

Inform Decisions and Improve Understanding Strategic Action Plan Full Content Outline

Objective: Increase knowledge to continually inform and improve management and policy decisions and the capacity to respond to change and challenges. Better educate the public through formal and informal programs about the ocean, our coasts, and the Great Lakes.

I. Overview of the Priority Objective

This strategic action plan (SAP) addresses the National Ocean Policy priority objective to:

- Ensure the availability of cross-cutting scientific research and technological innovation for developing management and policy decisions for ocean, coastal, and Great Lakes ecosystems and processes;
- Engage in ocean exploration to expand knowledge that has the potential to lead to new discoveries for energy resources and improved human health and well-being;
- Develop a comprehensive awareness and understanding of current and emerging human activities, including traditional, cultural, and historical, that affect our coastal watersheds and the ocean; and
- Increase the understanding of the importance and benefits that the ocean, coasts, and Great Lakes provide to our Nation's people.

II. Context and Continuity

Meeting this priority objective requires:

- Supporting basic and applied disciplinary and interdisciplinary scientific research, mapping, monitoring, observation, and assessment, coupled with development of forecasts, models, interactive maps, and other decision-support tools to address priority issues in ocean, coastal, and Great Lakes environments, including climate change, risks, and vulnerabilities;
- Increasing understanding of existing, emerging, and future uses of coastal, marine, and Great Lakes resources, effects of such uses on the ecosystems, tradeoffs among uses, and ways to increase sustainability of uses;
- Increasing scientific knowledge and detailed understanding of current and emerging human activities taking place in and around our Nation's waters;
- Improving management of resources and uses through data integration, increased scientific knowledge supporting management, development and improvement of spatially-explicit decision-support tools, and transition of research results into information products and tools for management;
- Increasing human capacity, developing a knowledgeable workforce, and improving education in ocean-related fields, including a focus on disadvantaged and underrepresented communities;
- Increasing ocean literacy through formal and informal education and public outreach;
- Supporting fundamental research for ocean exploration and discovery; and

- Improving integration of social and natural sciences in developing policy and management actions for the ocean, coastal, and Great Lakes ecosystems.

III. Body of the Plan

A. Action 1 - Prioritize research activities based on “Science for an Ocean Nation: An Update of the Ocean Research Priorities Plan.”

Federal agencies and partners will use the new “Science for an Ocean Nation: An Update of the Ocean Research Priorities Plan” (“Science for an Ocean Nation”) as the primary basis for prioritizing research activities within their agencies. They will coordinate such activities across agencies to achieve maximum efficiencies in advancing the ocean sciences. Linkages between the research priorities in “Science for an Ocean Nation” and the National Ocean Policy priority objectives are explicitly identified in the new report, thereby allowing agencies to easily identify the connections between them. This action has connections to the data gaps and research needs identified in all eight of the other SAPs. (Note: While “Science for an Ocean Nation” has not yet been officially released, a preliminary draft was available to the SAP writing team and the full report will be available to the public within the next few months. Meanwhile, we urge readers to refer to the 2007 predecessor of “Science for an Ocean Nation” entitled “Charting the Course for Ocean Science in the United States for the next Decade.” The new report differs from its predecessor by more strongly emphasizing the issues of ocean acidification and changing conditions in the Arctic, and by specifically linking the research priorities to the needs of the National Ocean Policy.)

1. Why Do This

- The National Ocean Policy calls for use of “the best available science and knowledge to inform decisions affecting the ocean, our coasts, and the Great Lakes, and enhance humanity’s capacity to understand, respond, and adapt to a changing global environment.” It also calls on us to “improve our understanding and awareness of changing environmental conditions, trends, and their causes, and of human activities taking place in ocean, coastal, and Great Lakes waters.”
- The new “Science for an Ocean Nation” lays out research needs to inform policy decisions across six broad societal themes that directly connect with the objectives of the National Ocean Policy.
- It therefore serves as a valuable framework to advance knowledge in a manner that will improve understanding and provide for informed decisions using the best available science.

