will to overcome. They include:

- **Fragmented management** of coastal and ocean resources by an outdated and disjointed collection of laws, institutions, and jurisdictions. At the federal level alone there are a multitude of laws, dozens of agencies, and divided authorities, mandates, and responsibilities. Add to this a vast number of state and local jurisdictions, each with their own laws and regulations, and it becomes clear that this overlapping and uncoordinated patchwork cannot effectively address the complex challenges we face.
- **Uncoordinated decision making** that rarely reflects the interconnections within and among coastal and ocean ecosystems and the people who depend on them, and instead manages individual species and places as if they were isolated. Agencies are thus divided along sectoral lines so that, for example fish, water, habitat, and other intricately interconnected parts of ecosystems are managed by separate and insufficiently coordinated agencies. This mismatch and a lack of coordination mean that management efforts overlap in some areas and leave serious gaps in others.
- **Isolated policies and management** approaches that rarely consider or account for the cumulative impacts of the range of human activities when making decisions. Because of this, actions that may seem minor when considered individually, such as the filling of one acre of wetland, may actually add to significant impacts when viewed in the broader context of a range of human actions in a given ecosystem or the filling of many hundreds of acres of wetlands, which may have been permitted one acre at a time.

The result of these mismatches and inefficiencies affect us in many tangible ways. Advances in ecosystem science and economics have revealed the many ways our economy and quality of life are dependent on the goods and services provided by properly functioning ocean and coastal ecosystems.

Establish a National Ocean Policy and Improve Federal Coordination and Leadership

Failure to recognize the important link between the health of our oceans and our economy and the critical role oceans play in regulating the Earth's climate is impeding progress toward improving ocean management. A common national goal of protecting and restoring our ocean and coastal ecosystems so they will continue to be healthy, resilient, and capable of providing the goods and services that people want and need must be articulated. At the federal level alone, our oceans are managed under more than 140 different federal laws and implemented by 18 federal agencies. Each of these laws is important but is targeted to an individual goal, resource, or area. A comprehensive strategy for moving management away from the current single-issue focus toward an ecosystem-based approach should be adopted.

A national ocean policy, supported by an interagency coordinating structure and strong leadership in the White House, would unify and guide the actions by the multiple federal agencies with ocean management responsibilities and bring greater coherency to the numerous laws addressing ocean, coastal, and Great Lakes resources. In recent years, legislation to establish a national ocean policy and develop both interagency and regional governance has been introduced in both the Senate and the House and efforts to move forward the important governance reforms recommended in this report should build on these laudable efforts. In addition, given the complexity of committee jurisdictions over matters

A STRONGER COMMITTEE ON OCEAN POLICY

In response to the U.S. Commission on Ocean Policy report, the Bush Administration created the Committee on Ocean Policy and assigned the Chairman of the Council on Environmental Quality (CEQ) as the Committee's chair. While a step in the right direction, the Joint Ocean Commission Initiative believes a strengthened Committee is needed and that it should be chaired by a new high-level advisor on ocean, coastal, and Great Lakes issues. This advisor would be equal in stature to the CEQ chair.

The strengthened Committee on Ocean Policy should be charged with a specific set of high-priority assignments for carrying out the new ocean policy. These should include, among others:

- Developing a coordinated and integrated offshore planning and management regime, including consideration of spatial approaches for managing ocean areas that define geographic areas as appropriate or inappropriate for specific types of activities based on ecological, economic, and societal goals.
- Providing for a consistent and coordinated federal role in facilitating and supporting regional and state ocean governance mechanisms to enhance the ability of states to work together to address common concerns along their coasts and in state waters.

pertaining to oceans and coasts in both the Senate and House, Congress should review its jurisdictional structure and develop protocols for joint or multiple committee oversight of ocean-related science and policy, with an initial focus on coordination among the core Senate and House committees with jurisdiction over ocean and coastal science programs.

In recognition of the important role that oceans play across a range of national issues critical to the economy, trade and international relations, the environment, and national security, the Joint Ocean Commission Initiative calls on President Obama to appoint a high-level advisor on ocean, coastal, and Great Lakes issues. The exact placement and authority of that individual within the White House structure could take several forms. This advisor would be roughly equal in stature and influence to the Chair of the Council on Environmental Quality (CEQ) and would serve as the chair of the Committee on Ocean Policy. This individual would be responsible for the effective coordination and integration of federal agency policies and management actions that affect ocean, coastal, and Great Lakes resources, ensuring they are consistent with the national ocean policy. The advisor on oceans would also coordinate with other policy offices in the White House such as CEQ, the Office of Science and Technology Policy (OSTP), Domestic Policy Council, and the Assistant to the President for Energy and Climate Change.

In light of the expanding and proposed uses of our coastal and ocean areas, integrated and effective strategies are urgently needed for managing current and emerging ocean and coastal activities, including traditional uses such as fishing, shipping, recreation, and oil and gas development as well as newer, emerging uses such as aquaculture, renewable energy development, and discovery of pharmaceuticals and other beneficial products. One promising approach that can support more integrated management is comprehensive marine spatial planning. Such an approach could specify general levels of acceptable human impacts for particular geographic areas in the ocean and provide greater clarity and predictability to ocean users and reduce conflicts, account for cumulative impacts on ecosystem health, and help achieve specific ecological, economic, and societal goals. Marine spatial planning has already been implemented effectively in several nations, including Australia, Belgium, Germany, the Netherlands, and Norway. A national ocean policy for the United States, with marine spatial planning as a potential element, would provide a common vision and enable an integrated and comprehensive approach to planning and managing ocean and coastal activities.

Much of the progress in addressing the problems facing our oceans and coasts is happening at the state level, with innovative management and governance mechanisms developing in states such as California, Massachusetts, New York, and Washington. In addition, formal multi-state initiatives have been created or are under development in every coastal and Great Lakes region around the nation. These regional initiatives are intended to support integrated, ecosystem-based management approaches for improving ocean and coastal health and enable governments at all levels to work together to identify regional goals and

priorities, improve responses to regional needs, and develop and disseminate regionally significant research and information. These state-led regional initiatives are moving in the right direction, but there is a need to expand, provide resources for, and more closely integrate federal and local efforts into these programs. Additional tools, support, and coordinated scientific and technical assistance from the federal government will be critical to resolving the most pressing issues and to allowing these regional approaches to reach their full potential for positive change.

A national ocean policy would greatly enhance the ability of states to work together to address common concerns by establishing a national commitment to a purposeful, proactive, and coordinated federal role in facilitating and supporting regional and state ocean governance mechanisms. In addition, a national framework for regional cooperation that is supported by regional scientific assessments of coastal and ocean ecosystem health could take these efforts to the next level of success. Integrated regional ecosystem assessments are a comprehensive way to assess the environmental, cultural, and economic characteristics of an area which, if implemented in coastal and marine areas across the nation, would improve the ability of decision makers and managers to understand and make strategic decisions regarding the use and protection of coastal and ocean ecosystems. Such assessments are beginning to take place on the West Coast of the United States with leadership from NOAA, but are in need of additional support from other federal agencies and nongovernmental institutions.

Specific Action 1: The Administration and Congress should establish a national ocean policy, specifically that it is the policy of the United States to protect, maintain, and restore the health of ocean, coastal, and Great Lakes ecosystems and enhance the sustainability of ocean and coastal economies. Further, it should require that federal agencies administer U.S. policies and laws to the fullest extent possible consistent with this national policy.

