

SUMMARY OF RECOMMENDATIONS

The Oceans Act of 2000 charged the U.S. Commission on Ocean Policy with carrying out the first comprehensive review of ocean-related issues and laws in more than thirty years. The Commission took up that charge, presenting over 200 recommendations throughout this report that will move the nation toward a more coordinated and comprehensive ocean policy. This chapter assembles all the recommendations in one place. To assist federal agencies and others in quickly identifying actions most relevant to them, it also provides an index of the recommendations organized by the agency, group, or individual charged with carrying out the proposed action.

Context for the Recommendations

Guiding Principles

As explained in Chapter 3, the Commission's work was guided by the following set of fundamental principles:

- **Sustainability:** Ocean policy should be designed to meet the needs of the present generation without compromising the ability of future generations to meet their needs.
- **Stewardship:** The principle of stewardship applies both to the government and to every citizen. The U.S. government holds ocean and coastal resources in the public trust—a special responsibility that necessitates balancing different uses of those resources for the continued benefit of all Americans. Just as important, every member of the public should recognize the value of the oceans and coasts, supporting appropriate policies and acting responsibly while minimizing negative environmental impacts.
- **Ocean–Land–Atmosphere Connections:** Ocean policies should be based on the recognition that the oceans, land, and atmosphere are inextricably intertwined and that actions that affect one Earth system component are likely to affect another.
- **Ecosystem-based Management:** U.S. ocean and coastal resources should be managed to reflect the relationships among all ecosystem components, including humans and nonhuman species and the environments in which they live. Applying this principle will require defining relevant geographic management areas based on ecosystem, rather than political, boundaries.

- **Multiple Use Management:** The many potentially beneficial uses of ocean and coastal resources should be acknowledged and managed in a way that balances competing uses while preserving and protecting the overall integrity of the ocean and coastal environments.
- **Preservation of Marine Biodiversity:** Downward trends in marine biodiversity should be reversed where they exist, with a desired end of maintaining or recovering natural levels of biological diversity and ecosystem services.
- **Best Available Science and Information:** Ocean policy decisions should be based on the best available understanding of the natural, social, and economic processes that affect ocean and coastal environments. Decision makers should be able to obtain and understand quality science and information in a way that facilitates successful management of ocean and coastal resources.
- **Adaptive Management:** Ocean management programs should be designed to meet clear goals and provide new information to continually improve the scientific basis for future management. Periodic reevaluation of the goals and effectiveness of management measures, and incorporation of new information in implementing future management, are essential.
- **Understandable Laws and Clear Decisions:** Laws governing uses of ocean and coastal resources should be clear, coordinated, and accessible to the nation's citizens to facilitate compliance. Policy decisions and the reasoning behind them should also be clear and available to all interested parties.
- **Participatory Governance:** Governance of ocean uses should ensure widespread participation by all citizens on issues that affect them.
- **Timeliness:** Ocean governance systems should operate with as much efficiency and predictability as possible.
- **Accountability:** Decision makers and members of the public should be accountable for the actions they take that affect ocean and coastal resources.
- **International Responsibility:** The United States should act cooperatively with other nations in developing and implementing international ocean policy, reflecting the deep connections between U.S. interests and the global ocean.

These principles underlie all the Commission's recommendations, and their full implementation will lead the nation toward a future where the benefits of the oceans and coasts are fully realized and the problems plaguing these areas are minimized.

Creating a Strong Role for States

Based on the charge of the Oceans Act of 2000, the Commission has recommended actions to achieve a coordinated and comprehensive national ocean policy at all levels of government—including federal, state, and local—and has called for enhanced partnerships among federal agencies and state and local stakeholders. The Commission sees a central role for states in ocean and coastal management and identifies many opportunities for them to contribute to an integrated national ocean policy. The President's Council of Advisors on Ocean Policy, a high-level advisory body to be appointed by the President, should serve as one important formal structure for input from nonfederal individuals and organizations, including governors of coastal states, additional state, territorial, tribal, and local government representatives, and others.

Some of the important areas for state involvement, as discussed throughout the report, include:

- formal and informal ocean education at all levels, including outreach to underrepresented and underserved communities.

- creation of regional ocean councils to help coordinate federal, state, tribal, and local planning and action, and designation of regional ocean information programs to supply the information needed to support an ecosystem-based approach.
- improved management of coastal areas, including incorporation of coastal watersheds, to achieve better pollution control, growth management, hazards mitigation, transportation planning, sediment management, and habitat conservation and restoration.
- development of a prioritized, comprehensive plan for upgrading the nation's aging and inadequate wastewater and drinking water infrastructure, including improved stormwater management.
- coordination of a national monitoring network and creation of useful products based on monitoring data.
- planning for early detection, prompt notification, and rapid response to marine invasive species.
- prevention of marine debris, in part through public outreach and education.
- management of commercial and recreational fish stocks and sustainable aquaculture operations.
- participation in a broad dialogue on the development of a coordinated offshore management regime, including the design and implementation of marine protected areas.

Another area where state input will be essential is the development of ocean observations and science to support policy decisions. States will need to communicate their information needs and priorities as part of the creation of a national strategy for basic and applied ocean science and technology, including the social science and economic research needed to understand the human dimensions and economic value of the oceans and coasts. States should also participate as full partners in the design and implementation of regional observing systems and their integration into the national Integrated Ocean Observing System.

Many of the Commission's recommendations explicitly call for the executive branch to consult with the nonfederal President's Council of Advisors on Ocean Policy and for federal entities to work closely with state and local governments. But even where it is left unstated, the importance of state input and action is assumed throughout.

The Need for Congressional Leadership

Substantial legislative action will be required to achieve a comprehensive, coordinated ocean policy. Some of the statutory changes needed include codifying a major portion of the new ocean policy framework, providing for organizational and jurisdictional restructuring within and between federal ocean agencies, and strengthening existing ocean programs and initiatives and enacting new ones. However, Congressional implementation of the cross-cutting initiatives called for by the Commission will be tested and challenged by the current organization of the committee systems in the Senate and House of Representatives. (For additional information on congressional committee jurisdictions over the range of ocean and coastal issues, see Appendix F.)

In addition to the recommendations that call for specific legislative changes, Congress will also need to supply additional funding to achieve meaningful improvement. Although a number of administrative and organizational changes can be made at little or no cost, most of the recommendations in this report—whether they call for major new initiatives or for expansion of successful existing programs—can only be implemented with financial support from Congress. Chapter 30 provides an extensive discussion of funding needs, and Appendix G provides a detailed table listing the estimated cost of every recommendation in the report. This should be helpful as a guide in the congressional appropriations process. Chapter 30 also suggests a mechanism, the Ocean Policy Trust Fund, for creating a dedicated, long-term source of support for ocean and coastal science and management.

Index to the Recommendations

The following section provides an index to all the Commission's recommendations, categorized according to the various organizations and individuals directed to take action. Each entry lists the numbers of all recommendations applicable to that entity. (As a reminder, recommendations are labeled by chapter number. For example, Recommendation 12-5 refers to the 5th recommendation in Chapter 12.) The complete text of all the recommendations, organized by chapter, follows this index.

Although each recommendation is listed below under the primary actor or actors charged with implementing it, other organizations or individuals are often tasked with providing input or helping to accomplish the objective. To see further details about implementation, and to fully understand the background and reasoning behind each recommendation, the reader should carefully examine the corresponding chapter of the report.

Recommendations to Congress

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Recommendations to the Executive Branch Leadership

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Assistant to the President (*proposed*)

Recommendations: 4-4, 7-3

National Ocean Council (*proposed*)

Recommendations:

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NOC Committee on Ocean Science, Education, Technology, and Operations (currently the National Ocean Research Leadership Council)

Recommendations: 4-7, 26-3, 27-1, 28-1, 28-4

Office on Ocean Education (Ocean.ED) (*proposed*)

Recommendations: 8-1, 8-4, 8-7, 8-8, 8-9, 8-11, 8-12, 8-16, 8-17

Office on Ocean Observing (Ocean.US)

Recommendations: 24-3, 26-2, 26-3, 26-4, 26-5, 26-7, 26-10

Office on Ocean Information (Ocean.IT) (proposed)

Recommendations: 28-1, 28-3

NOC Committee on Ocean Resource Management (proposed)

Recommendations: 4-8, 10-2, 13-2, 18-3, 20-7, 21-2

NOC International Committee (proposed)

Recommendations: 19-27, 29-3

President’s Council of Advisors on Ocean Policy (proposed)

Recommendation: 4-5

Council on Environmental Quality

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Recommendations to Federal Government Agencies

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National Oceanic and Atmospheric Administration

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National Sea Grant College Program

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Department of Defense

Army Corps of Engineers

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Federal Emergency Management Agency

Recommendation: 10–4

Department of the Interior

Recommendations: 5–2, 11–3, 17–3, 20–8, 24–2

Fish and Wildlife Service

Recommendations: 11–4, 16–7, 20–3, 20–4

Minerals Management Service

Recommendations: 16–10, 20–9, 24–3, 24–6

U.S. Geological Survey

Recommendations: 15–1, 15–3, 20–9

Department of Labor

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Department of State

Recommendations: 18–4, 18–6, 19–24, 19–25, 20–10, 21–4, 29–4, 29–5, 29–7

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Environmental Protection Agency

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National Science Foundation

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Interagency groups

Aquatic Nuisance Species Task Force and National Invasive Species Council

Recommendation: 17-5

Coral Reef Task Force

Recommendations: 21-2, 21-5

Federal Geographic Data Committee

Recommendation: 25-7

Interagency Committee for the Marine Transportation System

Recommendation: 13-2

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Recommendation: 12-4

Task Force on the Collection and Use of Hazards-related Data (proposed)

Recommendation: 10-2

Recommendations to Regional Bodies

Regional Ocean Councils *(proposed)*

Recommendations: 6–2, 6–4, 9–4, 11–2

Regional Fishery Management Councils

Recommendations: 19–3, 19–5, 19–6, 19–7, 19–15, 19–19, 19–22

Scientific and Statistical Committees

Recommendations: 19–2, 19–7

Interstate Fishery Commissions

Recommendations: 19–15, 19–22

Regional Dredging Teams

Recommendations: 12–4

Recommendations to States

As noted in the introduction to this chapter, the Commission sees a strong role for state, territorial, tribal, and local governments in implementing ocean policy. The list shown below includes only those recommendations that call for specific actions to be led by state-level actors. Many other recommendations and discussions throughout the report also emphasize the importance of state and local involvement.

Recommendations: 5–1, 5–4, 11–1, 14–2, 14–3, 14–11, 19–10, 19–15, 19–22

Recommendations Related to International Ocean Science, Policy, and Management

Recommendations:

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Complete List of Recommendations in order of Appearance in the Report

Chapter 1: Recognizing Ocean Assets and Challenges

No recommendations.

Chapter 2: Understanding the Past to Shape a New National Ocean Policy

No recommendations.

Chapter 3: Setting the Nation's Sights

No recommendations.

Chapter 4: Enhancing Ocean Leadership and Coordination

Recommendation 4-1

Congress should establish a National Ocean Council (NOC) within the Executive Office of the President, and a nonfederal President's Council of Advisors on Ocean Policy to provide enhanced federal leadership and coordination for the ocean and coasts. While Congress works to establish these components in law, the President should begin immediately to implement an integrated national ocean policy by establishing the NOC and President's Council of Advisors on Ocean Policy through an executive order, and by designating an Assistant to the President to chair the NOC.

Recommendation 4-2

The National Ocean Council (NOC) should provide high-level attention to ocean and coastal issues, develop appropriate national policies, and coordinate their implementation by the many federal departments and agencies with ocean and coastal responsibilities.

The NOC should be:

- chaired by an Assistant to the President.
- composed of cabinet secretaries of departments and directors of independent agencies with appropriate ocean- and coastal-related responsibilities. Heads of other relevant executive departments, agencies, commissions, quasi-official agencies and senior White House officials should be invited to attend meetings of the NOC when appropriate.

The NOC should carry out the following functions:

- develop broad principles (based on those outlined in Chapter 3) and national goals for governance of the nation's oceans and coasts, and periodically review and revise these goals.
- make recommendations to the President on developing and carrying out national ocean policy, including domestic implementation of international ocean agreements.
- coordinate and integrate activities of ocean-related federal agencies and provide incentives for meeting national goals.
- identify statutory and regulatory redundancies or omissions and develop strategies to resolve conflicts, fill gaps, and address new and emerging ocean issues for national and regional benefits.
- guide the effective use of science in ocean policy and ensure the availability of data and information for decision making at national and regional levels.
- develop and support partnerships among government agencies and nongovernmental organizations, the private sector, academia, and the public.

- expand education and outreach efforts by federal ocean and coastal agencies.
- work with a broad range of nonfederal stakeholders, governmental and nongovernmental, to develop a broad, flexible, and voluntary process for the establishment of regional ocean councils to help advance regional approaches.
- periodically assess the state of the nation's oceans and coasts to measure the achievement of national ocean goals.

Recommendation 4-3

The National Ocean Council (NOC) should adopt the principle of ecosystem-based management and assist federal agencies in moving toward an ecosystem-based management approach.

As part of this effort, the NOC should:

- coordinate the development of procedures for the practical application of the precautionary approach and adaptive management.
- encourage agencies to incorporate preservation of marine biodiversity in their management programs and support further study of biodiversity.

Recommendation 4-4

The President should designate an Assistant to the President to provide leadership and support for national ocean and coastal policy.