2. Timeframe - Near-term

3. Outcomes

- The recommendations in “Science for an Ocean Nation” significantly influence agency decisions about resource allocations and priorities within their science or education budgets.

- Increased knowledge leads to enhanced sustainable uses of and benefits from ocean, coastal, and Great Lakes resources.
- Better stewardship of resources is enabled by increased understanding of ecosystem processes, impacts of human uses, and vulnerabilities.
- Knowledge allows the creation of comprehensive and generic multi-hazard risk assessments and warning system tools to support policy and management, as well as models, policies, and strategies for mitigation of and/or finding adaptive solutions to coastal and ocean hazards, ecosystem variability, and climate change.

4. Milestones

- Agencies reference “Science for an Ocean Nation” in budget documents used to justify and defend budget decisions and include priorities from the report in annual budget requests.

5. Gaps and Needs in Science and Technology

- “Science for an Ocean Nation” identifies a number of gaps and needs.

B. Action 2 – Provide science to support emerging sustainable uses of resources.

Federal agencies and partners will provide science and services to support the development and production of emerging sustainable uses of ocean, coastal, and Great Lakes resources.

1. Why Do This

- Fundamental and applied scientific information and technology are needed to characterize resources, their uses, and potential environmental impacts.
- Providing scientific information and services will ensure that emerging and future uses of ocean, coastal, and Great Lakes resources are economically and ecologically sustainable.
- This will also better inform the process of coastal and marine spatial planning (CMSP) regarding potential economic and environmental impacts of compatible uses, and inform ecosystem-based management (EBM) (see the CMSP and EBM SAP outlines).

2. Timeframe - Long-Term

3. Outcomes

- Private industry, government agencies, and partners make better informed decisions about the feasibility and operations of sustainable uses of ocean, coastal, and Great Lakes resources based on environmental, social, and economic data and predictive modeling.
- Increased opportunities for sustainable and emerging uses of ocean, coastal, and Great Lakes resources, resulting in increased opportunities for economic growth, creation of new jobs, and increased sustainability of traditional ocean uses.

4. Milestones

- Develop joint agency aquaculture initiatives through the Joint Subcommittee on Aquaculture and other partnerships.
- Design new renewable energy technologies using the integrated oceanic and atmospheric observation system and modeling programs.
- Inventory the compiled nation-wide renewable energy potential and complete the national offshore wind energy resource map.
- Develop test beds to provide enhanced wind energy forecasts via the High Resolution Rapid Refresh modeling system.

5. Gaps and Needs in Science and Technology

- Research and technology development to support vibrant, profitable, and sustainable ocean, coastal, and Great Lakes resource and emerging technologies industries.
- Information necessary for existing and emerging resource uses to make informed decisions through the CMSP framework.

C. Action 3 - Provide science support for managers and policy makers.

To enable and inform science-based decisions, Federal agencies and partners will regularly assess needs of resource managers and policy makers for research, data, and information, directly respond to those needs by providing data and information, developing and improving spatially-explicit decision-support tools (e.g., integrated ecosystem assessments), and expanding training and technical assistance. This action will connect with related training activities with the EBM SAP.

1. Why Do This

- Robust decision-support tools and processes support rapid, effective, and publicly-supported management of growing uses of ocean, coastal, and Great Lakes resources.
- Providing needed research, data, information, and traditional knowledge will help ensure sustainability of natural resources, biodiversity, and critical ecosystem services.
- Assessing management and policy needs will also minimize the negative environmental and human health impacts (particularly due to climate change and sea-level rise) on vulnerable communities.

2. Timeframe - Mid-Term

3. Outcomes

Ocean, coastal, and Great Lakes decision-makers use technically robust decision-support tools, processes, and services that:

- Integrate scientific, environmental, and socio-economic information to support EBM and CMSP;

- Provide meaningful indicators of ecosystem health and societal goals; and
- Support prediction and scenario evaluation to make informed decisions, with particular focus on CMSP.