Specific ways that this should be accomplished are:

- Within the first six months, President Obama should issue an executive order that establishes a national ocean policy and appoints a high-level advisor on ocean, coastal, and Great Lakes issues.
- Congress should pass a comprehensive ocean policy act to provide a permanent and comprehensive policy and implementation framework for addressing ocean health. A national ocean policy act should build on President Obama's executive order and:
 - Authorize and fund implementation of comprehensive ocean governance legislation that creates a national ocean policy
 - Codify and strengthen the federal coordinating structure for implementing the national ocean policy
 - Develop a coordinated and comprehensive marine planning and management regime
 - Support regional marine and coastal management and governance efforts
- Congress should incorporate implementation of a new national ocean policy into existing or emerging legislative vehicles, such as legislation to address climate change or energy

policy, or stimulate the economy, as well as through ocean and coastal related bills such as reauthorization of the Coastal Zone Management Act (CZMA).

Specific Action 2: Congress should codify and strengthen NOAA to enhance its mission, improve its structure, and better enable it to carry out new and existing responsibilities.

NOAA should be codified either pursuant to a stand-alone organic act or as part of a comprehensive ocean policy act. A NOAA organic act should:

- Establish NOAA as the lead civilian ocean federal agency
- Set forth core missions of: assessment, prediction, and operations; ecosystem-based and integrated 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 missions and remain science-based, but with its management programs better connected to employ that science in decision making. The reorganization should also establish leadership roles and accountability mechanisms for implementation of major elements of the agency's missions

Specific Action 3: The Administration and Congress should support regional, ecosystem-based approaches to the management of ocean, coastal, and Great Lakes resources and support ecosystem-scale scientific research to support these efforts. Specifically:

- The Administration and/or Congress should create a national framework to support regional approaches and collaboration and enable integrated and science-based management. The framework could be established through the executive order or ocean policy act and implemented by the strengthened Committee on Ocean Policy.
- President Obama should issue a directive establishing federal interagency teams charged with developing comprehensive regional ecosystem assessments. The directive should require the participation of all relevant federal agencies and coordination with state and local managers and regional-scale ocean governance alliances in developing these assessments.

Improve Management of Coastal Areas

Our coastal areas are under pressure from rapidly expanding human populations, increased coastal water pollution, greater habitat destruction, and heightened risks to human safety and coastal property from storms, erosion, inundation, and flooding. Climate change is exacerbating each of these threats by raising sea levels, increasing the power of coastal storms, elevating air and water temperatures, increasing ocean-related health risks, and disrupting the life cycles of native species.

The Coastal Zone Management Act (CZMA), first enacted in 1972, created a national partnership between coastal and Great Lakes states and territories and the federal government to address major issues specific to coastal areas. The existing federal-state

partnership has made significant progress in addressing key coastal issues, but the current law is insufficient to meet the challenges of our time, such as addressing the impacts of climate change, particularly in light of rapid population growth and land development that is underway in coastal areas. The CZMA must be strengthened to adequately address the deteriorating environmental conditions and dramatic threats to human safety, property, and critical natural and built infrastructure posed by climate change and rapidly rising sea levels.

Despite efforts under the CZMA and the Clean Water Act to address the deteriorated state of water quality, our coastal and Great Lakes watersheds continue to be subject to chronic and acute influx of pollutants from multiple sources that include wastewater treatment plants,

Almost 26,000 American beaches have been temporarily closed or put under advisories because of pollution.

Nearly 90 percent of our wetlands, which are critical nursing grounds for marine life, natural storm barriers, and filters of precious ground water, have vanished due to development.

sewer system overflows, septic systems, industrial facilities, agricultural fields, and animal feeding operations. These growing water quality problems contribute substantially to increases in coastal dead zones and to health threats to marine ecosystems, organisms, and humans. The federal agencies with responsibilities for coastal water quality, including the U.S. Environmental Protection Agency (EPA), NOAA, the U.S. Geological Survey, and the U.S. Department of Agriculture (USDA), and the state and local agencies that

play central roles in addressing water quality must make increased progress in reducing water pollution by increasing funding, strengthening enforcement against both point and nonpoint source violations, and employing water-efficient and energy-efficient technologies in the nation's system of wastewater infrastructure. Potential impacts of climate change, particularly sea level rise and increased threats of flooding, need to be considered carefully in decisions about improvements to and placement of both wastewater and drinking water infrastructure.

Specific Action 4: Congress should strengthen and reauthorize the CZMA to enhance coastal management and to serve as a key mechanism to enable coastal communities to prepare for and adapt to climate change impacts. The revised act should:

- Set clear goals and priorities for coastal management that are consistent with and support the new national ocean policy and that encourage federal agencies and the states to set measurable objectives so that policies and implementation strategies can be monitored and adapted as conditions change
- Retain the existing federal consistency provision, which has been an important tool for states to influence federal activities that affect their coastal zones and whose implementation should be based on decision making processes that are timely and grounded in sound science
- Bolster other authorities for greater effectiveness, including those related to creation of public-private partnerships and other innovative strategies that engage users of the coast in its protection and restoration

- Encourage states to develop spatial plans for their state waters and collaborate with federal agencies on planning for uses in federal waters to reduce conflicts, increase certainty for public and private infrastructure investments, and protect sensitive areas
- Enhance and strengthen the existing partnership with states through their coastal management programs and provide meaningful support and adequate funding for local government actions that advance national goals, particularly as related to land use and development, addressing sea level rise and other impacts from climate change, protection of coastal habitat, and public access to the coast

Specific Action 5: Congress should strengthen the Clean Water Act by establishing a national goal of substantially reducing water pollution from nonpoint sources with measurable objectives to meet water quality standards. To ensure effective implementation, the Administration and Congress should ensure the following:

- Nonpoint programs at EPA, NOAA, and USDA are coordinated and complementary
- Additional funding is available to implement, incentivize, and enforce these programs
- Local and state managers are empowered with funding, technical assistance, and enforcement tools in order to strengthen their role in reducing land-based coastal water pollution

Improve Living Marine Resources Management

Our nation’s living marine resources are important to our national well-being for many reasons. Our wild fisheries are key sources of healthy food for citizens across the nation, in addition to a critical means of livelihood for fishermen and the many industries dependent on commercial and recreational fishing, including seafood processors, boat manufacturers, bait and tackle providers, tourist shops, hotels and restaurants, and many others. In addition, each species of marine life, even those we may not directly use, plays an important role in the food web that sustains those economically valuable fisheries. These other important categories of marine life, including marine mammals and sea birds, should be managed and protected as well in order to sustain marine biodiversity, a critical determiner of ecosystem health and resilience. The recommended actions in this section focus specifically on fisheries management.

The number of “dead zones” in the world’s oceans has doubled every 10 years since the 1960s, now covering a combined area the size of Oregon.

The Mississippi River, which drains 40 percent of the continental United States, carries an estimated 1.5 million metric tons of nitrogen into the Gulf of Mexico each year. This drainage contributes to an annual dead zone in the Gulf of Mexico roughly the size of Massachusetts.