The Assistant to the President should have the following responsibilities:

- chair the NOC.
- co-chair the President's Council of Advisors on Ocean Policy.
- lead NOC efforts to coordinate federal agency actions related to oceans and coasts.
- make recommendations for federal agency reorganization as needed to improve ocean and coastal management.
- resolve interagency policy disputes on ocean and coastal issues.
- reach out to state, territorial, tribal, and local stakeholders and promote regional approaches to ocean and coastal management.
- consult with the Office of Management and Budget (OMB) director and NOC members to identify programs that contribute significantly to the national policy for oceans and coasts, advise OMB and the agencies on appropriate funding levels for ocean- and coastal-related activities, and prepare the biennial reports mandated by section 5 of the Oceans Act of 2000.

Recommendation 4-5

The President's Council of Advisors on Ocean Policy, a formal structure for input from nonfederal individuals and organizations, should advise the President on ocean and coastal policy matters.

The President's Council of Advisors on Ocean Policy should be:

- composed of a representative selection of individuals appointed by the President, including governors of coastal states and other appropriate state, territorial, tribal and local government representatives, plus individuals from the private sector, research and education communities, nongovernmental organizations, watershed organizations, and other nonfederal bodies with ocean interests.
- comprised of members knowledgeable about and experienced in ocean and coastal issues.
- co-chaired by the chair of the National Ocean Council and a nonfederal member.

Recommendation 4–6

Congress should establish an Office of Ocean Policy to support the Assistant to the President, the National Ocean Council (NOC), and the President’s Council of Advisors on Ocean Policy. To provide staff support immediately, the President should establish an Office of Ocean Policy through the executive order creating the NOC and the President’s Council of Advisors on Ocean Policy.

The Office of Ocean Policy should be:

- composed of a small staff that reports to the Assistant to the President.
- managed by an executive director responsible for daily staff activities.

Recommendation 4–7

Congress, working with the National Ocean Council (NOC), should amend the National Oceanographic Partnership Act to integrate ocean observing, operations, and education into its marine research mission. A strengthened and enhanced National Ocean Research Leadership Council (NORLC) should be redesignated as the Committee on Ocean Science, Education, Technology, and Operations (COSETO), under the oversight of the NOC.

In particular, amendments to the National Oceanographic Partnership Act should specify that the newly-named COSETO:

- reports to the NOC.
- is chaired by the director of the Office of Science and Technology Policy to ensure appropriate links to government-wide science and technology policy and equity among participating federal agencies.
- includes in its mandate coordination and planning of federal marine facilities and operations, federal oversight of the Integrated Ocean Observing System, and coordination of ocean-related education efforts, in addition to its existing research responsibilities.
- includes existing NORLC members plus the director of the National Institute of Environmental Health Sciences at the National Institutes of Health, the assistant secretary for Natural Resources and Environment at the Department of Agriculture, and the undersecretary for science at the Smithsonian Institution.
- subsumes the current tasks of the National Science and Technology Council’s Joint Subcommittee on Oceans.
- is supported by the Office of Ocean Policy.

Recommendation 4–8

The National Ocean Council (NOC) should establish a Committee on Ocean Resource Management to better integrate the resource management activities of ocean-related agencies. This committee should oversee and coordinate the work of existing ocean and coastal interagency groups and less formal efforts, recommend the creation of new topical task forces as needed, and coordinate with government-wide environmental and natural resource efforts that have important ocean components.

The Committee on Ocean Resource Management should:

- be chaired by the chair of the Council on Environmental Quality to ensure appropriate links to government-wide environmental policy and equity among participating federal agencies.
- include undersecretaries and assistant secretaries of departments and agencies that are members of the NOC.
- report to the NOC.
- be supported by the Office of Ocean Policy.

Recommendation 4–9

The National Ocean Council (NOC) should review all existing ocean-related councils and commissions and make recommendations about their ongoing utility, reporting structure, and connections to the NOC.

Chapter 5: Advancing a Regional Approach

Recommendation 5-1

The National Ocean Council should work with Congress, the President's Council of Advisors on Ocean Policy, and state, territorial, tribal, and local leaders, including representatives from the private sector, nongovernmental organizations, and academia, to develop a flexible and voluntary process for the creation of regional ocean councils. States, working with relevant stakeholders, should use this process to establish regional ocean councils, with support from the National Ocean Council.

Recommendation 5-2

The President, through an executive order, should direct all federal agencies with ocean- and coastal-related functions to immediately improve their regional coordination and increase their outreach efforts to regional stakeholders.

To initiate this process, NOAA, EPA, USACE, DOI, and USDA should:

- collaborate with regional, state, territorial, tribal, and local governments, and nongovernmental parties to identify regional priorities and information needs.
- identify inconsistencies in agency mandates, policies, regulations, practices, or funding that prevent regional issues from being effectively addressed and communicate these to the National Ocean Council.
- improve coordination and communication among agencies, including the possible development of interagency protocols to guide regional decision making.
- coordinate funding and grants in a manner consistent with regional priorities.

Recommendation 5-3

The President should form a task force of federal resource management agencies to develop a proposal for adoption and implementation of common federal regional boundaries. The task force should solicit input from state, territorial, tribal, and local representatives.

Recommendation 5-4

Pending the creation of a regional ocean council, the governors in each region should select a suitable entity to operate a regional ocean information program that carries out research, data collection, information product development, and outreach based on the needs and priorities of ocean and coastal decision makers.

The entity assigned to carry out the regional ocean information program should:

- include representation from federal agencies, state, territorial, tribal, and local decision makers, scientists, as well as experts in information exchange and outreach.
- communicate regional research and information priorities to federal agencies and others with ocean and coastal responsibilities to help guide their programs.
- maintain strong links with the regional ocean observing systems to help them fulfill regional data collection requirements while adhering to national Integrated Ocean Observing System requirements.

Recommendation 5-5

The National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA), working with other appropriate federal and regional entities, should coordinate the development of regional ecosystem assessments, to be updated periodically.

As part of this process, NOAA and EPA should:

- incorporate data and information developed at the state and local levels, including resource assessments developed by state coastal management programs.
- coordinate with the organization responsible for improving regional ocean information collection and dissemination activities to make optimum use of regional information.
- collaborate closely with regional ocean councils.

Recommendation 5–6

The Council on Environmental Quality should revise its National Environmental Policy Act guidelines to state that environmental impact statements for proposed ocean- and coastal-related activities should incorporate the regional ecosystem assessments called for in Recommendation 5–5.

Chapter 6: Coordinating Management in Federal Waters

Recommendation 6–1

The National Ocean Council should ensure that each current and emerging activity in federal waters is administered by a lead federal agency and make recommendations for Congressional action where needed. The lead agency should coordinate with other applicable authorities and should ensure full consideration of the public interest.

Recommendation 6–2

Congress, working with the National Ocean Council (NOC) and regional ocean councils, should establish a balanced, ecosystem-based offshore management regime that sets forth guiding principles for the coordination of offshore activities, including a policy that requires a reasonable portion of the resource rent derived from such activities to be returned to the public. In developing an offshore management regime, Congress, the NOC, and regional ocean councils should:

- adopt as guiding principles those set forth by the Commission.
- recognize the need, where appropriate, for comprehensive, single-purpose ocean governance structures, which would be based on the guiding principles of the new regime and integrated with other uses.
- include a process for addressing new and emerging activities.

Recommendation 6–3

The National Ocean Council should develop national goals and guidelines leading to a uniform process for the effective design, implementation, and evaluation of marine protected areas.

The process should include the following:

- marine protected area designations that are based on the best available science to ensure that an area is appropriate for its intended purpose.
- periodic assessment, monitoring, and modification to ensure continuing ecological and socioeconomic effectiveness of marine protected areas.
- design and implementation that consider issues of national importance, such as freedom of navigation, and are conducted in the context of an ecosystem-based comprehensive offshore management regime.

Recommendation 6–4

To create effective and enforceable marine protected areas, regional ocean councils and appropriate federal, regional, state, and local entities should work together on marine protected area design, implementation, and evaluation. Planners should follow the process developed by the National Ocean Council, actively soliciting stakeholder input and participation.

Chapter 7: Strengthening the Federal Agency Structure

Recommendation 7-1

Congress should establish an organic act for the National Oceanic and Atmospheric Administration (NOAA) that codifies its existence and mission. The act should ensure that NOAA's structure is consistent with the principles of ecosystem-based management and with its three primary functions of: assessment, prediction, and operations; management; and research and education.

Specifically, NOAA's structure should support its role in:

- assessment, prediction, and operations for ocean, coastal, and atmospheric environments, including mapping and charting, satellite-based and in situ data collection, implementation of the Integrated Ocean Observing System, broadly based data information systems, and weather services and products.
- management of ocean and coastal areas and living and nonliving marine resources, including fisheries, ocean and coastal areas, vulnerable species and habitats, and protection from pollution and invasive species.
- research and education on all aspects of marine resources, including a focus on the importance of research and development, the use of scientifically valid technical data throughout the agency and with external partners, and promotion of educational activities across the agency and with the public.

Recommendation 7-2

The Office of Management and Budget (OMB), at the instruction of the President, should review the National Oceanic and Atmospheric Administration budget within OMB's Natural Resources Programs, along with the budgets of the U.S. Departments of Agriculture, Energy, and the Interior, the U.S. Environmental Protection Agency, the National Science Foundation, the National Aeronautics and Space Administration, and the U.S. Army Corps of Engineers' Directorate of Civil Works.

Recommendation 7-3

The Assistant to the President, with advice from the National Ocean Council and the President's Council of Advisors on Ocean Policy, should review federal ocean, coastal, and atmospheric programs, and recommend opportunities for consolidation of similar functions.

Recommendation 7-4

Congress should authorize the President to propose structural reorganization of federal departments and agencies, subject to Congressional approval.

In particular, such legislation should:

- preclude Congress from amending the President's proposal.
- require Congress to vote on the President's proposal within a specified time period after submission of the plan by the President.

Recommendation 7-5

Following establishment of the National Ocean Council and the President's Council of Advisors on Ocean Policy, strengthening of the National Oceanic and Atmospheric Administration, and consolidation of similar federal ocean and coastal programs, the President should propose to Congress a reorganization of the federal government that recognizes the links among all the resources of the sea, land, and air, and establishes a structure for more unified, ecosystem-based management of natural resources.

Chapter 8: Promoting Lifelong Ocean Education

Recommendation 8-1

Congress should amend the National Oceanographic Partnership Act to add a national ocean education office (Ocean.ED) with responsibility for strengthening ocean-related education and coordinating federal education efforts.

In particular, Ocean.ED should:

- develop a national strategy for enhancing educational achievement in natural and social sciences and increasing ocean awareness, including promotion of programs that transcend the traditional mission boundaries of individual agencies.
- develop a medium-term (five-year) national plan for ocean-related K–12 and informal education, working with federal, state, and nongovernmental education entities.
- coordinate and integrate all federal ocean-related education activities and investments.
- establish links among federal efforts, state and local education authorities, informal education facilities and programs, institutions of higher learning, and private-sector education initiatives, and strengthen existing partnerships.
- report to the National Ocean Council’s Committee on Ocean Science, Education, Technology, and Operations.

Recommendation 8-2

Congress should provide funding for Ocean.ED operations and program implementation as a line item in the National Oceanic and Atmospheric Administration (NOAA) budget, to be spent at the direction of the National Ocean Council (NOC). NOAA should develop a streamlined process for distributing Ocean.ED funds to other federal and nonfederal entities based on the NOC-approved plan.

Recommendation 8-3

The National Oceanic and Atmospheric Administration, National Science Foundation, Office of Naval Research, and National Aeronautics and Space Administration should strengthen their support of both formal and informal ocean-related education, including appropriate evaluations of these efforts.

In particular, these agencies should:

- develop, with assistance from Ocean.ED, a cooperative system of dedicated, sustained, multi-agency funding for formal and informal ocean education. This funding should be explicitly linked to the national ocean education plan.
- provide support for development and implementation of ocean-related education materials and activities with a requirement that evaluation mechanisms be included as a component of every program.

Recommendation 8-4

Ocean.ED should develop a framework for evaluating the effectiveness of ocean-related education programs, ocean-based K–12 professional development programs, best practices for incorporating ocean-based examples into K–12 education, and public education programs.

Recommendation 8-5

The National Ocean Council (NOC), working with the National Science Foundation, should place the Centers for Ocean Sciences Education Excellence (COSEE) within the NOC structure as a program to be organized and overseen through Ocean.ED. The NOC should also work to expand the COSEE program.

Expansion of COSEE should include:

- tripling the number of regional centers to twenty-one, with each center receiving at least \$1.5 million a year for an initial five year period.

- expanding the reach of each center beyond its immediate participants.
- identifying models for successful partnerships between scientists and K–12 teachers.
- devising strategies to incorporate the expertise of university science education specialists.
- implementing professional development programs for K–12 teachers and university research professors.

Recommendation 8–6

The National Sea Grant College Program should increase the proportion of its resources dedicated to ocean and coastal education.

Recommendation 8–7

Ocean.ED, working with state and local education authorities and the research community, should coordinate the development and adoption of ocean-related materials and examples that meet existing education standards.

Specifically, Ocean.ED should:

- assess existing ocean-based curricula offerings, highlighting exemplary materials that are aligned with national standards.
- promote the creation of companion materials to the National Science Education Standards that are based on ocean data and research findings (including social and economic fields).
- disseminate ocean-based examples and assessment questions that link to the concept standards in physical and life sciences, geography, history, and other topics and that demonstrate the value of oceans in teaching fundamental concepts.
- promote the development of case studies that stress the interconnected nature of the ocean, land, and atmosphere.