4. Milestones

- Create an interagency (Federal, State, Tribal, regional, and local) team that will complete an assessment of existing and needed research, data, information, traditional knowledge, decision-support tools, and training to support ocean, coastal, and Great Lakes decision-makers.
- Develop and provide appropriate training curricula, decision-support tools, and information services to meet the needs of ocean, coastal, and Great Lakes decision-makers and other stakeholders, as identified in the interagency assessment.

5. Gaps and Needs in Science and Technology

- Social science research and application related to the effective design and application of tools, technologies and information services (See Action 7).
- Quantification and valuation of ecosystem services related to coastal management decision making.

D. Action 4 - Develop human capacity and the workforce.

Develop human capacity and a knowledgeable workforce, and provide scholarships, internships, fellowships, and other opportunities for high school, undergraduate, and graduate students, particularly from underrepresented groups, pursuing degrees in ocean science, management, and related fields.

1. Why Do This

- Current graduation rates in geosciences are low, particularly for underrepresented groups.
- U.S. competitiveness depends on a well-educated workforce.

2. Timeframe - Mid-term

3. Outcomes

- More students, particularly from underrepresented groups, graduate in academic fields related to ocean science and management at the undergraduate and graduate level.
- The number of students entering the workforce through Federally-supported fellowship and internship programs related to ocean science and management is increased.
- K-12 students are engaged in extracurricular ocean-related Science, Technology, Engineering, and Mathematics (STEM) activities.

4. Milestones

- Award scholarships, fellowships, and internships for high school, undergraduate, and graduate students that leverage Federal investment in research, laboratories, and natural areas to support education.
- Focus on underrepresented groups by working with professional societies, nonprofits, and minority-serving institutions when recruiting applicants for scholarship, fellowship, and internship programs.
- Develop a new post-doctoral program for ocean sciences.
- Host competitions and activities for high school students that demonstrate impact on students' choices of future academic and career paths.
- Support underwater and ocean technology programs for secondary and post-secondary education with Federal resources.
- Fund studies to track changes in the future ocean workforce.

5. Gaps and Needs in Science and Technology - None

E. Action 5 - Increase ocean literacy.

Increase ocean literacy and expand the accessibility and use of ocean content in formal and informal educational programming for students, teachers, and the public.

1. Why Do This

- The Ocean Project study shows high public concern about but low understanding of ocean issues.
- Studies by the National Research Council and others show effectiveness of formal and informal science education programs at raising levels of awareness and stewardship.

2. Timeframe - Mid-term

3. Outcomes

- Greater access to Federally-funded ocean research for formal and informal education institutions.
- Increased public awareness and understanding of ocean science issues.
- Communities are better stewards of ocean, coastal, and Great Lakes resources.

4. Milestones

- Support inclusion of ocean content in revised national science education standards.
- Support regional ocean education plans.
- Complete a study of environmental attitudes and knowledge in middle schools with environmental education programs.
- Develop a comprehensive ocean science curriculum for middle school based on Ocean Literacy Essential Principles.

- Use data from surveys of community understanding and attitudes of ocean issues to inform future educational programming, communications, and public engagement.
- Increase the numbers of scientists engaged in ocean education.
- Engage students and public audiences in ocean science and management through innovative programs and emerging technologies.
- Create new professional development opportunities for educators that use Federal ocean research and data; train educators to reach multicultural audiences.
- Increase use of Ocean Literacy Essential Principles and related principles by networks and partners that engage students, teachers, and the public.
- Increase outdoor and experiential learning opportunities in coastal watersheds.
- Develop infrastructure and demonstration projects that deliver ocean observing data for formal and informal education.
- Support citizen science programs that engage participants in ocean sciences.
- Use inventories of Federal STEM education programs to identify additional partnership opportunities.
- Support efforts to incorporate as appropriate native and traditional knowledge into ocean education materials.