Unfortunately, many fisheries have been mismanaged, resulting in sharp declines in numerous stocks and causing economic hardship for many coastal communities. The Magnuson-Stevens Fishery Conservation and Management Act is the primary federal statute governing how we manage our nation’s fisheries and plays a vital role in our nation’s effort to rebuild depleted fish populations and achieve sustainable fisheries

management. Important reforms were incorporated into Congress’s 2006 reauthorization of the Magnuson-Stevens Act, including strengthening the existing requirement to prevent overfishing, improving science, requiring the rebuilding of overfished species within a strict time frame, and calling on NOAA’s National Marine Fisheries Service to revise and update its procedures for complying with the National Environmental Policy Act when making fisheries decisions. Unfortunately, funding for the Magnuson-Stevens Act has been insufficient and implementation of some of the key provisions has been slow, including the need for NOAA to issue guidance to ensure that catch levels are set to ensure overfishing does not occur. Adequate funding is needed for fisheries research and stock assessments, development of environmentally-friendly gear, and expanded monitoring, as well as other important tools and techniques for improving fisheries management.

The good news is that carefully crafted Limited Access Privilege Programs (LAPPs), catch-shares, and Community and Regional Fishing Associations, relatively new approaches to fisheries management authorized in the amended Magnuson-Stevens Act, hold promise for enabling sustainable fisheries and fishing communities. When designed and implemented appropriately, these new approaches can align incentives toward greater efficiency, profitability, safety, and long-term health and vitality of the community and ecosystem. No single management method will solve all of the problems that beset our depleted fisheries, but a variety of new and innovative tools and strategies should be carefully considered and employed as appropriate to address this complex and multi-dimensional issue.

Fisheries have been depleted in part because of overfishing, bycatch of nontarget species, and the use of damaging fishing gear—all of which can be successfully addressed in a fully implemented Magnuson-Stevens Act. In addition, the health of our fisheries has suffered

from a host of serious management problems that currently fall outside of the range of influence of fisheries managers and fishermen, including coastal and ocean water pollution, degradation of essential fish habitat, inhibition of riverine waters flows, and a host of other critical land-based issues. For these reasons, in addition to the direct management of fisheries, it is critical for managers of other key activities—such as agriculture, urban and suburban land use, energy development, and marine transportation—to consider the impacts on the health of marine ecosystems when making decisions. So while improvement of fisheries

More than 750,000 salmon reached the Sacramento River to spawn in 2002. Five years later, that number dropped to 68,000, forcing the unprecedented closure of the salmon fisheries up and down the West Coast.

The cumulative effects of climate change, pollution, and many decades of overfishing have caused a 90 percent decline in the ocean’s big fish population, including sharks and tuna.

management is critical, it must be designed and executed as one part of the integrated, ecosystem approach recommended throughout this report in which goals for the entire ecosystem influence the decision making of a range of agencies.

Specific Action 6: The Administration should support expedited implementation of the Magnuson-Stevens Fishery Conservation and Management Act, with Congress ensuring that NOAA has the necessary funding to effectively implement the Act’s provisions, including those that implement an ecosystem-based management approach and address overfishing, habitat protection, bycatch, and the monitoring, collection, and use of high quality science in fisheries management.

Specific Action 7: The Administration and Congress should actively encourage the use of innovative, science-based approaches that take into account important ecosystem dynamics that affect the health of our nation’s marine ecosystems as a whole and, in particular, its fisheries. These include:

- Improving water quality through a strengthened Clean Water Act and CZMA, and ensuring adequate freshwater inflows to rivers and estuaries
- Improving fisheries information, stock assessments, and catch monitoring, and employing collaborative research approaches
- Developing a vision and specific goals for what healthy marine ecosystems should look like, including what populations of fish are optimal and what types of fleets and communities are desired
- Carefully considering and, where appropriate, employing innovative management techniques, such as LAPPs, catch-share programs, and Community and Regional Fishing Associations
- Providing incentives for local clean marina and working waterfront programs
- Protecting important ocean and coastal habitats, including upland areas

Bolstering International Leadership

The same challenges facing our oceans and coasts—fisheries decline, pollution, habitat loss, invasive species, and climate change—are prevalent around the world. Efforts by the United States to address these challenges at home need to be extended beyond our borders. By virtue of having the largest Exclusive Economic Zone (EEZ) in the world, the United States must be a strong leader in international action to ensure protection of our national economic and security interests as well as our valuable marine resources.

Climate change is significantly affecting the world’s oceans and coasts—sea level rise threatens coastal communities, infrastructure, and transportation systems; the absorption of carbon by our oceans has resulted in increased

The United States must take a leadership role in the development and implementation of effective climate change mitigation and adaptation strategies, including committing to significant reductions in greenhouse gases. In setting goals for greenhouse gas reductions, the U.S. leaders must take into account the level of reduction needed to mitigate impacts on oceans, coasts, and Great Lakes, including ocean acidification and sea level rise.

acidification that impacts the health and migration patterns of marine ecosystems and species; and ice cover in the Arctic Ocean has reached a record low level. The intensifying worldwide impacts of climate change amplify the importance of global cooperation on ocean issues.

Accede to the Law of the Sea Convention

The United States must accede to the Convention on the Law of the Sea to protect our national security interests, secure sovereign rights over extensive marine areas, promote international commerce, and further the conservation of ocean resources. Accession would give the United States a seat at the table and a leadership role in international negotiations regarding the implementation, interpretation, and enforcement of the Convention.

The influence of the Convention on international activities, such as those surrounding commercial, military, and environmental activities in the Arctic, is growing. Recent data on the melting of the Arctic ice cap has both businesses and governments involved in a multi-billion dollar rush to secure rights to access natural resources and energy sources in areas immediately adjacent to their EEZ. For the United States, this new frontier could support a variety of economic activities and new jobs in the coming decades, including traditional and alternative energy exploration and development, shipping through the Arctic, and sustainable development of new fisheries. Yet in some cases it is unclear how far the rights to the resources extend beyond the continental shelf. As the sole industrialized nation not party to the Convention—to which 155 nations and the European Union belong—the United States remains sidelined in current dialogues about access to these resources. As Canada, Denmark, Russia, and other nations assert territorial claims to Arctic resources, the United States must be in a position to protect its sovereign rights and prevent unsubstantiated claims by acceding to the Convention. Becoming a party to the Convention will allow our nation to benefit economically from the rich resources in the region while also positioning the United States as a major player in decisions about how to manage this newly exposed ocean frontier.

Because the provisions of the Convention help protect vital U.S. economic interests and provide the stability crucial for investment in global maritime enterprises, there is overwhelming bipartisan support for accession from a broad and diverse range of interests. All major U.S. ocean industries, including offshore energy, maritime transportation and commerce, fishing, and shipbuilding, support accession to the Convention, as does the U.S. Chamber of Commerce. Environmental and scientific research organizations also strongly support the Convention. 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.

Specific Action 8: The United States Senate should provide its advice and consent to U.S. accession to the Convention on the Law of the Sea by the end of 2009. This will allow the United States to assume a leadership position in guiding the implementation and enforcement of a key international legal framework that is instrumental to our national and economic security and the conservation of ocean resources.