Recommendation 8–8

Ocean.ED, working with academic institutions and local school districts, should help establish more effective relationships between the research and education communities to expand professional development opportunities for teachers and teacher educators.

Specifically, Ocean.ED should:

- provide supplemental grants and other rewards to scientists who partner with teachers and teacher educators to include educational components in their research projects.
- establish a grants program for development and implementation of an enhanced core curriculum in science content that incorporates ocean concepts for pre-service teachers. Applicants should be required to demonstrate collaborations and partnerships among education, science, mathematics, and engineering faculty.

Recommendation 8–9

Ocean.ED should promote partnerships among government agencies, school districts, institutions of higher learning, aquariums, science centers, museums, and private marine laboratories to develop more opportunities for students to explore the marine environment, both through virtual means and hands-on field, laboratory, and at-sea experiences.

Ocean.ED should ensure that programs for students:

- include a broad range of options, from in-school modules, to accessible after-school activities, daylong field trips, and summer programs.
- acknowledge cultural differences and other aspects of human diversity to expose students and teachers from all cultures and backgrounds to ocean issues.

Recommendation 8–10

The National Oceanic and Atmospheric Administration, National Science Foundation, and Office of Naval Research should support colleges and universities in promoting introductory ocean and coastal science and engineering courses to expose a wider cross-section of students, including non-science majors, to these subjects.

These agencies should support this effort by:

- providing small grants to assist in course development, equipment purchases, faculty support, and field experiences.
- fostering collaborations between institutions with graduate ocean programs and others with a primarily undergraduate population.

Recommendation 8–11

Ocean.ED should guide and promote the development of the nation's ocean-related workforce. In particular, Ocean.ED should:

- promote student support, diversified educational opportunities, and investment in innovative approaches to graduate education that prepare students for a broad range of careers.
- encourage, with targeted federal support, graduate departments of ocean sciences and engineering to experiment with new or redesigned programs that emphasize cross-disciplinary courses of study.
- set targets for federal stipends for ocean-related education to be competitive with other disciplines.

Recommendation 8–12

The National Oceanic and Atmospheric Administration and the U.S. Department of Labor should establish a national ocean workforce database and compile an annual report for the National Ocean Council on trends in ocean-related human resource development and needs. This effort should include an information clearinghouse to facilitate career decisions, provide access to career guidance, and enable employers, guidance counselors, and others to develop effective strategies to attract students to ocean-related careers. Ocean.ED should organize an ocean workforce summit every five years to address the alignment of ocean education with workforce needs.

Recommendation 8–13

The National Oceanic and Atmospheric Administration (NOAA) should establish a national ocean education and training program, patterned after the National Institutes of Health model, within its Office of Education and Sustainable Development to provide diverse and innovative ocean-related education opportunities at the undergraduate, graduate, and post-doctoral levels.

Specifically, NOAA should:

- offer students at the undergraduate level experiential learning opportunities in a range of marine fields through summer internships or similar mechanisms.
- support fellowships and traineeships at the graduate and postdoctoral levels that emphasize interdisciplinary approaches and real-world experiences outside the university setting, especially in areas critical to the agency's mission.
- support professorships in fields of particular interest to NOAA.

Recommendation 8–14

The National Science Foundation's Directorates for Geosciences, Biological Sciences, and Education and Human Resources should develop cooperative programs to provide diverse, multidisciplinary educational opportunities at the undergraduate, graduate, and postdoctoral levels in a range of ocean-related fields.

Recommendation 8–15

The Office of Naval Research (ONR) should reinvigorate its support of graduate education in ocean sciences and engineering. This could be accomplished, in part, by increasing the number of ocean-related awards made under ONR’s National Defense Science and Engineering Graduate Fellowship Program.

Recommendation 8–16

The National Oceanic and Atmospheric Administration, National Science Foundation, Office of Naval Research, and National Aeronautics and Space Administration should encourage increased participation of traditionally underrepresented and underserved groups in the ocean-related workforce. Ocean.ED should coordinate among these agencies and institutions of higher learning. Specifically, Ocean.ED should:

- ensure that the appropriate mix of programs and opportunities exists to provide underrepresented and underserved groups ample access to and support for pursuing ocean-related graduate education, including opportunities at Minority Serving Institutions and other universities and oceanographic institutions.
- ensure that programs are established through a competitive process and evaluated for performance on an annual basis.

Recommendation 8–17

Ocean.ED, working with other appropriate entities, should promote existing mechanisms and establish new approaches for developing and delivering relevant, accessible information and outreach programs that enhance community education.

In particular, Ocean.ED should:

- work with ocean-related informal education initiatives to better engage underrepresented and underserved populations and communities by using mechanisms, materials, and language familiar to and accepted by them.
- work with informal education facilities to develop the capacity to quickly prepare and deliver new science-based materials and programs to the public and the media to capture immediate interest in noteworthy advances in ocean science.
- engage industry, the commercial sector, and the media in community education and stewardship programs.

Chapter 9: Managing Coasts and their Watersheds

Recommendation 9–1

Congress should reauthorize the Coastal Zone Management Act (CZMA) to strengthen the planning and coordination capabilities of coastal states and enable them to incorporate a coastal watershed focus and more effectively manage growth. Amendments should include requirements for resource assessments, the development of measurable goals and performance measures, improved program evaluations, incentives for good performance and disincentives for inaction, and expanded boundaries that include coastal watersheds.

Specifically, CZMA amendments should address the following issues:

- **resource assessments**—State coastal management programs should provide for comprehensive periodic assessments of the state’s natural, cultural, and economic coastal resources. These assessments will be critical in the development of broader regional ecosystem assessments, as recommended in Chapter 5.
- **goals**—State coastal management programs should develop measurable goals based on coastal resource assessments that are consistent with national and regional goals. State coastal programs should work with local governments, watershed groups, nongovernmental organizations, and other regional entities, including regional ocean councils, to develop these goals.

- **performance measures**—State coastal management programs should develop performance measures to monitor their progress toward achieving national, regional, and state goals.
- **evaluations**—State coastal management programs should continue to undergo periodic performance evaluations by the National Oceanic and Atmospheric Administration. In addition to the existing evaluation criteria, the performance measures developed by state programs should also be reviewed. The public, representatives of watershed groups, and applicable federal program representatives should participate in these program evaluations.
- **incentives**—Existing incentives for state participation—federal funding and federal consistency authority—should remain, but a substantial portion of the federal funding received by each state should be based on performance. Incentives should be offered to reward exceptional accomplishments, and disincentives should be applied to state coastal management programs that are not making satisfactory progress in achieving program goals.
- **boundaries**—Coastal states should extend the landward side of their coastal zone boundaries to encompass coastal watersheds. Mechanisms should also be established for coordinating with watershed management groups outside of a state’s designated coastal zone boundary.

Recommendation 9–2

Congress should consolidate area-based coastal management programs in a strengthened National Oceanic and Atmospheric Administration (NOAA), capitalizing on the strengths of each program. At a minimum, this should include bringing together the Coastal Zone Management and National Marine Sanctuary programs and the National Estuarine Research Reserve System, currently administered by NOAA, and additional coastal programs administered by other agencies, including the National Estuary Program, the John H. Chafee Coastal Barrier Resources System, and the U.S. Fish and Wildlife Service Coastal Program.

Recommendation 9–3

The National Ocean Council should recommend changes to federal funding and infrastructure programs to discourage inappropriate growth in fragile or hazard-prone coastal areas and ensure consistency with national, regional, and state goals aimed at achieving economically and environmentally sustainable development.

Recommendation 9–4

Congress should amend the Coastal Zone Management Act, Clean Water Act, and other federal laws, where appropriate, to provide better financial, technical, and institutional support for watershed management initiatives. The National Ocean Council and regional ocean councils should enhance support for coastal watershed initiatives by coordinating agency programs, technical assistance, and funding and by overseeing development of an accessible clearing-house of information on watershed best management practices.

Chapter 10: Guarding People and Property against Natural Hazards

Recommendation 10–1

The U.S. Army Corps of Engineers’ Civil Works Program, with guidance from the National Ocean Council, should ensure valid, peer-reviewed cost-benefit analyses of coastal projects, provide greater transparency to the public, enforce requirements for mitigating the impacts of coastal projects, and coordinate such projects with broader coastal planning efforts.

Recommendation 10–2

The National Ocean Council should establish a task force of appropriate federal agencies and state and local governments, with the Federal Emergency Management Agency in the lead, to improve the collection and use of hazards-related data.

Under the oversight of the NOC’s Committee on Ocean Resource Management, the hazards-related data task force should develop a coordinated effort that includes the following functions:

- systematic collection, storage, analysis, and dissemination of data on post-disaster losses and the cost of mitigation efforts.
- development and transmittal to communities of the information and tools they need to understand the risks of hazards to their residents and their social, physical, economic, and environmental infrastructures.
- cooperation with the Federal Geographic Data Committee and state and local governments to achieve comprehensive, digitized, georeferenced mapping and identification of all natural hazards.
- development of adequate funding proposals for the National Flood Insurance Program map modernization initiative, including a high-priority effort to update maps for high-risk coastal communities.

Recommendation 10–3

The National Ocean Council should recommend changes in the National Flood Insurance Program (NFIP) to reduce incentives for development in high-hazard areas.

Specifically, NFIP changes should:

- establish clear disincentives to building or rebuilding in coastal high-hazard zones by requiring property owners at risk of erosion to pay actuarially sound rates for insurance.
- enforce measures that reduce vulnerability to natural hazards, including assistance in retrofitting older structures and buyout programs for susceptible structures with repetitive-loss histories.
- create enforceable mechanisms to direct development away from undeveloped floodplains and erosion zones.

Recommendation 10–4

The Federal Emergency Management Agency (FEMA) should enhance technical assistance to state and local governments for developing or improving their hazard mitigation plans. The National Ocean Council should identify opportunities for conditioning federal hazards-related financial and infrastructure support on completion of FEMA-approved state and local hazards mitigation plans.

Chapter 11: Conserving and Restoring Coastal Habitat

Recommendation 11–1

Congress should amend the Coastal Zone Management Act to create a dedicated funding program for coastal and estuarine land conservation. In addition, a larger share of U.S. Department of Agriculture and other federal agency conservation programs should be directed to coastal and estuarine lands. To guide these programs, each state should identify priority coastal habitats and develop a plan for establishing partnerships among willing landowners for conservation purposes, with participation from federal agency, local government, nongovernmental, and private-sector partners.

Recommendation 11–2

The regional ocean councils, working with state coastal management programs and other governmental and nongovernmental entities, should assess regional needs and set goals and priorities for ocean and coastal habitat conservation and restoration efforts that are consistent with state and local goals. The National Ocean Council should develop national goals that are consistent with regional, state, and local goals, and should ensure coordination among all related federal activities.

Recommendation 11–3

The U.S. Department of the Interior, National Oceanic and Atmospheric Administration, U.S. Department of Agriculture, and U.S. Army Corps of Engineers should enhance their restoration science, monitoring, and assessment activities. Congress should amend relevant legislation to allow greater discretion in using a portion of federal habitat conservation and restoration funds for related research, monitoring, and assessments.

Recommendation 11–4

The U.S. Fish and Wildlife Service should complete, digitize, and periodically update the National Wetlands Inventory.

Recommendation 11–5

The National Ocean Council should coordinate development of a comprehensive wetlands protection framework that is linked to coastal habitat and watershed management efforts, and should make specific recommendations for the integration of the Clean Water Act Section 404 wetlands permitting process into that broader management approach.

Chapter 12: Managing Sediment and Shorelines

Recommendation 12–1

The National Ocean Council should develop a national strategy for managing sediment on a regional basis. The strategy should incorporate ecosystem-based principles, balancing ecological and economic considerations.

In addition, the strategy should:

- acknowledge adverse impacts on marine environments due to urban development, agriculture, dams, dredging, pollutant discharges, and other activities that affect sediment flows or quality.
- ensure involvement of port managers, coastal planners, land use planners, and other stakeholders in watershed planning.
- emphasize watershed management as a tool to address upstream land uses that affect sediment input to rivers and coastal waters.

Recommendation 12–2

Congress should direct the U.S. Army Corps of Engineers (USACE) to adopt regional and ecosystem-based management approaches in carrying out all of its sediment-related civil works missions and should modify USACE authorities and processes as necessary to achieve this goal.

Recommendation 12–3

The U.S. Army Corps of Engineers should ensure that its selection of the least-cost disposal option for dredging projects reflects a more accurate accounting of the full range of economic, environmental, and other relevant costs and benefits for options that reuse dredged material, as well as for other disposal methods.

Recommendation 12–4

The National Dredging Team should ensure vigorous and sustained implementation of the recommendations contained in its *Dredged Material Management: Action Agenda for the Next Decade*, moving toward more ecosystem-based approaches. Regional dredging teams, working with regional ocean councils, should establish sediment management programs that expand beyond single watersheds to larger regional ecosystems.

Recommendation 12–5

The U.S. Army Corps of Engineers, working with U.S. Department of the Interior agencies, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency, in consultation with state and local governments, should develop and implement a strategy for improved assessments, monitoring, research, and technology development to enhance sediment management.

Recommendation 12–6

Congress should modify its current authorization and funding processes to require the U.S. Army Corps of Engineers (USACE), or an appropriate third party, to monitor outcomes from past USACE projects and assess the cumulative, regional impacts of USACE activities within coastal watersheds and ecosystems. Such assessments should be peer-reviewed consistent with recommendations from the National Research Council.