Strengthen U.S. Leadership in Advancing Important and Innovative Solutions to Protect and Adequately Manage the Arctic Marine Ecosystem

Protecting the Arctic marine ecosystem must receive special consideration from the Obama Administration. While many areas of the world, from the tropics to the polar regions, will face significant and alarming impacts that the United States must certainly address, the Arctic is a newly exposed and vulnerable area that demands our immediate and urgent attention. Specifically, the United States must consider how to balance the protection and use of this vulnerable area within its own EEZ and should fully engage with the international community to develop international rules, standards, and systems for marine environmental protection in the face of rapidly increasing potential for industrial and shipping activities in the Arctic Ocean. There is an urgent need for a comprehensive, science-based management regime to ensure effective, integrated, and ecosystem-based management of human activities in this vulnerable region. These decisions must be grounded in scientific research to understand the Arctic marine ecosystem, such as assessment of fish stocks and how they may be migrating, and possibilities for oil spill response in ice-covered waters. A precautionary approach, as defined by the U.S. Commission on Ocean Policy, should be taken when considering new industrial activities in the Arctic until a thorough scientific assessment is completed and a comprehensive and integrated management plan is in place.

Ice cover in the Arctic Ocean reached a record low level during the summer of 2007, raising concern about climate change and accelerating efforts by Arctic nations to secure rights over extensive natural resources in the region.

Specific Action 9: The Administration should work to ensure that the Arctic Ocean is managed in a comprehensive, integrated, and science-based manner. Specifically, it should:

- Develop a comprehensive, integrated, and science-based management plan to govern Arctic areas in the U.S. EEZ that addresses emerging issues and guides choices about if, when, where, and how activities are permitted in the Arctic
- Initiate multi-lateral negotiations that lead to implementation of an integrated, ecosystem-based management approach to managing new and expanded activities throughout the Arctic Ocean, either within existing or new international frameworks

Specific Action 10: The Administration should implement a strong scientific research program in the Arctic. This should include:

- An integrated Arctic Observing Network and an Alaska Ocean Observing System
- Bilateral discussions on scientific matters with Russia
- Adequate infrastructure for conducting robust scientific research, including vessels, polar class icebreakers, and fundamental platforms for research on the Arctic Ocean
- The interagency Study of Arctic Environmental Change (SEARCH) to provide a system-scale, cross-disciplinary, and long-term Arctic research program

Strengthen U.S. Leadership in Advancing Important and Innovative Solutions to Protect and Restore Living Marine Resources around the Globe

Three quarters of the world’s marine fisheries are fully exploited, overexploited, or depleted. Given the importance of fish and fish products to global food security, the United States should play a lead role in ensuring the long term sustainability of international fisheries resources. A critical priority for addressing the decline in fisheries and marine biodiversity overall is to work with the international community to protect the high seas, the area of the ocean beyond the 200-mile limit of national jurisdiction, which comprises 45 percent of the planet’s surface. Long considered important for its fish, scientists are now discovering that the high seas—along with coastal areas, seamounts, and coral reefs—contain some of the richest biodiversity on the planet. Biodiversity is increasingly believed to be important in maintaining ecosystem processes and services crucial for human survival and well-being. This marine biodiversity is under increasing threat from many sources, including overfishing, noise and chemical pollution, habitat destruction, and now ocean warming and acidification from climate change.

The most important factor undermining the effectiveness of international cooperation and management of fisheries on the high seas is the prevalence of illegal, unregulated, and unreported (IUU) fishing. IUU fishing decimates valuable fish populations and kills tens of thousands of marine animals as bycatch. It also destroys fragile habitats through unregulated use of damaging fishing practices, including bottom trawling. Bottom trawling is one of the most destructive fishing practices on the high seas, often destroying corals, sponges, seamounts, and other vulnerable marine species and habitats. The United States should increase its commitment to international marine conservation, including ending destructive fishing practices and protecting vulnerable and declining species.

Overcapitalization of the global commercial fishing fleet is a major contributor to the widespread depletion of economically important fish stocks. At the global level, a significant factor in continued overcapitalization is the system of fishing subsidies that exist in many

countries. Fishing subsidies that support overcapitalization harm the competitiveness of U.S. exports in the international seafood market and promote IUU fishing, which further harms our domestic commercial fisheries, both ecologically and economically.

Specific Action 11: The Administration should fully implement the IUU fishing provisions of the Magnuson-Stevens Act and require all executive offices that represent the United States internationally to support NOAA's efforts and recommendations on management, enforcement, and coordinated technical assistance for nations engaging in IUU fishing.

Specific Action 12: The Administration and Congress should support ongoing U.S. efforts in the World Trade Organization negotiations calling for an end to fishing subsidies that promote overcapitalization and global depletion of fish stocks.

Strengthening Ocean Science

In a rapidly changing world, decision makers are increasingly reliant on credible and timely scientific information to help guide the formulation, implementation, and evaluation of policy. To meet this need, ocean science and research institutions around the nation are striving to dramatically improve the quality, availability, and utility of ocean related science and information provided to policy makers, managers, and the public. Unfortunately, despite a renewed national focus on science and technology in general, the capacity for ocean sciences to find solutions to pressing national priorities is not often recognized at the highest levels.

There has been a slow but steady deterioration of sustained support for ocean and coastal science and infrastructure over the past few decades, resulting from shifting priorities in National Aeronautics and Space Administration (NASA), Navy, and Department of Energy, and chronic underfunding of ocean and coastal science in NOAA, Department of the Interior, and EPA. This benign neglect is limiting our ability to understand the oceans' role in major public policy challenges, including responding to climate change, evaluating renewable energy opportunities in coastal waters, understanding critical ecosystem thresholds where potentially irreversible or enduring changes may occur, and stimulating the science and technology base that is central to our nation's economy. Fortunately, there are bright spots where progress has been made. The ocean science community is poised to build on these successes and capitalize on the opportunities that can be created with additional resources and a shift toward a new management approach that facilitates greater integration and collaboration across the federal government and with industry, academic, and private sector stakeholders.

Improving the Ocean Science Enterprise

The nation is falling short of addressing a litany of chronic challenges facing our oceans and coasts. This lack of progress, coupled with potential impacts associated with climate change, are creating grave concerns that we may be unexpectedly approaching tipping points where unpredicted and enduring changes will significantly alter the health, productivity, and economic viability of systems, processes, and communities. Our understanding of the complexity of ocean-related processes and their interrelationship with the atmosphere and land remains limited due in large part to inadequate funding to support basic and applied

scientific research and the translation of this research into useable information, as well as the lack of a coherent process for coordinating science policies and integrating scientific information into management policies.

“We will restore science to its rightful place.”

—President Barack Obama, January 20, 2009

Changes in federal management of ocean science are needed to encourage greater interagency coordination and facilitate expanded public-private partnerships, which will help maximize the effectiveness of limited fiscal resources. The progress made under the Committee on Ocean Policy’s Joint Subcommittee on Ocean Science and Technology (JSOST) in enhancing and elevating interagency science coordination should be codified and strengthened, including its role in helping shape annual budget guidance for ocean science priorities. Attention should also be given to charging individuals within key White House offices with responsibility for ocean issues, expanding the use of the congressionally mandated National Ocean Partnership Program (NOPP) as a mechanism for coordinating interagency funding of ocean science priorities, and using the Ocean Research and Resources Advisory Panel as a communication conduit with the nonfederal community.