Recommendation 12–7

The U.S. Environmental Protection Agency, working with other appropriate entities, including state and local governments, should build upon EPA's 2002 draft contaminated sediments science plan to develop and conduct coordinated strategies for assessment, monitoring, and research to better understand how contaminated sediment is created and transported. The strategies should also develop technologies for better prevention, safer dredging or onsite treatment, and more effective post-recovery treatment of contaminated dredged material.

Chapter 13: Supporting Marine Commerce and Transportation

Recommendation 13–1

Congress should designate the U.S. Department of Transportation (DOT) as the lead federal agency for planning and oversight of the marine transportation system and DOT should submit regular reports to Congress on the condition and future needs of the system. The National Ocean Council should identify overlapping functions in other federal agencies and make recommendations concerning the advisability of transferring those functions to DOT.

Recommendation 13–2

Congress should codify the Interagency Committee for the Marine Transportation System and place it under the oversight of the National Ocean Council (NOC).

Under the oversight of the NOC's Committee on Ocean Resource Management, the Interagency Committee for the Marine Transportation System should:

- be chaired by the U.S. Department of Transportation.
- improve coordination among all participants in the U.S. marine transportation system.
- promote the integration of marine transportation with other modes of transportation and with other ocean and coastal uses and activities.
- recommend strategies and plans for: better informing the public of the importance of marine commerce and transportation; devising alternate funding scenarios to meet short- and long-term demands on the marine transportation system; matching federal revenues derived from marine transportation with funding needs to maintain and improve the system; and delineating short- and long-term priorities.

Recommendation 13–3

The U.S. Department of Transportation should draft a new national freight transportation strategy to support continued growth of the nation's economy and international and domestic trade. This strategy should improve the links between the marine transportation system and other components of the transportation infrastructure, including highways, railways, and airports. Based on the new strategy, investments of national transportation funds should be directed toward planning and implementation of intermodal projects of national significance.

Recommendation 13–4

The U.S. Department of Transportation should conduct a thorough analysis and assessment of the potential societal and economic benefits of increased short sea shipping.

Recommendation 13–5

The U.S. Department of Transportation (DOT), working with other appropriate entities, should establish a national data collection, research, and analysis program to provide a comprehensive picture of freight flows in the United States and to enhance the performance of the nation's intermodal transportation system. DOT should periodically assess and prioritize the nation's future needs for ports and intermodal transportation capacity to fulfill the needs of the nation's expected future growth in marine commerce.

The freight information collection program should include:

- economic models that project trade and traffic growth and determine the impacts of growth on U.S. ports and waterways and the inland infrastructures connected to them.
- models and guides to identify bottlenecks and capacity shortfalls.
- consistent, nationally accepted definitions and protocols for measuring capacity.
- innovative trade and transportation data collection technology and research to fill critical data gaps.
- assessment of the social and economic ramifications of marine transportation investments as compared to other transportation investments.

Recommendation 13–6

The U.S. Department of Transportation (DOT) should incorporate emergency preparedness requirements in developing a national freight transportation strategy. Because this will require input from many agencies and stakeholders, DOT should work closely with the U.S. Department of Homeland Security, Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency, ports, and marine industries.

Emergency preparedness planning should focus on:

- prevention of threats to national security and port operations.
- response and recovery practices, including assessments of available resources such as salvage and harbor clearance capacity and alternative port capacity.
- technological requirements for security screening, cargo movement and tracking, and traffic management.
- research and development needs related to innovative technologies that can minimize interruptions and security risks to port operations.
- identification of resources needed to implement prevention, response and recovery strategies for the nation's ports.

Chapter 14: Addressing Coastal Water Pollution

Recommendation 14–1

The U.S. Environmental Protection Agency (EPA), working with states, should require advanced nutrient removal for wastewater treatment plant discharges that contribute to degradation of nutrient-impaired waters as needed to attain water quality standards. EPA should also determine the extent of the impact of chemicals in wastewater from residential and industrial sources, including pharmaceuticals.

In particular, EPA should:

- support research and demonstration projects for biological nutrient removal and other innovative advanced treatment processes to eliminate nitrogen and phosphorus from wastewater discharges.
- ensure that information about innovative advanced treatment processes and technologies is widely disseminated.
- support development of technologies to reduce concentrations of pharmaceuticals, personal care product ingredients, and other biologically active contaminants in wastewater treatment plant discharges.

Recommendation 14–2

The U.S. Environmental Protection Agency (EPA), working with states, should increase technical and financial assistance to help communities improve the permitting, design, installation, operation, and maintenance of septic systems and other on-site treatment facilities. State and local governments, with assistance from EPA, should adopt and enforce more effective building codes and zoning ordinances for septic systems and should improve public education about the benefits of regular maintenance.

Recommendation 14–3

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) should support research on the removal of nutrients from animal wastes that may pollute water bodies and on the impact of pharmaceuticals and other contaminants on water quality. EPA and USDA should also develop improved best management practices that retain nutrients and pathogens from animal waste on agricultural lands. Where necessary to meet water quality standards, states should issue regulatory controls on concentrated animal feeding operations in addition to those required by EPA.

Recommendation 14–4

The U.S. Environmental Protection Agency (EPA), working with state and local governments and other stakeholders, should develop and periodically review a comprehensive long-term plan to maintain and upgrade the nation’s aging and inadequate wastewater and drinking water infrastructure, anticipating demands for increased capacity to serve growing populations, correction of sewer overflows, and more stringent treatment in the coming decades. To implement this plan, Congress should significantly increase the Clean Water and Drinking Water State Revolving Funds.

Recommendation 14–5

The U.S. Environmental Protection Agency, working with states, should experiment with tradable credits for nutrients and sediment as a water pollution management tool and evaluate the ongoing effectiveness of such programs in reducing water pollution.

Recommendation 14–6

The U.S. Environmental Protection Agency, working with states, should modernize the National Pollutant Discharge Elimination System’s monitoring and information management system and strengthen the program’s enforcement to achieve greater compliance with permits.

Recommendation 14–7

The U.S. Department of Agriculture (USDA) should align its conservation programs and funding with other programs aimed at reducing nonpoint source pollution, such as those of the U.S. Environmental Protection Agency and the National Oceanic and Atmospheric Administration. In particular, USDA's Natural Resources Conservation Service should:

- require that its state conservationists coordinate with representatives of federal and state water quality agencies and state coastal management agencies, and participate in watershed and coastal management planning processes, to ensure that funding for agricultural conservation programs complements and advances other federal and state management programs.
- provide enhanced technical assistance in the field to better support growing agricultural conservation programs.

Recommendation 14–8

The National Ocean Council (NOC), working with states, should establish reduction of nonpoint source pollution in coastal watersheds as a national goal, with a particular focus on impaired watersheds. The NOC should then set specific, measurable objectives to meet human health- and ecosystem-based water quality standards. The NOC should ensure that all federal nonpoint source pollution programs are coordinated to attain those objectives.

Recommendation 14–9

The National Ocean Council should strengthen efforts to address nonpoint source pollution by evaluating the nonpoint source pollution control programs established under Section 6217 of the Coastal Zone Act Reauthorization Amendments and under Section 319 of the Clean Water Act and making recommendations to Congress for improvements to these programs, including their possible consolidation.

Improvements to the programs should:

- require enforceable best management practices and other management measures throughout the United States, with increased federal support for states to develop and implement those practices and measures.
- eliminate counterproductive financial disincentives.
- enhance cooperation and coordination between federal and state water quality and coastal management agencies.

Recommendation 14–10

To ensure protection of coastal resources nationwide, Congress should provide authority under the Clean Water Act and other applicable laws for federal agencies to establish enforceable management measures for nonpoint sources of pollution and impose financial disincentives related to programs that result in water quality degradation if a state persistently fails to make meaningful progress toward meeting water quality standards on its own.

Recommendation 14–11

The U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, and other appropriate entities should increase assistance and outreach to provide decision makers with the knowledge and tools needed to make sound land use decisions that protect coastal water quality. State and local governments should adopt or revise existing codes and ordinances to require land use planning and decision making to carefully consider the individual and cumulative impacts of development on water quality, including effects on stormwater runoff.

Recommendation 14–12

The U.S. Environmental Protection Agency (EPA), working with state and local governments, should strengthen implementation of the National Pollutant Discharge Elimination System Phase I and II stormwater programs.

Improvements should include:

- local codes or ordinances that are designed to achieve the management goals for a particular watershed and require use of EPA-approved best management practices.
- monitoring to determine whether goals and state water quality standards are being met and to identify ongoing problems.
- an adaptive management approach to ensure that efforts are effective and that best management practices are modified as needed.
- improved public education.
- increased enforcement of legal requirements and personnel sufficient to implement stormwater management programs.

Recommendation 14–13

The U.S. Environmental Protection Agency, working with states, should develop and implement national and regional strategies to reduce the sources and impacts of atmospheric deposition to water bodies, building upon plans such as the EPA Air-Water Interface Work Plan.

Recommendation 14–14

The United States should work with other nations to develop and implement international solutions to better address the sources and impacts of transboundary atmospheric deposition, and to initiate needed research programs.

Chapter 15: Creating a National Monitoring Network

Recommendation 15–1

The National Oceanic and Atmospheric Administration, U.S. Geological Survey, and U.S. Environmental Protection Agency, working with states and other appropriate entities, should develop a national monitoring network that coordinates and expands existing efforts, including monitoring of atmospheric deposition. The network should be built on a federally funded backbone of critical stations and measurements to assess long-term trends and conditions, with additional stations or measurements as needed to address regional characteristics or problems.

Recommendation 15–2

The National Oceanic and Atmospheric Administration should ensure that the national monitoring network includes adequate coverage in both coastal areas and the upland areas that affect them, and that the network is linked to the Integrated Ocean Observing System, to be incorporated eventually into a comprehensive Earth observing system.

Recommendation 15–3

The National Oceanic and Atmospheric Administration, U.S. Geological Survey, and U.S. Environmental Protection Agency, working with states and other appropriate entities, should ensure that the national monitoring network has clear goals, specifies core variables and an appropriate sampling framework, and is periodically reviewed and updated. These agencies should also work with the regional ocean information programs to determine regional and local information needs.

Specifically, the national monitoring network should include the following elements:

- clearly defined goals that fulfill user needs and provide measures of management success.
- a core set of variables to be measured at all sites, with regional flexibility to measure additional variables where needed.

- an overall system design that determines where, how, and when to monitor and includes a mix of time and space scales, probabilistic and fixed stations, and stressor- and effects-oriented measurements.
- technical coordination that establishes standard procedures and techniques.
- periodic review of the monitoring network, with modifications as necessary to ensure that useful goals are being met in a cost-effective way.

Chapter 16: Limiting Vessel Pollution and Improving Vessel Safety

Recommendation 16–1

The U.S. Coast Guard should encourage industry partners engaged in vessel management to develop stronger voluntary measures, particularly those that reward crew member contributions, as part of a continuing, long-term effort to build a culture of safety, security, and environmental compliance in routine vessel operations.

Recommendation 16–2

The U.S. Coast Guard should carry out sustained and strengthened performance-based inspections as a key component of vigorous enforcement of marine safety and environmental protection laws. Coast Guard activities in these areas should be coordinated with new demands for vessel security inspections and other security requirements.

Recommendation 16–3

The United States should work with other nations to accelerate efforts at the International Maritime Organization to enhance flag state oversight and enforcement.

These efforts should include implementation of:

- a code outlining flag state responsibilities and obligations.
- a voluntary audit regime, to be followed by adoption of a mandatory external audit regime for evaluating flag state performance.
- measures to ensure that responsible organizations, acting on behalf of flag states, meet established performance standards.
- increased technical assistance, where appropriate, for flag states that participate in self-assessments and audits.

Recommendation 16–4

The U.S. Coast Guard, working with other nations, should establish a permanent mechanism to strengthen and harmonize port state control programs under the auspices of the International Maritime Organization. To assist port states, the Coast Guard should also support efforts to enhance an international vessel information database.

Recommendation 16–5

Congress should establish a new statutory regime for managing wastewater discharges from large passenger vessels that applies throughout the United States.

This regime should include:

- uniform discharge standards and waste management procedures.
- thorough recordkeeping requirements to track the waste management process.
- required sampling, testing, and monitoring by vessel operators using uniform protocols.
- flexibility and incentives to encourage industry investment in innovative treatment technologies.

Recommendation 16–6

The U.S. Environmental Protection Agency should revise the Clean Water Act marine sanitation device (MSD) regulations to require that new MSDs meet significantly more stringent pathogen standards. Manufacturers should be required to warranty that new MSDs will meet these standards for a specific time period.

Recommendation 16–7

The U.S. Environmental Protection Agency (EPA) should conduct a thorough assessment, including field inspections, to verify the availability and accessibility of functioning pumpout facilities in existing no-discharge zones and prior to the approval of any new no-discharge zones. The U.S. Fish and Wildlife Service and EPA, working with states, should coordinate their efforts to increase the availability of adequate, accessible, and operational pumpout facilities, particularly in no discharge zones.

Recommendation 16–8

The United States should ratify MARPOL Annex VI and work for International Maritime Organization (IMO) adoption of even stricter air emission standards that reflect advances in marine engine technology, availability of cleaner fuels, and improved operational practices. The U.S. Environmental Protection Agency, working with other appropriate entities, should use Annex VI criteria and guidelines to evaluate U.S. ocean and coastal areas with impaired air quality, and seek IMO designation of appropriate areas as Sulfur Oxide Emission Control Areas.

Recommendation 16–9

The U.S. Environmental Protection Agency, working with other appropriate entities, should investigate and implement incentive-based measures that could lead to measurable voluntary reductions in vessel air emissions.

Recommendation 16–10

The U.S. Department of Transportation, U.S. Coast Guard, U.S. Environmental Protection Agency, and Minerals Management Service, in consultation with states, should conduct a risk-based analysis of all oil transportation systems that identifies and prioritizes sources of greatest risk. Based on that analysis, the agencies should develop a comprehensive, long-term plan for action to reduce overall spill risks and the threat of significant spills.

Recommendation 16–11

The U.S. Coast Guard, working with the spill response and marine salvage communities, should develop comprehensive policy guidance and contingency plans for places of refuge in the United States. The plans should clearly delineate decision-making authorities and responsibilities and provide for coordinated and timely assessments and responses to vessels seeking a place of refuge.

Recommendation 16–12

The National Ocean Council should coordinate federal agency efforts to reduce the release of air and oil pollutants from small vessel operations through a combination of outreach and education, development of incentives to encourage early replacement of older two-stroke engines, and support for innovative pilot programs at the federal, state, and local levels.

Recommendation 16–13

The U.S. Environmental Protection Agency, National Oceanic and Atmospheric Administration, U.S. Coast Guard, and other appropriate entities should support a vigorous, coordinated research program on the fates and impacts of vessel pollution. Research results should be used to guide management priorities, develop new control technologies, determine best management practices, and create more effective regulatory regimes as needed.

Recommendation 16–14

In developing and implementing maritime domain awareness initiatives, the U.S. Coast Guard should work with the National Ocean Council to ensure that, in addition to their other intended purposes, these initiatives provide effective support for ocean and coastal management needs.

Chapter 17: Preventing the Spread of Invasive Species

Recommendation 17–1

The U.S. Coast Guard's national ballast water management program should include a number of important elements: uniform, mandatory national standards which incorporate sound science in the development of biologically meaningful and enforceable ballast water treatment; a process for revising the standard to incorporate new technologies; full consultation with the U.S. Environmental Protection Agency, both during and after the program's development; and an interagency review, through the National Ocean Council, of the policy for ships that declare they have no ballast on board.

Recommendation 17–2

The National Ocean Council should commission a credible, independent, scientific review of existing U.S. ballast water management research and demonstration programs and make recommendations for improvements.

The review should consider the following issues:

- how federally funded research and demonstration programs can best promote technology development, support on-board ship testing, and move technologies from research to commercial use.
- what the best role is for industry and how industry can be engaged in onboard testing of experimental ballast water management technologies.
- what kind of peer review process is needed for scientific oversight of technology development, selection of demonstration projects, and testing of experimental treatment systems.
- what is an adequate funding level for a successful ballast water research and demonstration program.

Recommendation 17–3

The U.S. Departments of Agriculture, Commerce, the Interior, and Homeland Security should more actively employ existing legal authorities to prohibit imports of known or potentially invasive species. The National Ocean Council should recommend any changes to such legal authorities that might result in more effective prevention efforts.

Recommendation 17–4

The National Ocean Council, working with the Aquatic Nuisance Species Task Force and the National Invasive Species Council, should coordinate public education and outreach efforts on aquatic invasive species, with the aim of increasing public awareness about the importance of prevention.

The education and outreach effort should be pursued on several fronts:

- connect local, regional, and national outreach and education efforts, including recommendations from the U.S. Invasive Species Management Plan and programs initiated by industries that deal with non-native species.
- provide the public, importers and sellers, pet store and restaurant owners, divers, and others with information about the harm caused by invasive species and safer methods of shipping, owning, and disposing of non-native species.
- require the aquaculture, horticulture, pet, and aquarium industries to clearly inform customers of the potential hazards of releasing non-native species.

Recommendation 17–5

The National Invasive Species Council and the Aquatic Nuisance Species Task Force, working with other appropriate entities, should establish and implement a national plan for early detection of invasive species and a well-publicized system for prompt notification and rapid response.

The plan should:

- provide risk assessments for potentially invasive species, including possible pathways of introduction.
- conduct a comprehensive national biological survey and monitoring program for early detection, building upon recent progress in this area by academia, the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency.
- determine the threshold needed to trigger a rapid response and develop environmentally sound rapid-response, eradication, and control actions.
- designate resources for implementing surveys and eradication programs.
- develop partnerships among government and industry to fund and implement response actions.

Recommendation 17–6

The National Ocean Council (NOC) should review and streamline the current proliferation of programs for managing aquatic invasive species in marine environments, and should coordinate federal, regional, and state efforts. Consolidated plans should be implemented to develop risk assessment and management approaches for intentional and unintentional species introductions that minimize the potential of invasions at the lowest cost.

Specifically, the NOC should:

- review the effectiveness of existing programs and legal authorities and clarify the lines of responsibility and enforcement authority, including responsibility for intentional introductions of non-native species.
- develop long-term goals and measures for evaluating effective performance.
- estimate funding needs to prevent the introduction of invasive species, including support for regional and state programs.
- determine whether, in the long term, a single agency should be charged with preventing the entry of, monitoring, and containing invasive species in coastal and marine waters.

Recommendation 17–7

The United States should take a leading role in the global effort to control the spread of aquatic invasive species by working internationally to develop treaties, agreements, and policies to minimize the introduction and establishment of such species.

Recommendation 17–8

The National Ocean Council should coordinate the development and implementation of an interagency plan for research and monitoring to understand and prevent the spread of aquatic invasive species. The results should be used to improve management decisions and avoid future economic losses.

New research and monitoring efforts should focus on:

- gathering baseline taxonomic information and strengthening taxonomic skills; performing quantitative assessments of ecosystems; identifying invasive pathogens and vectors of introduction; and determining how invasive species disrupt ecosystem functions.
- understanding the human dimensions behind species introductions, including human behavior, decision making, and economics.
- developing new options for minimizing invasions, including innovative technologies, and translating these findings into practical policy options for decision makers.

Chapter 18: Reducing Marine Debris

Recommendation 18–1

The National Oceanic and Atmospheric Administration should establish a marine debris management program that expands on and complements the U.S. Environmental Protection Agency's program in this area. The NOAA program should be closely coordinated with EPA's activities, as well as with the significant efforts conducted by private citizens, state, local, and nongovernmental organizations.

Recommendation 18–2

The National Oceanic and Atmospheric Administration and U.S. Environmental Protection Agency should coordinate and implement expanded marine debris control efforts, including: enforcement of existing laws; public outreach and education; partnerships with local governments, community groups, and industry; monitoring and identification; and research.

Recommendation 18–3

The National Ocean Council (NOC) should re-establish an interagency marine debris committee, co-chaired by the National Oceanic and Atmospheric Administration and U.S. Environmental Protection Agency, and placed under the oversight of the NOC's Committee on Ocean Resource Management.

Recommendation 18–4

The U.S. Department of State and National Oceanic and Atmospheric Administration, working with the United Nations Food and Agriculture Organization and other appropriate entities, should develop a detailed plan of action to address derelict fishing gear around the world, to be implemented within large multi-national regions.

Recommendation 18–5

The National Oceanic and Atmospheric Administration should work with all interested parties, governmental and private, to implement incentives or other effective programs for prevention, removal, and safe disposal of derelict fishing gear.

Recommendation 18–6

The U.S. Department of State should increase efforts internationally to ensure that there are adequate port reception facilities available for disposal of garbage from ships, particularly in Special Areas designated under Annex V of the International Convention for the Prevention of Pollution from Ships.

Chapter 19: Achieving Sustainable Fisheries

Recommendation 19–1

Congress should amend the Magnuson–Stevens Fishery Conservation and Management Act (MSFCMA) and related statutes to require Regional Fishery Management Councils (RFMCs) and interstate fisheries commissions to rely on their Scientific and Statistical Committees (SSCs), incorporating SSC findings and advice into the decision-making process. In keeping with this stronger role, SSC members should meet more stringent scientific and conflict of interest requirements, and receive compensation.

To ensure a strengthened SSC, MSFCMA amendments should require the following:

- Each RFMC should nominate candidates for service on its SSC. Nominees should be scientists with strong technical credentials and experience, selected from federal, state, or tribal governments or academia. Private sector scientists who are technically qualified may also be nominated if they meet the conflict of interest requirements, although the SSC should not be constituted as a representational body.

- the National Oceanic and Atmospheric Administration (NOAA) should evaluate the qualifications and potential conflicts of interest of SSC nominees through an independent review process designed by a credible, scientific organization. Ultimately, SSC appointments should be approved by the NOAA Administrator.
- SSC members should serve for fixed terms to allow for rotation and addition of new members over time.
- like RFMC members, participants in the SSC (or their home institutions) should be compensated for time spent on RFMC business.

Recommendation 19–2

Scientific and Statistical Committees (SSCs) should supply Regional Fishery Management Councils with the scientific advice necessary to make fishery management decisions. Such information could include reports on stock status and health, socioeconomic impacts of management measures, sustainability of fishing practices, and habitat status. In particular, the SSCs should determine allowable biological catch based on the best scientific information available.

Recommendation 19–3

Each Regional Fishery Management Council (RFMC) should set harvest limits at or below the allowable biological catch determined by its Scientific and Statistical Committee. The RFMCs should begin immediately to follow this practice, which should be codified by Congress in amendments to the Magnuson–Stevens Fishery Conservation and Management Act.

Recommendation 19–4

The National Marine Fisheries Service, working with the Regional Fishery Management Councils and the interstate fisheries commissions, should develop a process for independent review of the scientific information relied on by Scientific and Statistical Committees.

The process should include three distinct procedures:

- a standard annual review by regional scientists to certify that the correct data and models are being used.
- an enhanced review to evaluate the models and assessment procedures. To ensure that these reviews are independent, a significant proportion of the reviewers should come from outside the region and be selected by a group such as the Center for Independent Experts. These types of reviews should be conducted on a three- to five-year cycle, or as needed, to help ensure that the latest methods and approaches are being used.
- an expedited review to be used when results are extremely controversial or when the normal review process would be too slow. In these cases, all reviewers should be selected by a group such as the Center for Independent Experts.

Recommendation 19–5

Each Regional Fishery Management Council should set a deadline for its Scientific and Statistical Committee (SSC) to determine allowable biological catch. If the SSC does not meet that deadline, the National Marine Fisheries Service Regional Science Director should set the allowable biological catch for that fishery.

Recommendation 19–6

Once allowable biological catch is determined, whether by the Scientific and Statistical Committee or the National Marine Fisheries Service (NMFS) Regional Science Director, the Regional Fishery Management Council should propose a fishery management plan in time for adequate review and approval by NMFS. If the plan is not in place in a timely fashion, NMFS should suspend all fishing on that stock until it is able to review the adequacy of the management plan.

Recommendation 19–7

The Regional Fishery Management Councils and their Scientific and Statistical Committees should develop an annual, prioritized list of management information needs and provide it to the National Marine Fisheries Service (NMFS). NMFS should incorporate these needs to the maximum extent possible in designing its research, analysis, and data collection programs.

Recommendation 19–8

The National Marine Fisheries Service (NMFS), working with states and interstate fisheries commissions, should require that all saltwater anglers obtain licenses to improve in-season data collection on recreational fishing. NMFS should review existing saltwater angler licensing programs to determine which approaches best facilitate the collection of data. Based on this review, existing programs should be modified as needed and used wherever possible, developing new programs only if necessary. Priority should be given to fisheries in which recreational fishing is responsible for a large part of the catch, or in which recreational fishermen regularly exceed their allocated quota.

Recommendation 19–9

The National Oceanic and Atmospheric Administration (NOAA) should create an expanded, regionally-based cooperative research program that coordinates and funds collaborative projects between scientists and commercial, tribal, and recreational fishermen. NOAA should develop a process for external evaluation and ranking of all cooperative research proposals to ensure the most worthwhile projects are funded, the most capable performers are undertaking the research, and the information produced is both scientifically credible and useful to managers.

Recommendation 19–10

Congress should develop new statutory authority, similar to the Atlantic Coastal Fisheries Cooperative Management Act, to support and empower the Gulf States and Pacific States Fisheries Management Commissions. All interstate management plans should adhere to the national standards in the Magnuson–Stevens Fishery Conservation and Management Act, and the federal guidelines implementing these standards. States should participate in the development of the guidelines to ensure they are applicable to interstate plans.

Recommendation 19–11

Where a fish stock crosses administrative boundaries, the National Oceanic and Atmospheric Administration should ensure that a single state, Regional Fishery Management Council (RFMC), interstate marine fisheries commission, or NOAA itself is designated as the lead authority.

In general:

- for interjurisdictional fisheries that occur primarily in state waters, the state (if only one state is involved), or the relevant interstate fisheries commission, should take the lead within both state and federal waters.
- for fisheries that involve two or more RFMCs, NOAA should designate the lead.
- for fisheries that have substantial activities in both state and federal waters, the relevant authorities should determine a lead; if they are unable to agree within a reasonable time period (not more than six months), NOAA should designate the lead.
- jurisdiction for highly migratory species should remain in its current configuration.
- any other disputes regarding jurisdiction should be resolved by NOAA.

Recommendation 19–12

Congress should amend the Magnuson–Stevens Fishery Conservation and Management Act to require governors to submit a broad slate of candidates for each vacancy of an appointed Regional Fishery Management Council seat. The slate should include at least two representatives each from the commercial fishing industry, the recreational fishing sector, and the general public.