Specific Action 13: The Administration should strengthen and Congress should codify, where appropriate, the federal ocean science governance regime to more closely align ocean and coastal science priorities with the needs of policy makers and managers. They should do this by:

- Reaffirming the role of JSOST as part of the Committee on Ocean Policy structure, and requiring agencies to work together under the JSOST co-chairs to develop an annual interagency ocean budget guidance memorandum in collaboration with Office of Management and Budget (OMB)
- Expanding the use of NOPP as an interagency project funding mechanism
- Codifying and strengthening the role of the Ocean Research and Resources Advisory Panel as the conduit for securing input from the nongovernmental community
- Elevating ocean science and coordination with JSOST as a core responsibility of key staff within the OSTP, the National Science and Technology Council, CEQ, OMB, and the new Assistant to the President for Energy and Climate Change

Ocean Science for Addressing Climate Change

Enhanced scientific understanding of our oceans and coasts is essential to our effort to respond to the challenges associated with climate change. A more robust understanding of the role of oceans in climate change is required for evaluating mitigation options such as carbon sequestration in oceans, the continuing capacity of the oceans to absorb greenhouse gases, and more accurately forecasting the magnitude and intensity of impacts at multiple scales—global, regional, and local—and assessing alternatives for adapting to these impacts. Yet, despite acknowledgement that oceans are a key driver of climate change, and the growing desire to refine predictions of impacts at the regional and even local scales, fiscal support for ocean science has remained flat. Equally disturbing, given the significant economic and environmental risks accompanying climate change, has been the lack of resources committed to strengthening capacity in the social sciences, which provides information essential to evaluating options and managing risks that threaten the health and welfare of individuals, communities, businesses, and ecosystems.

Nearly 40 percent of the scientific instruments on the country's environmental satellites are expected to stop operating by 2010.

The magnitude of these threats continues to grow as the pace of climate change accelerates. This was made clear when researchers recently updated the fourth assessment report by the U.N. Intergovernmental Panel on Climate Change, released in 2007, to suggest that sea levels could rise twice as much as predicted by the end of the century, exceeding three feet as the upper range. When combined with the fact that the oceans have been absorbing more than 80 percent of the heat added to the climate system and absorbing greenhouse gases, in particular carbon dioxide, and are therefore becoming increasingly acidic, the need to commit greater attention and resources to understanding the complex and dynamic process involving oceans and climate becomes more urgent.

Given the implications of sea level rise on coastal communities and the vulnerability of private and public infrastructure, such as buildings, homes, and transportation systems, the impacts of increasing acidity on coastal and marine ecosystems, and the effects of shifting precipitation patterns on water supply and agricultural production, decision makers are in urgent need of improved climate and ocean-related information forecasts at the global, regional, and local scales. Unfortunately, the current ocean and coastal science enterprise supporting climate change is being compromised by a lack of fiscal support for key infrastructure and science programs and the lack of a centralized effort to gather and distribute critical information. For example, the U.S. observing systems that study global, national, and regional ocean processes is rudimentary and incomplete, while modernization of critical U.S. satellite systems has endured repeated setbacks. Funding for the construction and operation of ships, buoys, cabled observatories, planes, and underwater observing and monitoring hardware and associated programs has been stagnant. These problems are

exacerbated by a disjointed data management system and lack of focus on developing and refining products and services urgently needed by decision makers and managers facing difficult policy and management choices. These deficits must be addressed immediately if the United States and other nations are to make informed, balanced decisions on policies and actions to mitigate and adapt to climate change.

Specific Action 14: The Administration and Congress should enhance the integration of ocean and coastal science into the broader climate initiative, recognizing that many of the limitations in climate change science result from an inadequate understanding of ocean-related processes and their interactions with land and atmosphere. Specific steps include:

- Increase funding for ocean and coastal focused basic and applied research across the federal government to improve our understanding of the underlying processes driving climate change, its impacts on the environment, economy, and society, and our capacity to evaluate mitigation and adaptation strategies. Key focus areas of this research should include the role of oceans in carbon cycling, water cycling, and the transfer of heat, as well as sea level rise and the increasing acidification of the oceans.
- Strengthen capacity in the social sciences to help focus climate science on the issues with greatest societal and environmental impact, including impacts on coastal communities.
- Fully fund the implementation of a comprehensive (global, national, regional) ocean and coastal observing, monitoring, and modeling system to ensure the availability of high quality data to support climate change mitigation and adaptation forecast and assessment efforts. This should include support for transitioning ocean and atmospheric data collection and synthesis programs from research to operational status.
- Establish and fund a federal Climate Services Program, with NOAA as a major partner, charged with leading a collaborative public-private effort to produce and deliver credible, timely, and useful information to enable management of climate-related risks and opportunities from the global to the local scale. This must complement efforts to understand, monitor, and forecast changes associated with natural variability (e.g., El Niño).

Ocean Science and the Economy

Advancing ocean science is necessary to address more than climate change, it is also part of the fundamental structure that supports our economy. Agriculture, transportation, fishing, recreation and tourism, and coastal development are all dependent upon information derived from ocean and coastal science. It also relates closely to one of our highest national priorities: a clean and secure energy future. With abundant opportunities for wind, wave, tidal and thermal energy production, and reserves of oil and gas, our oceans and coasts are a significant source of both traditional and clean, renewable, domestic energy. Advances in ocean science are critical to understanding the benefits and costs associated with these

opportunities as the nation struggles to strike a new balance and realign its priorities in the face of a major economic and environmental transition.

Ocean science also underlies our understanding of natural hazards such as hurricanes and storms. Their impacts carry potentially staggering economic and human health costs, and improved understanding of ocean and coastal processes will contribute to improved forecasts that benefit virtually every sector of the economy. Improved ocean science underlies our capacity to make better predictions of changes in regional weather patterns that dictate freshwater availability, droughts, wildfires, and flooding, allowing for preemptive and preventative approaches that will help mitigate the associated economic and social impacts.

The Integrated Ocean Observing System (IOOS), which integrates data from sensors at the bottom of the ocean to the satellites far above the Earth, allows us to better understand and forecast change and its impacts. This forecasting capability provides critical information to support commercial fisheries operations, offshore energy facilities, marine transportation, agriculture operations, and many other sectors of the economy. Unfortunately, lack of a strong national framework and supporting regional structure and underfunding of the U.S. observing systems and related ocean infrastructure has severely limited the nation's capacity to provide reliable and timely information and quality products to these core economic industries.

Accurate mapping of oceans and coasts is essential to better understanding and management of how human and natural forces are affecting marine ecosystems and coastal communities. Flooding, sea level rise, and other hazards will impact public and private infrastructure. With over half the nation's population living along the coast, accurate maps can help decision makers bolster the resiliency of coastal communities and influence investment decisions regarding construction of public and private infrastructure, including highways, railways and port facilities, hospitals, water and sewer plants, businesses, and homes. In addition, improved nautical charts and information on tides and currents would greatly enhance both the safety and efficiency of marine transportation, while mapping of the ocean floor would also inform management decisions on offshore industrial development and its impacts on sensitive habitat areas. Integrated coastal and ocean maps that are based on a common spatial reference frame and standard protocols, and upon which data collection, analyses, and products can be incorporated, is central to the management of our coastal and marine areas.

Hurricane Katrina caused more than 1,800 deaths, the loss of more than 400,000 jobs and 275,000 homes, and caused an estimated \$110 billion in damages.

According to the Reinsurance Industry Association, the value of insured private property along the Gulf of Mexico and Atlantic coasts of the U.S. totals roughly \$9 trillion.