Recommendation 19–13

Congress should give the Administrator of the National Oceanic and Atmospheric Administration responsibility for appointing Regional Fishery Management Council (RFMC) members, with the goal of creating RFMCs that are knowledgeable, fair, and reflect a broad range of interests.

Recommendation 19–14

Congress should amend the Magnuson–Stevens Fishery Conservation and Management Act to require that all newly appointed Regional Fishery Management Council (RFMC) members complete a training course within six months of their appointment. The National Marine Fisheries Service should contract with an external organization to develop and implement this training course. After six months, a new member who has not completed the training should continue to participate in RFMC meetings, but should not be allowed to vote.

The training course should:

- be open to current RFMC members and other participants in the process as space permits.
- cover a variety of topics including: fishery science and basic stock assessment methods; social science and fishery economics; tribal treaty rights; the legal requirements of the Magnuson–Stevens Fishery Conservation and Management Act, the National Environmental Policy Act, the Administrative Procedures Act, and other relevant laws or regulations; conflict of interest policies for RFMC members; and the public process involved in developing fishery management plans.

Recommendation 19–15

Congress should amend the Magnuson–Stevens Fishery Conservation and Management Act to affirm that fishery managers are authorized to institute dedicated access privileges. Congress should direct the National Marine Fisheries Service to issue national guidelines for dedicated access privileges that allow for regional flexibility in implementation. Every federal, interstate, and state fishery management entity should consider the potential benefits of adopting such programs.

At a minimum, the national guidelines should require dedicated access programs to:

- specify the biological, social, and economic goals of the plan; recipient groups designated for the initial quota shares; and data collection protocols.
- provide for periodic reviews of the plan to determine progress in meeting goals.
- assign quota shares for a limited period of time to reduce confusion concerning public ownership of living marine resources, allow managers flexibility to manage fisheries adaptively, and provide stability to fishermen for investment decisions.
- mandate fees for exclusive access based on a percentage of quota shares held. These user fees should be used to support ecosystem-based management. Fee waivers, reductions, or phase-in schedules should be allowed until a fishery is declared recovered or fishermen's profits increase.
- include measures, such as community-based quota shares or quota share ownership caps, to lessen the potential harm to fishing communities during the transition to dedicated access privileges.
- be adopted only after adequate public discussion and close consultation with all affected stakeholders, to ensure community acceptance of a dedicated access plan prior to final Regional Fishery Management Council approval.

Recommendation 19–16

Congress should repeal all programs that encourage overcapitalization of fishing fleets, including the Fisheries Finance Program (formerly the Fishing Vessel Obligation Guarantee Program) and those sections of the Capital Construction Fund that apply to fisheries. The National Oceanic and Atmospheric Administration (NOAA) should take appropriate steps to permanently reduce fishing capacity to sustainable levels.

The following actions will assist in reducing overcapitalization in fisheries:

- to the maximum extent practicable, capacity reduction programs should be funded by those who profit from them—the fishermen remaining in the fishery.
- federal contributions to capacity reduction programs should only be made where additional effort is prohibited from entering the fishery. The highest priority for public funding of capacity reduction should be given to fisheries that grant dedicated access privileges to participants.
- NOAA should monitor capacity reduction programs to determine whether they are meeting their objectives and to ensure that vessels removed from U.S. fisheries do not contribute to overcapitalization in other nations.
- fishermen should be allowed to transfer existing Capital Construction Fund accounts into Individual Retirement Accounts or other appropriate financial instruments that do not promote overcapitalization.

Recommendation 19–17

The National Marine Fisheries Service should expand its use of Joint Enforcement Agreements to implement cooperative fisheries enforcement programs with state agencies. The U.S. Coast Guard should also be included as an important participant in such agreements.

Recommendation 19–18

The National Marine Fisheries Service and the U.S. Coast Guard should strengthen cooperative enforcement efforts at the national level by developing a unified strategic plan for fishery enforcement that includes significantly increased joint training, and at the regional and local levels, by developing a stronger and more consistent process for sharing information and coordinating enforcement.

Recommendation 19–19

The National Marine Fisheries Service (NMFS), working with the Regional Fishery Management Councils (RFMCs), the U.S. Coast Guard, and other appropriate entities, should maximize the use of the Vessel Monitoring System (VMS) for fishery-related activities. VMS with two-way communication capability and other features that assist personnel in monitoring and responding to potential violations should be required over time for all commercial fishing vessels receiving permits under federal fishery plans, including party and charter boats that carry recreational fishermen. NMFS and RFMCs, working with state representatives, should also identify state fisheries that could significantly benefit from VMS implementation.

Recommendation 19–20

The U.S. Coast Guard should manage the integration of a fishery Vessel Monitoring System (VMS) database into the larger maritime operations database and should work with the National Marine Fisheries Service to ensure effective use of VMS data for monitoring and enforcement.

Recommendation 19–21

The National Marine Fisheries Service (NMFS) should change the designation of essential fish habitat from a species-by-species to a multispecies approach and, ultimately, to an ecosystem-based approach. The approach should draw upon existing efforts to identify important habitats and locate optimum-sized areas to protect vulnerable life-history stages of commercially and recreationally important species. NMFS should work with other management entities to protect essential fish habitat when such areas fall outside their jurisdiction.

This effort should include:

- well-documented, science-based analytical methods.
- consideration of ecologically valuable species that are not necessarily commercially important.
- an extensive research and development program to refine existing analytical methods and develop additional means to identify habitats critical to sustainability and biodiversity goals.

Recommendation 19–22

The National Marine Fisheries Service (NMFS), Regional Fishery Management Councils, states, and interstate fisheries commissions, should develop regional bycatch reduction plans that address the broad ecosystem impacts of bycatch for areas under their jurisdiction. Implementation of these plans will require NMFS to collect data on bycatch of all species captured by commercial and recreational fishermen, not only of commercially important species. The selective use of observers should remain an important component of these efforts.

Recommendation 19–23

The National Marine Fisheries Service (NMFS) should expand its program in conservation engineering to help reduce the impacts of fishing on ecosystems. The program should give high priority to finding ways to reduce bycatch in fisheries that interact with endangered species. As gear and fishing methods are shown to be effective, NMFS should promote their rapid implementation in U.S. fisheries and work with the U.S. Department of State to promote their international adoption.

Recommendation 19–24

The U.S. Department of State, working with other appropriate entities, should encourage all countries to ratify the Fish Stocks Agreement and the United Nations Food and Agriculture Organization’s Compliance Agreement. In particular, the United States should condition other nations’ access to fishing resources within the U.S. exclusive economic zone on their ratification of these agreements. The United States and other signatory nations should also develop additional incentives to encourage all nations to ratify and enforce these agreements.

Recommendation 19–25

The U.S. Department of State, working with the National Oceanic and Atmospheric Administration, should review and update regional and bilateral fishery agreements to which the United States is a party, to ensure full incorporation of the latest science and harmonize those agreements with the Fish Stocks Agreement. The United States should fulfill existing international fishery management obligations, including full funding of U.S. commitments.

Recommendation 19–26

The National Oceanic and Atmospheric Administration, working with the U.S. Fish and Wildlife Service and U.S. Department of State, should design a national plan of action for the United States that implements, and is consistent with, the International Plans of Action adopted by the United Nations Food and Agriculture Organization and its 1995 Code of Conduct for Responsible Fisheries. This national plan should stress the importance of reducing bycatch of endangered species and marine mammals.

Recommendation 19–27

The National Ocean Council (NOC) should initiate a discussion on effective international implementation of the United Nations Food and Agriculture Organization’s Code of Conduct for Responsible Fisheries and other Plans of Action.

In particular, the NOC’s international committee should suggest methods to encourage nations to:

- join relevant regional fishery management organizations.
- implement and enforce regional agreements to which they are bound.
- collect and report the data necessary to manage fish stocks sustainably and to reduce fishery impacts on habitats and protected species.
- reduce or eliminate illegal, unreported, and unregulated fishing by ships flying their flag.
- reduce fishing fleet capacity, particularly on the high seas.
- reduce bycatch of non-targeted species, in particular endangered populations such as sea turtles and marine mammals, via the use of innovative gear and management methods such as onboard observer programs.

Chapter 20: Protecting Marine Mammals and Endangered Marine Species

Recommendation 20–1

Congress should amend the Marine Mammal Protection Act to require the Marine Mammal Commission to coordinate with all the relevant federal agencies through the National Ocean Council (NOC), while remaining independent. The NOC should determine whether there is a need for similar oversight bodies for other marine animals whose populations are at risk, such as sea turtles.

Recommendation 20–2

Congress should amend the Marine Mammal Protection Act to place the protection of all marine mammals within the jurisdiction of the National Oceanic and Atmospheric Administration.

Recommendation 20–3

The National Marine Fisheries Service and U.S. Fish and Wildlife Service, with guidance from the National Ocean Council, should significantly improve their coordination with respect to the implementation of the Endangered Species Act, particularly for anadromous species and sea turtles, and in circumstances where land-based activities have significant impacts on marine species.

Recommendation 20–4

The U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration should expand their cooperative agreements with states under Section 6 of the ESA, including enhanced research, management, monitoring, and public information.

Recommendation 20–5

Congress should amend the Marine Mammal Protection Act to require the National Oceanic and Atmospheric Administration to more clearly specify categories of activities that are allowed without authorization, those that require authorization, and those that are prohibited.

Recommendation 20–6

Congress should amend the Marine Mammal Protection Act to revise the definition of harassment to cover only activities that meaningfully disrupt behaviors that are significant to the survival and reproduction of marine mammals.

Recommendation 20–7

The National Oceanic and Atmospheric Administration (NOAA) should implement programmatic permitting for activities that affect marine mammals, wherever possible. Case-by-case permitting, which is more resource intensive, should be used for activities that do not fit within any programmatic category or when circumstances indicate a greater likelihood of harm to marine animals. The National Ocean Council (NOC) should create an interagency team to recommend activities appropriate for programmatic permitting, those that are inappropriate, and those that are potentially appropriate pending additional scientific information.

To carry this out:

- the interagency team, under the oversight of the NOC’s Committee on Ocean Resource Management, should include representatives from NOAA, the National Science Foundation, U.S. Army Corps of Engineers, Minerals Management Service, and U.S. Navy, with input from the Marine Mammal Commission.
- programmatic permits should be subject to periodic review, and remain valid for a limited time to ensure that the best available science can be incorporated into permit requirements.
- enforcement efforts should be strengthened and the adequacy of penalties reviewed.

Recommendation 20–8

The National Oceanic and Atmospheric Administration and U.S. Department of the Interior agencies should develop an expanded program, coordinated through the National Ocean Council, to examine and mitigate the effects of human activities on marine mammals and endangered species.

The program should focus on two areas:

- research, monitoring, and assessment to better understand the basic biology, physiology, life history, and population dynamics of marine mammals, sea turtles, and other endangered or vulnerable marine species and to understand how disease, contaminants, harmful algal blooms, human activities, and other stressors may impact these animals. An important goal will be to enhance the capability to respond quickly to strandings and unusual mortality events of marine mammals and sea turtles.
- technology and engineering to eliminate or mitigate human impacts on marine mammals, sea turtles, and other endangered species.

Recommendation 20–9

The National Science Foundation, National Oceanic and Atmospheric Administration, U.S. Geological Survey, and Minerals Management Service should expand research on ocean acoustics and the potential impacts of noise on marine mammals. These additional sources of support are important to decrease the reliance on U.S. Navy research in this area. The research programs should be complementary and well coordinated, examining a range of issues relating to noise generated by scientific, commercial, and operational activities.

Recommendation 20–10

The U.S. Department of State, working with the National Oceanic and Atmospheric Administration and the U.S. Department of the Interior, should continue to actively pursue efforts to reduce the impacts of human activities on marine species at risk in foreign and international waters.

Chapter 21: Preserving Coral Reefs and Other Coral Communities

Recommendation 21–1

Congress should establish a Coral Protection and Management Act that enhances research, protection, management, and restoration of coral ecosystems.

The new legislation should include the following elements:

- mapping, monitoring, assessment, and research programs to fill critical information gaps, to be carried out primarily through the National Oceanic and Atmospheric Administration and the U.S. Coral Reef Task Force in partnership with the academic research community.
- increased protections for vulnerable coral reefs, including the use of marine protected areas.
- liability provisions for damages to coral reefs, similar to those in the National Marine Sanctuaries Act, but with greater flexibility to use funds in a manner that provides maximum short- and long-term benefits to the reef.
- support for state-level coral reef management.
- outreach activities to educate the public about coral conservation and reduce human impacts.
- support for U.S. involvement, particularly through the sharing of scientific and management expertise, in bilateral, regional, and international coral reef management programs.

Recommendation 21–2

As part of the new Coral Protection and Management Act, Congress should codify and strengthen the U.S. Coral Reef Task Force and place it under the oversight of the National Ocean Council (NOC).

The Coral Reef Task Force should be strengthened in the following ways:

- it should report to the NOC's Committee on Ocean Resource Management.
- its membership should be expanded to include the U.S. Department of Energy and specify participation by the U.S. Army Corps of Engineers within the U.S. Department of Defense.
- in collaboration with the states and territories, it should coordinate the development and implementation of regional ecosystem-based plans to address the impacts of nonpoint source pollution, fishing, and other activities on coral reef resources.

Recommendation 21–3

The National Oceanic and Atmospheric Administration (NOAA) should serve as the lead agency for management of deep-water coral communities. In this role, NOAA should work with states, academic institutions, and others to enhance national capabilities related to deep-water corals, including expanded surveys of their distribution and abundance and research on the major threats to their continued existence. After an appropriate review, NOAA should make recommendations to the National Ocean Council on the advisability of expanding the Coral Reef Task Force's charter and membership to oversee deep-water corals or creating a similar task force on deep-water corals.