At the broadest national level, legislation has been enacted to advance U.S. competitiveness and improve the nation's ability to compete globally and meet challenging demands by improving and innovating math, science, and critical language programs. This initiative provides an excellent opportunity to draw upon and strengthen the scientific and educational resources and expertise within the ocean science community and should be expanded to support agencies such as NOAA and NASA.

Specific Action 15: The Administration and Congress should secure the availability of ocean-related information, products, and services critical to the operations of key sectors of the U.S. economy, drawing on the resources and expertise of the broader ocean and coastal community. Needed actions include:

- Enact legislation and significantly increase funding for the national and regional elements of IOOS to improve the quality of data, products, and services demanded by core economic sectors such as energy, agriculture, transportation, fishing, tourism, and insurance
- Increase funding for integrated coastal and marine mapping and charting and critical underlying datum reference systems to help make information more readily accessible to decision makers, managers, and the public
- Fully integrate NOAA, NASA, and the National Science Foundation ocean-related science and education programs into the American Competitiveness Initiative to strengthen the focus on interdisciplinary studies and capitalize on growing public, academic, and industry interest in economic opportunities and exploration in offshore waters

Ocean Science for Ecosystem and Human Health

Robust ocean science is also essential to advancing our understanding of the underlying processes that drive or influence ecosystem health and determining baseline conditions and how and at what rates these conditions are changing. This is of increasing importance given the unprecedented rate of climate change and its impact on natural processes. This information provides the basis for assessing ecological impacts of policy options, such as those related to individual projects, including energy production in offshore waters or habitat restoration efforts, as well as the more difficult to quantify impacts stemming from cumulative impacts associated with multiple activities that cause ecological disruption or harm.

Better understanding of ocean ecosystems will also help us address declining biodiversity in our oceans. Biodiversity is a key indicator of the health of an ecosystem. The unprecedented rate of loss of biodiversity in marine ecosystems, as measured against the ecological record, has tremendous environmental and economic consequences, not the least of which is the decline or loss of valuable goods and services that healthy ecosystems provide.

Research on ocean ecosystems will also help ensure that human health is protected from environmental hazards associated with degraded or compromised coastal and ocean areas, specifically chemical, sediment, and pathogenic pollution of coastal and estuarine waters, whose impacts include:

- The effects of chemical exposure, particularly subtle effects such as neurotoxicity, increasing antibiotic resistance, interactions between chemical contaminants and other stressors (including diseases, harmful algal toxins, and climate change), and reproductive complications associated with endocrine disruptors and other chemical and pharmaceutical contaminants in the marine environment
- The increase in the frequency and intensity of harmful algal blooms, which contaminate seafood, causing human gastrointestinal and respiratory problems
- The increasing exposure of humans and marine animals to infectious diseases in ocean and coastal waters, including those that may be transmitted from animals to humans and vice versa

While considerable uncertainty surrounds our knowledge of the cumulative impact of chronic exposure to low doses of multiple toxins, there is growing evidence that this is contributing to a growing autoimmune epidemic. Greater attention must be directed toward understanding the human health implications of exposure to natural and man-made toxic chemicals, harmful algal toxins, infectious diseases, and interactions among them in coastal systems as part of a broader national strategy to protect ecosystems and the human health and well-being that depend on them.

These challenges further reinforce the need to move toward a holistic approach to ecosystem research, assessment, and management. The interaction of physical, biological, and chemical processes and its implications on management policies in coastal areas demands reevaluation of how we approach both science and policy. As has been noted throughout this report, this transition to an ecosystem-based management approach is dependent upon a well-integrated and adequately funded system of analytical tools, observation facilities, and mechanisms for effectively communicating scientific information to support decision making.

Specific Action 16: The Committee on Ocean Policy and OSTP should take the lead in developing a comprehensive strategy to guide marine-related ecosystem-focused research, assessment, and management. They should begin by:

- Establishing and funding an interagency environmental monitoring and forecasting program to coordinate, and where appropriate, consolidate existing monitoring programs from across the government. The program should include the establishment of a national system of environmental indicators, focusing initially on indicators relevant to climate change and ecosystem health, and building upon existing and collaborative governmental and nongovernmental efforts.

- Establishing a coordinated national program focused on understanding and predicting individual and cumulative impacts of natural and anthropocentric processes on ecosystem health and productivity, including development of an integrated assessment protocol that incorporates, biodiversity, ecosystem services, human health impacts, and socioeconomic factors, and based on a standardized approach, enabling the assessment of environmental change and its societal implications.

Enhancing Capacity of the Ocean Science Community

One of the greatest difficulties facing the coastal and ocean science community—which includes federal agencies, private organizations, and academia—is prioritizing its needs and identifying the resources necessary to meet them. Unlike space science where there are fewer competing interests and the focus is predominantly on exploration, the oceans, coasts, and Great Lakes are heavily used areas where competing interests often collide and the demand for information has real-time social, economic, and ecological implications. In addition, it is the area in which many scientific disciplines intersect and compete for attention and resources.

It is incumbent upon the coastal and ocean science community to work collaboratively to identify the highest priority needs for understanding our oceans, coasts, and Great Lakes and develop a coherent strategy for securing adequate resources. The ocean science community should initiate this process by identifying core issues or areas of national importance, building on the U.S. Commission on Ocean Policy, the Pew Oceans Commission, the Ocean Research Priorities Plan, the Climate Change Science Plan, and work of the National Academy of Sciences. This body of work should be a basis to evaluate priorities and recommend investment strategies for meeting the challenges facing our oceans and coasts. This effort is essential to moving the community past the needs assessment stage, which has been done repeatedly, to assessing where limited resources can be applied with the greatest return to the nation.

Specific Action 17: The Administration should initiate an effort among governmental, academic, and private stakeholders engaged in ocean science to prioritize competing demands within the ocean and coastal science community. This process should be led by a collaboration of JSOST and the Consortium for Ocean Leadership, with input from the Subcommittee on Integrated Management of Ocean Resource. Activities of this collaboration should include:

- Developing an investment strategy, building on core focal areas addressed in existing reports, that identifies ocean and coastal priorities and the programmatic and infrastructure costs associated with their implementation
- Working with the National Academies' Ocean Studies Board to include immediate and long-term infrastructure requirements necessary to support a robust coastal and ocean science enterprise

- Integrating ocean and coastal programs responsible for generating information, products, and services with the goal of developing coordinated interagency environmental services and prediction capability

Funding Ocean and Coastal Policies and Programs

The ocean and coastal economy—that portion of the economy that relies directly on ocean attributes, as well all economic activity that takes place on or near the coast—is a major contributor to the U.S. economy, generating half of the nation’s Gross Domestic Product. Despite the role oceans and coasts play in supporting our economic well-being, they remain poorly understood and underappreciated. The oceans have not been a priority in our political system and, as a consequence, chronic underinvestment has left much of our ocean related infrastructure in poor condition. Furthermore, single-purpose management programs struggle to uphold their responsibilities, ocean scientists compete for a smaller percentage of the federal research budget, and ocean science is virtually absent from the education curriculum. Just as one must make an ongoing investment in the operation and maintenance of physical capital in order for it to remain productive, one must do the same with respect to natural capital. Investments in ocean and coastal conservation and management activities should be viewed as the funding for operations and maintenance that supports the natural capital of the oceans, which generates much of these revenues in the first place.