Recommendation 21–4

The National Oceanic and Atmospheric Administration should develop national standards—and promote adoption of international standards—to ensure that coral reef resources are harvested in a sustainable manner. The U.S. Department of State should implement incentive programs to encourage international compliance with these standards.

Recommendation 21–5

The U.S. Coral Reef Task Force, in coordination with the regional ocean information programs, should develop regional, ecosystem-based research plans to help protect coral reef ecosystems. These plans should guide agency research funding and be incorporated into the design and implementation of the national monitoring network and the Integrated Ocean Observing System.

Chapter 22: Setting a Course for Sustainable Aquaculture

Recommendation 22–1

Congress should amend the National Aquaculture Act to designate the National Oceanic and Atmospheric Administration (NOAA) as the lead federal agency for marine aquaculture, create an Office of Sustainable Marine Aquaculture in NOAA, and designate the Secretary of Commerce as a permanent co-chair, along with the Secretary of Agriculture, of the Joint Subcommittee on Aquaculture. NOAA should use this authority to design and implement national policies for environmentally and economically sustainable marine aquaculture.

Recommendation 22–2

The National Oceanic and Atmospheric Administration’s new Office of Sustainable Marine Aquaculture should be responsible for developing a comprehensive, environmentally-sound permitting, leasing, and regulatory program for marine aquaculture.

The permitting and leasing system and implementing regulations should:

- reflect a balance between economic and environmental objectives consistent with national and regional goals.
- be coordinated with guidelines and regulations developed at the state level.
- include a system for the assessment and collection of a reasonable portion of the resource rent generated from marine aquaculture projects that rely on ocean resources held in the public trust.
- include the development of a single, multi-agency permit application for proposed marine aquaculture operations.
- include a permit review process that includes public notice and an opportunity for state, local, and public comment.
- require applicants to post a bond or other financial guarantee to ensure that any later performance problems can be remedied and that abandoned facilities can be safely removed at no additional cost to taxpayers.
- require the development, dissemination, and adoption of best management practices, with periodic updates to reflect advances in research and technology.
- be well coordinated with other activities in federal waters.

Recommendation 22–3

The National Oceanic and Atmospheric Administration’s new Office of Sustainable Marine Aquaculture should expand marine aquaculture research, development, training, extension, and technology transfer, including a socioeconomic component. The Office should set priorities for research and technology, in close collaboration with the National Sea Grant College Program, states, tribes, academia, industry, and other stakeholders.

Recommendation 22–4

The United States should work with the United Nations Food and Agriculture Organization to encourage and facilitate worldwide adherence to the aquaculture provisions of the Code of Conduct for Responsible Fisheries.

Chapter 23: Connecting the Oceans and Human Health

Recommendation 23–1

The National Oceanic and Atmospheric Administration, National Science Foundation, National Institute of Environmental Health Sciences, and other appropriate entities should support expanded research and development efforts to encourage multidisciplinary studies of the evolution, ecology, chemistry, and molecular biology of marine species, discover potential marine bioproducts, and develop practical compounds.

These efforts should include:

- a strong focus on discovering new marine microorganisms, visiting poorly sampled areas of the marine environment, and studying species that inhabit harsh environments.
- encouragement for private-sector investments and partnerships in marine biotechnology research and development to speed the creation of commercially available marine bioproducts.

Recommendation 23–2

The National Oceanic and Atmospheric Administration, National Science Foundation, National Institute of Environmental Health Sciences, and other appropriate entities, should support expanded research efforts in marine microbiology and virology.

These efforts should include:

- the discovery, documentation, and description of new marine bacteria, algae, and viruses and the determination of their potential negative effects on the health of humans and marine organisms.
- the elucidation of the complex inter-relations, pathways, and causal effects of marine pollution, harmful algal blooms, ecosystem degradation and alteration, emerging marine diseases, and climate change in disease events.

Recommendation 23–3

The National Oceanic and Atmospheric Administration, National Science Foundation, National Institute of Environmental Health Sciences, and other appropriate entities should support the development of improved methods for monitoring and identifying pathogens and chemical toxins in ocean and coastal waters and organisms.

This effort should include:

- developing accurate and cost-effective methods for detecting pathogens, contaminants, and toxins in seafood for use by both state and federal inspectors.
- developing in situ and space-based methods to monitor and assess pollution inputs, ecosystem health, and human health impacts.
- developing new tools for measuring human and environmental health indicators in the marine environment.
- developing models and strategies for predicting and mitigating pollutant loadings, harmful algal blooms, and infectious disease potential in the marine environment.

Recommendation 23–4

Congress should establish a national, multi-agency Oceans and Human Health Initiative to coordinate and sponsor exploration, research, and new technologies related to examining the connections among the oceans, ecosystem health, and human health. The National Oceanic and Atmospheric Administration's Oceans and Human Health Initiative and the National Institute of Environmental Health Sciences–National Science Foundation Centers for Oceans and Human Health should be expanded and coordinated as the basis for this initiative.

The new Oceans and Human Health Initiative should:

- be implemented through both competitively awarded grants and support of federally-designated centers with federal, state, academic, and private-sector investigators eligible to compete for funding.

- work with the National Ocean Council to review other relevant agency programs and suggest areas where coordination could be improved.
- transfer new technologies into management programs that protect human health and the health of ocean and coastal ecosystems.

Recommendation 23–5

The National Oceanic and Atmospheric Administration, Environmental Protection Agency, and Food and Drug Administration, working with state and local managers, should fully implement all existing programs to protect human health from contaminated seafood and coastal waters.

Particularly, the federal agencies should:

- incorporate new findings and technologies, especially those developed within the Oceans and Human Health Initiative, into monitoring and prevention programs.
- coordinate and increase interagency public education and outreach efforts in this area.

Chapter 24: Managing Offshore Energy and Other Mineral Resources

Recommendation 24–1

Congress should use a portion of the revenues the federal government receives from the leasing and extraction of outer Continental Shelf (OCS) oil and gas to provide grants to all coastal states that can be invested in the conservation and sustainable development of renewable ocean and coastal resources. States off whose coasts OCS oil and gas is produced should receive a larger share of such revenue to compensate them for the costs of addressing the environmental and socioeconomic impacts of energy activity in adjacent federal waters. None of the programs that currently receive revenues from OCS oil and gas activities should be adversely affected by this new allocation.

Recommendation 24–2

The U.S. Department of the Interior should expand the Minerals Management Service’s Environmental Studies Program.

Priorities for the enhanced Environmental Studies Program should include:

- conducting long-term environmental research and monitoring at appropriate outer Continental Shelf (OCS) sites to better understand cumulative, low-level, and chronic impacts of OCS oil and gas activities on the natural and human environments.
- working with state environmental agencies and industry to evaluate the risks to the marine environment posed by aging offshore and onshore pipelines, particularly in the Gulf of Mexico.

Recommendation 24–3

Ocean.US, working with the National Oceanic and Atmospheric Administration (NOAA) and Minerals Management Service (MMS), should include the offshore oil and gas industry as an integral partner in the design, implementation, and operation of the Integrated Ocean Observing System (IOOS), especially in areas where offshore oil and gas activities occur.

Specifically, Ocean.US, NOAA, and MMS should work with the oil and gas industry to:

- employ industry resources, such as pipelines, platforms, and vessels as part of the IOOS.
- incorporate nonproprietary data into IOOS informational products and larger environmental databases, while protecting the security of proprietary data and meeting other safety, environmental, and economic concerns.

Recommendation 24–4

The National Ocean Council (NOC), working with the U.S. Department of Energy and other appropriate entities, should review the status of gas hydrates research and development to determine whether methane hydrates can contribute significantly to meeting the nation’s long-term energy needs. If such contribution looks promising, the NOC should recommend an appropriate level of investment in methane hydrates research and development, and determine whether a comprehensive management regime for industry access to hydrate resource deposits is needed.

Recommendation 24–5

Congress, with input from the National Ocean Council, should enact legislation providing for the comprehensive management of offshore renewable energy development as part of a coordinated offshore management regime.

Specifically, this legislation should:

- be based on the premise that the oceans are a public resource.
- streamline the process for licensing, leasing, and permitting renewable energy facilities in U.S. waters.
- subsume existing statutes, such as the Ocean Thermal Energy Conversion Act.
- ensure that the public receives a fair return from the use of the resource and that development rights are allocated through an open, transparent process that considers state, local, and public concerns.

Recommendation 24–6

The Minerals Management Service should systematically identify the nation’s offshore non-energy mineral resources and conduct the necessary cost-benefit, long-term security, and environmental studies to create a national program that ensures the best uses of those resources.

Chapter 25: Creating a National Strategy for Increasing Scientific Knowledge

Recommendation 25–1

Congress should double the federal ocean and coastal research budget over the next five years. The new funds should be used to support a balance of basic and applied research.

Recommendation 25–2

The National Ocean Council should develop a national ocean and coastal research strategy that reflects a long-term vision and promotes advances in basic and applied ocean science and technology. The strategy should recognize the different ocean science sectors (government, academic, commercial, and nongovernmental), acknowledge their different roles, and maximize the use of partnerships.

Recommendation 25–3

The National Ocean Council (NOC) research strategy should include a national program for social science and economic research to examine the human dimensions and economic value of the nation’s oceans and coasts. The NOC should direct relevant agencies to include socioeconomic research as an integral part of their efforts.

The national program should include:

- an operational socioeconomic research and assessment function within the National Oceanic and Atmospheric Administration (NOAA).

- an interagency steering group, chaired by NOAA and including the Bureau of Labor Statistics (BLS), Bureau of the Census, Bureau of Economic Analysis (BEA), U.S. Department of Agriculture, U.S. Environmental Protection Agency, and National Science Foundation to coordinate ocean-related socioeconomic research.
- biennial reports by BLS and BEA on the employment, wages, and output associated with U.S. coasts and oceans.
- biennial reports by the Bureau of Transportation Statistics on intermodal access to U.S. ports and maritime facilities and assessments of relevant maritime system performance and economic data.
- periodic reports on such topics as coastal demographics, geographic patterns and trends of ocean and coastal use, economic contributions, attitudes and perceptions, functioning of governance arrangements, and public-private partnerships.
- establishment of partnerships to take maximum advantage of the expertise resident within government agencies, academic institutions, and the private sector.
- increased interactions with regional, state, and local stakeholders through regional ocean councils and regional ocean information programs so their information needs can be met and socioeconomic changes at these levels can be documented and analyzed.

Recommendation 25–4

Congress should significantly expand the National Sea Grant College Program as part of doubling ocean and coastal research funding.

Recommendation 25–5

The National Ocean Council (NOC) should direct ocean-related agencies to develop ten-year science plans and budgets consistent with the national strategy. The NOC should provide additional guidance concerning granting mechanisms.

The NOC guidance should:

- require agencies to provide multi-year (greater than five-year) funding opportunities in addition to traditional grant mechanisms.
- reiterate the importance of balancing basic and applied research projects and promote the transition of basic research results to applied uses.
- require a system of independent review for all grant applications, including those from federal laboratories.
- incorporate the science needs and priorities of local, state, regional, and national managers, working with the regional ocean information programs.

Recommendation 25–6

The National Oceanic and Atmospheric Administration and the National Science Foundation should lead an expanded national ocean exploration program, with additional involvement from the U.S. Geological Survey and the U.S. Navy’s Office of Naval Research. Public outreach and education should be integral components of the program.

Recommendation 25–7

The Federal Geographic Data Committee (FGDC) should coordinate federal ocean and coastal mapping and charting activities with the goal of creating standardized, easily accessible national maps. These maps should be able to incorporate living and nonliving marine resource data along with bathymetry, topography, and other natural features, and should provide seamless data across the shoreline, coastal zone, nearshore areas, and open ocean waters.

To accomplish these goals, the FGDC should:

- coordinate an interagency budget strategy to accelerate the completion of mapping priorities throughout coastal areas, the exclusive economic zone, and continental shelf.
- establish and maintain a Web-accessible registry that allows federal agencies to coordinate mapping and charting missions.

- establish and maintain a single Web-based source to provide easy access to geospatial data and integrated national maps.
- ensure that federal mapping and charting activities take full advantage of resources available in the academic and private sectors.
- ensure that federal mapping activities take advantage of state resources and address state information needs.

Recommendation 25–8

Congress should re-establish an Office of Technology Assessment to provide it with objective and authoritative analyses of complex scientific and technical issues.

Chapter 26: Achieving a Sustained, Integrated Ocean Observing System

Recommendation 26–1

The National Ocean Council should make development and implementation of a sustained, national Integrated Ocean Observing System (IOOS) a key element of its leadership and coordination role. As an essential component of IOOS development, the NOC should promote strong partnerships among federal, state, territorial, tribal, and local governments, non-governmental organizations, industry, and academia, drawing upon the strengths and capabilities of each sector in the design, development, and operation of the IOOS.

Recommendation 26–2

Ocean.US should be responsible for planning the national Integrated Ocean Observing System (IOOS). The National Oceanic and Atmospheric Administration should serve as the lead federal agency for implementing and operating the IOOS, with extensive interagency coordination and subject to approval of all plans and budgets by the National Ocean Council.

Recommendation 26–3

Congress should amend the National Oceanographic Partnership Act to formally establish Ocean.US under the National Ocean Council (NOC).