Ocean and coastal management programs that work to address specific problems need significant new funding to tackle both existing and emerging issues. Nonpoint source pollution, fisheries management, coastal development, coral reef conservation, harmful algal blooms, ocean and seafood-borne diseases, and invasive species are just a few of the issues that managers at both the federal and state levels struggle to address. These issues have a substantial impact on the economic and ecological viability of our oceans and coasts, as well as human health, and it is time to provide our coastal and marine managers with the information and tools they need to address these major challenges. Maintaining the economic and ecological viability of our oceans and coasts will require decision makers to have access to sound information and up-to-date tools and technologies. These needs can only be met by increasing funding for ocean-related science, management, and education.

Establish an Ocean Investment Fund

Establishing an Ocean Investment Fund in the U.S. Treasury would clearly demonstrate the commitment of the Administration and Congress to our ocean and coastal resources. The monies for the Fund are readily available from an assessment of resource rents for the use of publicly-owned resources by the private sector in federal waters. The crediting of a significant portion of such rents to a fund dedicated to the management and conservation of ocean and coastal resources has been a consistent and key principle of the Joint Ocean

Commission Initiative from its inception and is based on the recommendations of the two Ocean Commissions that preceded it.

The Ocean Investment Fund would be a complementary scientific, natural resource management, and environmental (green) technological supplement to ongoing economic recovery efforts. The critical contribution of our oceans, coasts, and Great Lakes to the nation's economy, current financial recovery efforts, and the generation of jobs; the various crises threatening those water bodies and their continued capacity to contribute to our fiscal recovery; and the intractable management challenges required to address such crises by the public and private sectors of our economy all support the need for a dedicated source of revenue from the national government to sustain our ocean resources.

Currently, virtually all federal revenues being generated from activities on the Outer Continental Shelf (OCS) are from oil and gas activities—averaging some \$5–7 billion annually in recent years but bringing in as much as \$18 billion in Fiscal Year 2008. Additionally, it is clear that converging economic, technological, demographic, and environmental factors make our oceans an attractive and challenging place for new and emerging enterprises. Marine aquaculture, bioprospecting, and a broad range of non-conventional offshore energy activities (e.g., wind, tidal, and wave power generation projects) are on the horizon and can and should generate federal revenues from the use of space on and resources of the OCS. The Joint Ocean Commission Initiative believes that a significant portion of all such revenues coming from our oceans should be reinvested in our oceans and their management. They should be credited to the Ocean Investment Fund and used to support federal, regional, coastal state and local ocean and coastal management initiatives. These revenues should not replace existing, regular appropriations but rather be used to address the emerging national ocean issues of the 21st century that have been underfunded or neglected in recent years.

At the national level, as noted above, our failure to adequately invest in ocean and coastal science and management has severely limited the capacity of federal agencies to understand our oceans and coasts. In particular, better assessing the role of oceans in climate change continues to be a challenge, constraining our capacity to adequately address the impacts of such change on our coastal communities, economies, and ecosystems—impacts that include the effects of ocean acidification on the marine food web and coral reefs and the impact of rising ocean temperatures on fisheries and ocean health threats. Increasing our scientific understanding of the links between oceans and climate change and improving our management strategies to mitigate and adapt to climate change impacts requires substantial fiscal resources for both federal and state agencies.

The Joint Ocean Commission Initiative recommends that the key institutions in the Executive Office of the President with oversight responsibility for science, climate, and energy policy—OSTP, CEQ, the Assistant to the President for Energy and Climate Change, and leaders on the

strengthened Committee on Ocean Policy—be given authority to make recommendations for allocating Investment Fund revenues among federal agencies on an annual basis. This would help facilitate interagency collaboration and coordination by supporting interdisciplinary and integrated programs and activities that have difficulty securing funding through the individual departmental budgeting process.

With respect to our coastal states and local communities, it is at these levels where much of the day-to-day work of integrated, multiple use management in the coastal zones is carried out and where, among other phenomena, sea level rise and its impact on coastal infrastructure and habitats will be immediately experienced and adaptation required. Efforts at establishing and enhancing regional-scale ocean partnerships also requires fiscal and other support and collaboration at the national level.

In this time of economic crisis many demands will be made on the revenues coming from the OCS, particularly if additional offshore areas are open to leasing and development. Nevertheless, we believe that the investment of a significant portion of these revenues in our oceans, coasts, and Great Lakes is consistent with the priorities of the Administration and Congress to support economic and energy security initiatives and enhance natural resource management. This includes supporting green technologies such as alternative offshore energy production and a commitment to balancing economic and environmental impacts of such projects in federal waters. Additionally, consistent with the President's overall stimulus initiative and his efforts to encourage public-private partnerships, authorization should be granted to allow some of these funds to be used to leverage private capital for promising coastal and ocean investments.

Specific Action 18: The Administration and Congress should establish an Ocean Investment Fund, using a significant portion of the resource rents generated by private commercial activities occurring in federal waters on the OCS. This fund should be dedicated to providing financial support for national, regional, and coastal state and local programs related to understanding and managing our oceans, coasts, and Great Lakes. An Ocean Investment Fund should be established based on the following guidelines:

- The Fund should receive a portion of resource rents from activities that include offshore oil and gas development as well as new and emerging uses such as marine aquaculture, bioprospecting, wind farms and other alternative, non-conventional offshore energy generation technologies.
- The Fund should be allocated (1) to all coastal states, as determined by Congress, and used for the conservation and sustainable development of renewable coastal resources and the management of their coastal zones including the development of new methods of addressing adaptation to climate change, and (2) to the federal government, allocated among agencies as determined by the primary ocean policy entity in the Executive Office of the President, to begin to reverse the serious gap in scientific research and integrated

planning and management, and other national responsibilities to address pressures on our oceans, coasts, and Great Lakes.

- The activities and programs supported by the Fund, among the coastal states and federal ocean agencies, must be consistent with the national ocean policy established by executive order or legislation.
- Specific eligible uses of the funds by the states should be established by Congress for the management, conservation, and sustainable development of renewable ocean and coastal resources.
- None of the proceeds provided through the Fund should replace regular appropriations nor should any of the programs currently receiving OCS oil and gas revenues be adversely affected by this additional allocation.
- The legislation establishing the Fund should authorize and encourage the use of some of the revenues to leverage private investments in, and the sharing of responsibilities with respect to, the integrated management of our ocean and coastal resources.

Dedicate Carbon Credit Funds to Addressing Ocean and Coastal Climate Research, Mitigation, and Adaptation

Our oceans and coasts may be the first and most dramatic casualty of climate change. Many coastal areas are already experiencing significant impacts related to sea level rise and ocean acidification. Policies developed by the Administration and Congress to address climate change must recognize the fundamental role oceans play in governing climate change and ecosystem processes.

Advances in our understanding of climate change are responsible for growing global recognition of the serious economic, social, national security, and environmental consequences accompanying this change. Yet, despite these advances, our understanding of the processes driving climate change and our capacity to forecast its long-term consequences remain limited. As a consequence, climate change mitigation and adaptation strategies continue to evolve as new information regarding the planet's capacity to respond to this change improves. It is imperative that greater attention and resources be committed to supporting global, regional, and local scientific programs dedicated to advancing our understanding of climate change, particularly in the oceans, which are the primary driver to climate change.

Equally important is the need to use existing knowledge to implement proactive adaptation strategies, particularly along the coasts where the impacts of climate change will have potentially staggering economic, human health and safety, and environmental impacts. Over half the nation's population lives along our coasts, and this concentration of people and infrastructure is highly vulnerable to sea level rise and the increase in the intensity of hurricanes, storms, and flooding. Efforts taken now to rethink the placement and design of

critical infrastructure, such as highways, railway, ports, and water treatment plants, as well as private homes, will contribute greatly to the long-term resiliency of coastal communities and the health and safety of their populations.

A similar effort is necessary to protect ecologically important coastal habitats. Many coastal wetlands are surrounded by development with no opportunity for inland migration, while ocean ecosystems are being forced to adapt to changes at a rate unprecedented in recent ecological history. A forward-looking strategy that commits resources to supporting habitat conservation now will pay off in the future as we struggle to balance the challenges that will accompany encroaching and more acidic ocean waters. This proactive approach must also provide resources to address the chronic influx of pollution that continues to stress sensitive coastal and ocean ecosystems. Enhancing the resiliency of these systems is essential to ensuring they remain healthy and productive during the coming decades when the impacts of climate change will become more acute.

The growing demand for better climate information to guide balanced and informed mitigation and adaptation strategies provides clear justification for the dedication of a portion of proceeds from any sale of carbon credits or carbon tax to support these efforts. Given the central role of oceans as a driver of climate change, and the direct impacts this change will have on our ocean and coastal resources and coastal communities, a portion of any proceeds from the sale of carbon credits should be directed toward supporting ocean-related science and coastal mitigation and adaptation strategies. A proactive commitment of funding to support high-quality science and effective public policy can greatly reduce long-term costs to taxpayers, while protecting their health and safety and enhancing their economic opportunities.

Specific Action 19: As the Administration and Congress craft proposals to address climate change, a portion of any funds generated by the sale of carbon credits pursuant to a cap and trade or tax system should be dedicated to protecting, maintaining, and restoring ocean and coastal ecosystems, as well as promoting greater scientific understanding of the relationship between the oceans and climate change. The key institutions in the Executive Office of the President with oversight responsibility for science, climate, and energy policy, including leaders on the Committee on Ocean Policy, should be charged with recommending the allocation of those dedicated revenues among federal agencies on an annual basis.

Improve Coordination through an Integrated Budget

One way to improve coordination among federal programs that address ocean, coastal, and Great Lakes resources is to create an integrated coastal and ocean budget. Such a budget would make it easier to track support for and analyze the progress of a variety of ocean and coastal programs that are spread across the federal government but that are closely related,

and in some instances overlapping or duplicative. It would complement a similar effort to track climate change funding, while also assist with assessing how these funds are shared with and used by nongovernmental partners supporting ocean-related programs.

Specific Action 20: The Administration should develop an integrated federal coastal and ocean budget that identifies science and management programs and funding levels to use as a baseline and evaluation tool for assessing past, current, and future funding trends and needs in ocean and coastal science and management.

April 2009

INVESTMENT NEEDED FOR HEALTHY OCEANS AND COASTS

A major challenge confronting our ability to effectively understand and manage ocean and coastal resources is the lack of sustained investment in ocean-related science, management, and education. Our failure to provide this investment has resulted in the near-crisis situation that is jeopardizing our economic and national security, health and well-being, and placing entire marine ecosystems at risk. While the Joint Initiative is mindful of the national economic situation and budgetary pressures, making the investments proposed in the report will directly contribute to economic recovery, significantly advance our capacity to address the challenges of climate change, and provide a lasting foundation for further enhancing the benefits we derive from our oceans and coasts. Thus, as the Administration and Congress formulate their budget recommendations for Fiscal Year 2010, the Joint Initiative strongly recommends that careful consideration be given to dedicating significant resources to the specific actions identified in the report, using the levels identified in the accompanying table as a guide.

An enduring consequence of the chronic underfunding is the relatively poor state of infrastructure to support ocean and coastal science, research, and management needs. This is particularly evident in the science community, which is struggling with a depleted and increasingly obsolete fleet of research vessels, including those capable of working in polar waters, a crisis in procurement of earth-observing satellites, deteriorating research facilities, and the slow pace of development and deployment of new technologies such as the implementation of global, national, and regional ocean and coastal observing systems. In addition, funding has remained stagnant for core activities such as coastal zone management and water quality protection and has only increased minimally for programs that manage critical resources, such as fisheries, coral reefs, and important habitat areas.

The magnitude of this shortfall was made clear in the report of the U.S. Commission on Ocean Policy, which identified outstanding funding needs of \$4 billion dollars, a number that did not include major infrastructure costs such as the multi-billion dollar satellite modernization program or basin-wide habitat restoration projects in the Gulf of Mexico, Great Lakes, Everglades, Chesapeake Bay, or Puget Sound. Nor did the U.S. Commission on Ocean Policy fully anticipate the growing need for improved ocean and coastal science and management to better understand, predict, and adapt to climate change.

Funding Estimate Caveats and Considerations

The table below provides a general estimate of the initial funding necessary to initiate implementation of the specific actions in this report. The Joint Initiative intends to work with the ocean community to expand and refine the funding levels and justification offered in the table. A few caveats and considerations are important to keep in mind when reviewing the accompanying table:

- The funding levels in the table are not definitive, but are intended to provide a frame of reference for the relative magnitude of costs associated with activities under each action.
- The funding levels represent first year costs above levels provided in Fiscal Year 2009.
- Several recommendations represent multi-year initiatives that have significant funding requirements requiring a “ramp-up” in outyear funding, such as implementation of ocean and coastal observing systems, development of a Climate Services Program, or reauthorization of the Coastal Zone Management Act. The funding levels in the table reflect first year costs only.
- The science funding recommendations do not include needs associated with modernization of the earth observing satellite system, and the Arctic research recommendation does not reflect funding need for icebreakers.

Initial Estimated Implementation Costs for Specific Actions

Specific Action	Initial Costs (Year 1)
IMPROVING OCEAN AND COASTAL POLICY AND MANAGEMENT	
1. Establish a National Ocean Policy	\$2 million
2. Codify and Strengthen NOAA	Administrative action
3. Support Regional Collaborations	\$14 million
4. Reauthorize and Strengthen the Coastal Zone Management Act	\$200 million
5. Strengthen the Clean Water Act	TBD
6. Fully Implement the Magnuson-Stevens Act	\$50 million
7. Implement Innovative and Ecosystem-Based Approaches to Fisheries Management	TBD
BOLSTERING INTERNATIONAL LEADERSHIP	
8. Accede to the Law of the Sea Convention	\$5 million
9. Ensure Comprehensive Management of the Arctic Ocean	Administrative action
10. Implement a Strong Scientific Research Program in the Arctic	\$395 million
11. Reduce Illegal, Unregulated, and Unreported Fishing	TBD
12. Support Efforts to End Fishing Subsidies	Administrative action
STRENGTHENING OCEAN SCIENCE	
13. Strengthen Ocean Science	\$4 million
14. Integrate Ocean Science into Climate Change Efforts	\$575 million
15. Provide Critical Ocean Information	\$350 million
16. Develop a Strategy for Ocean Research and Assessment	\$100 million
17. Prioritize Ocean Science Needs	\$1 million
GRAND TOTAL:	\$1.7 billion



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