Ocean.US should:

- report to the NOC’s Committee on Ocean Science, Education, Technology, and Operations.
- be provided with funding as a line item within the National Oceanic and Atmospheric Administration’s budget, to be spent subject to NOC approval.
- have authority to bring in outside experts on rotational appointments when needed.

Recommendation 26–4

Ocean.US should proactively seek input from coastal and ocean stakeholder communities to build cross-sector support for the national Integrated Ocean Observing System (IOOS) and develop a consensus on operational requirements.

Specifically, Ocean.US should seek input on its plans from:

- agencies with homeland security responsibilities, including ideas for future research and development to improve and enhance the system.
- state, local, territorial, and tribal agencies, industry, academia, nongovernmental organizations, and the public in the design and implementation of regional observing systems and their integration into the national IOOS.

Recommendation 26–5

Ocean.US should develop a set of core variables to be collected by all components of the national Integrated Ocean Observing System. This set of core variables should include appropriate biological, chemical, geological, and physical variables and be based on input from the National Federation of Regional Associations.

Recommendation 26–6

The National Oceanic and Atmospheric Administration, the National Science Foundation (NSF), the Office of Naval Research, and the National Aeronautics and Space Administration should require investigators who receive federal funding related to ocean observatories, including the NSF Ocean Observatories Initiative, to plan for the transfer of successful technologies to an operational mode in the Integrated Ocean Observing System.

Recommendation 26–7

Ocean.US should recommend priorities for space-based missions as an essential component of the national Integrated Ocean Observing System (IOOS). The National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA) should work together on the development, budgeting, and scheduling of IOOS satellite missions, based on Ocean.US plans.

Ocean.US, NOAA, and NASA should:

- work closely with the user community and the space industry to identify the most important space-based ocean observation needs.
- work with the international community to ensure that requirements for the Global Ocean Observing System are coordinated with U.S. plans for satellite remote sensing.
- implement phased satellite missions and equipment replacement to maintain unbroken, consistent data streams based on Ocean.US plans.

Recommendation 26–8

Congress should transfer ongoing operation of the National Aeronautics and Space Administration (NASA) Earth environmental observing satellites to the National Oceanic and Atmospheric Administration (NOAA) to achieve continuous collection of critical space-based Earth environmental measurements. NOAA and NASA should work together to identify research satellite missions that have operational applications and to ensure the smooth transition of each Earth environmental observing satellite after its launch and testing.

Recommendation 26–9

The National Oceanic and Atmospheric Administration (NOAA) should improve its capacity to calibrate, collect, and disseminate satellite data and to integrate satellite-derived information with traditional ocean and coastal databases. NOAA should ensure that a suitable archive exists to preserve historical satellite data, particularly those related to long-term trends such as climate.

Recommendation 26–10

Ocean.US and the National Oceanic and Atmospheric Administration (NOAA) should work with state and local governments, the Regional Associations, educators, nongovernmental organizations, and the private sector, to ensure that information products generated from the Integrated Ocean Observing System (IOOS) are useful to a broad user community.

In particular, Ocean.US and NOAA should:

- work with the U.S. Navy, the Regional Associations, Ocean.IT, and the private sector to create new models and forecasting methods to meet user information needs.
- work with the Regional Associations to provide the training and tools necessary for users to work with, and benefit from, IOOS information products.

Recommendation 26–11

Congress should fund the Integrated Ocean Observing System (IOOS) as a line item in the National Oceanic and Atmospheric Administration (NOAA) budget, to be spent subject to National Ocean Council (NOC) direction and approval. IOOS funds should be appropriated without fiscal year limitation. NOAA should develop a streamlined process for distributing IOOS funds to other federal and nonfederal partners based on the NOC plan.

Recommendation 26–12

The National Ocean Council should oversee coordination of the Integrated Ocean Observing System with other existing and planned terrestrial, watershed, atmospheric, and biological observation and information collection systems, with the ultimate goal of developing a national Earth Observing System.

Recommendation 26–13

The National Ocean Council (NOC) should promote international coordination and capacity building in the field of global ocean observations.

Specifically, the NOC should:

- lead the interagency implementation of the 2003 Declaration on Earth Observing.
- encourage and support developing nations' participation in the Global Ocean Observing System.
- continue to advocate full, open, and meaningful data access policies and contribute technological expertise to ensure access by all participants.

Chapter 27: Enhancing Ocean Infrastructure and Technology Development

Recommendation 27–1

The National Ocean Council (NOC) should develop a national ocean and coastal infrastructure and technology strategy, including detailed plans for funding and implementation, to support science, resource management, assessments, enforcement, and education. The strategy should guide agency plans for facility construction, upgrading, or consolidation and for new technology development.

In particular, the national strategy should:

- be developed through the NOC's Committee on Ocean Science, Education, Technology, and Operations.
- set specific priorities for acquiring and upgrading ocean and coastal infrastructure, including vessels, facilities, instrumentation, and equipment.
- build on the existing capabilities of federal, state, academic, and private entities.
- identify emerging technologies that should be incorporated into agency operations.
- promote international partnerships to deploy and share major oceanographic assets.

Recommendation 27–2

The National Oceanic and Atmospheric Administration should establish an Office of Technology Transfer with responsibility for expediting the transition of proven ocean-related technologies into operational applications. This office should work closely with the National Science Foundation, the U.S. Navy, the National Aeronautics and Space Administration, academic institutions, regional organizations, and private industry to achieve its mission.

Recommendation 27–3

The National Ocean Council should undertake an assessment of U.S. ocean and coastal infrastructure and technology every five years. These assessments should account for all federal, state, academic, and private assets and should be used to create and update a national facilities database.

The assessments should build on this Commission's efforts (Appendix 5), including information on:

- the location, ownership, availability, remaining service life, and replacement cost for a wide range of ocean infrastructure assets.
- maintenance and operational costs associated with these assets.
- associated human resource needs.
- the outcomes of past federal investments in ocean technology and infrastructure, with recommendations for improvements.

Recommendation 27–4

Congress should create a mechanism to ensure a dedicated funding stream for critical ocean science infrastructure and technology needs. Spending priorities should be based on the National Ocean Council’s ocean and coastal infrastructure and technology strategy.

High-priority areas for funding include the following:

- the renewal of the University-National Oceanographic Laboratory System fleet and other essential air fleets and deep-submergence vehicles.
- the completion of the third and fourth dedicated fishery research vessels.
- the acquisition of vessels and infrastructure needed for an expanded national ocean exploration program.
- the Integrated Ocean Drilling Program non-riser drilling vessel.
- the refurbishment or replacement of two U.S. Coast Guard polar ice breakers.
- the ongoing modernization of existing assets, including telecommunications assets, laboratories, and other facilities.

Recommendation 27–5

Congress should support the infrastructure and technology requirements related to ocean and coastal management, operations, and enforcement. Priorities should be based on the National Ocean Council’s ocean and coastal infrastructure and technology strategy.

High-priority areas for funding include the following:

- recapitalization of the Coast Guard fleet based on an accelerated modernization plan.
- modernization of other federal fleets as needed.
- ongoing maintenance and upgrades of land-based operational and enforcement facilities.
- maintenance and upgrading of monitoring buoys, gages, and stations.
- coordinated satellite observing deployment.

Recommendation 27–6

The National Oceanic and Atmospheric Administration should establish four to six national virtual marine technology centers at existing institutions to provide coordinated access, through electronic means, to cutting-edge, large-scale research technologies.

Chapter 28: Modernizing Ocean Data and Information Systems

Recommendation 28–1

Congress should amend the National Oceanographic Partnership Act to establish Ocean.IT as the lead federal interagency planning organization for ocean and coastal data and information management. Ocean.IT should consist of representatives from all federal agencies involved in ocean data and information management.

Ocean.IT should:

- report to the National Ocean Council’s Committee on Ocean Science, Education, Technology, and Operations.
- create an interagency plan to improve coordination between the existing data centers and to integrate ocean and coastal data from different agencies and from the academic and private sectors.
- set priorities for archiving historical and nondigital data.
- coordinate shared resources and the acquisition of new hardware for use by the ocean sciences community.
- work with existing supercomputer centers to negotiate adequate time for ocean science needs.
- assess federal agency software needs and initiate interagency programs to create high-priority applications, such as new modeling programs.

- coordinate federal agency efforts to attract information technology expertise into the ocean sciences community.
- communicate with regional, state, and local organizations, including the regional ocean information programs, to determine user needs and feed this information back to relevant agencies.

Recommendation 28–2

The National Oceanic and Atmospheric Administration (NOAA) and the U.S. Navy should establish an ocean and coastal information management and communications partnership to generate information products relevant to national, regional, state, and local operational needs.

The NOAA-Navy partnership should:

- prioritize products and forecasts based on input from regional ocean information programs, Ocean.IT, Ocean.US, the Regional Associations of the IOOS, and other federal, regional, state, and local users.
- base products and forecasts on all available data sources.
- support the generation of new models and forecasts in collaboration with Ocean.IT, academia, and the private sector.

Recommendation 28–3

Ocean.IT should work with developers of the National Virtual Ocean Data System and other innovative data management systems to implement a federally-supported system for accessing ocean and coastal data both within and outside the national data centers.

Recommendation 28–4

The National Ocean Council (NOC) should establish and enforce common requirements and deadlines for investigators to submit data acquired during federally funded ocean research projects.

In establishing these requirements, the NOC's Committee on Ocean Science, Education, Technology, and Operations should:

- develop incentives to ensure more timely submission of investigator data to the national centers.
- require that a certification of data deposit be supplied to investigators who comply with the new regulations and that this certificate be presented before subsequent federal funding is provided.

Recommendation 28–5

The U.S. Navy should periodically review and declassify appropriate naval oceanographic data for access by the civilian science community.

Recommendation 28–6

The President should convene an interagency task force to plan for modernizing the national environmental data archiving, assimilation, modeling, and distribution system with the goal of creating an integrated Earth environmental data and information system.

The task force should:

- be comprised of all federal agencies with environmental data collection responsibilities.
- propose a plan for the national environmental data system that includes specific cost estimates and phasing requirements to ensure timely implementation.

Chapter 29: Advancing International Ocean Science and Policy

Recommendation 29–1

The United States should accede to the United Nations Convention on the Law of the Sea.

Recommendation 29–2

The National Ocean Council should coordinate an expedited review and analysis of the ocean-related components of the United Nations Convention on Biological Diversity and recommend to the U.S. Department of State whether, from an ocean perspective, ratification of this treaty would be beneficial to U.S. interests.

Recommendation 29–3

The National Ocean Council (NOC) should establish and oversee an interagency committee to support the development and implementation of ocean-related international policy.

The international committee of the NOC should:

- be chaired by the U.S. Department of State.
- make recommendations to the Assistant to the President, the Secretary of State, and other agency heads as appropriate, on international ocean policy.
- assess the implementation status of ocean-related treaties to which the United States is a party and recommend appropriate actions and funding required to fulfill U.S. treaty obligations.
- provide technical assistance to the NOC on international ocean issues.

Recommendation 29–4

The National Ocean Council should assess emerging international ocean-related management challenges and make recommendations for either incorporating these activities under existing management regimes or developing appropriate new ones. The U.S. Department of State should work with the international community to implement these recommendations.

Recommendation 29–5

The U.S. Department of State should improve its integration of ocean-related scientific expertise in policy and program development and implementation.

These improvements can be accomplished by:

- conducting State Department staff training about the relevance of scientific considerations to international ocean policy.
- increasing scientific support throughout the department to address current and emerging ocean-related issues, particularly through the use of borrowed personnel from resource agencies or academic institutions.
- creating mechanisms to facilitate input from the scientific community on complex ocean-related issues.

Recommendation 29–6

The United States should continue to participate in and support major international ocean science organizations and programs.

Recommendation 29–7

The U.S. Department of State should offer strong support for U.S. scientists conducting research programs around the world. Existing international partnerships should be strengthened and new partnerships promoted to facilitate the conduct of international research.

Recommendation 29–8

The United States should increase its efforts to enhance long-term ocean science and management capacity in other nations through grants, education and training, technical assistance, and sharing best practices, management techniques, and lessons learned.

Chapter 30: Funding Needs and Possible Sources

Recommendation 30–1

Congress should establish an Ocean Policy Trust Fund in the U.S. Treasury, composed of unallocated federal revenues from outer Continental Shelf (OCS) oil and gas activities, plus revenues from any new activities approved in federal waters, to support the nation’s new coordinated and comprehensive national ocean policy. Trust Fund monies should be disbursed to coastal states, other appropriate coastal authorities, and federal agencies to support improved ocean and coastal management, based on an allocation determined by Congress with input from the National Ocean Council. The Trust Fund should be used to supplement—not replace—existing appropriations for ocean and coastal programs.

The Ocean Policy Trust Fund should be distributed as follows:

- \$500 million in the first year, increasing to \$1.0 billion in the third and subsequent years, among all coastal and Great Lakes states, territories, and federally-recognized tribes with coastal resource treaty rights. A larger share should go to OCS producing states to address offshore energy impacts. The funds should be used for the conservation and sustainable development of renewable ocean and coastal resources, including any new responsibilities that arise as a result of Commission recommendations and the expansion of programs and activities that are currently underfunded.
- the remainder of the funds to federal agencies to address the new or expanded activities assigned to them as a result of Commission recommendations.

Recommendation 30–2

The National Ocean Council, in cooperation with the Office of Management and Budget, should coordinate the compilation of a biennial report from the President on ocean funding, as required by the Oceans Act of 2000, including establishment of a consistent reporting format and a more useful classification scheme.