5. Gaps and Needs in Science and Technology - None

F. Action 6 - Engage in ocean exploration.

Federal agencies will engage in exploration to expand our knowledge of little-known Great Lakes and oceanic biodiversity, biogeochemical processes, ecosystem services, and climate interactions to bring new understanding and benefits to research, management, policy, and the public.

1. Why Do This

- Ninety-five percent of the ocean is poorly known or essentially unexplored, and the potential for discoveries to expand knowledge, lead to new energy sources, develop new products, and inspire the next generation of ocean scientists is enormous.
- For the U.S. to be a global leader in ocean exploration and knowledge of the connections between human well-being and the natural environment, we need to explore currently unexplored or poorly-known Great Lakes and oceanic biodiversity, biogeochemical processes, ecosystem services, and climate interactions at the global-scale.

2. Timeframe - Mid-term

3. Outcomes

- New ocean discoveries expand our knowledge and understanding of Great Lakes and oceanic biodiversity, biogeochemical processes, ecosystem services, and

climate interactions, and this new knowledge informs management, policy, the public, and future research.

- Scientific insights and innovative technologies enhance the Nation's competitiveness by increasing scientific and technological capability and discovering new opportunities for biomedical and business development.
- The pace, efficiency, and scope of exploration are increased, and resulting discoveries are disseminated to the global scientific and societal enterprise.

4. Milestones

- Execute five expeditions in poorly-known or unknown Great Lakes and national and international ocean regions.
- Communicate new discoveries from five expeditions regularly to the public as well as to the scientific community.
- Establish five new cost-sharing partnerships with domestic and international governmental and nongovernmental entities that support global-scale systematic exploration.

5. Gaps and Needs in Science and Technology

- Innovative tools, technologies, and international partnership activities to provide the most cost-effective strategies for ocean exploration and discovery.
- A suite of common products related to ocean exploration and research agreed to by Federal agencies and partners.
- An easily accessible electronic library of scientific information and products related to ocean exploration, research, and education efforts.

G. Action 7 - Integrate social and natural scientific information.

Federal agencies and partners will integrate information from a broad range of social sciences with the natural sciences.

1. Why Do This

- Information from social sciences and economics must be routinely integrated with the natural sciences to inform research, policy development, and management decision-making, especially for ecosystem-based management and restoration, to improve public understanding of management actions.
- Incorporating social and natural sciences will support and enhance sustainable economies and other uses.
- Using social science research to apply decision theory to ocean issues will inform ocean policy decisions and assist in developing best management practices.

2. Timeframe - Long-term

3. Outcomes

- Methods and metrics that integrate the social and natural sciences are developed.
- Knowledge of human behavior, attitudes and preferences, societal values, economics, and human use of and dependence on ecosystem services is routinely acquired and incorporated into ecosystem assessments, decision-making, and management of ocean, coastal, and Great Lakes resources.
- Public attitudes and preferences are routinely incorporated into ecosystem assessments, policy, and management decisions.

4. Milestones

- Develop one or more pilot projects that use socioeconomic and natural sciences to identify, develop, and test valuation frameworks for ecosystem services.
- Based on the results of the pilot projects, develop a framework for valuing the ecosystem services of the Nation's critical ocean, coastal, and Great Lakes resources.
- Perform trends analyses to characterize human interactions with the ocean, coasts, and Great Lakes and identify 'cutting edge' issues, with intent to maintain relevant data collection and analyses for the long term.
- Apply, adapt, or develop two new decision-support tools that integrate information from natural and social sciences and are targeted toward improving the ability of Federal, State, and Tribal authorities to meet their economic, environmental, public health and safety, social justice, and equity objectives related to ocean, coastal, and Great Lakes resources and uses.

5. Gaps and Needs in Science and Technology

- More robust approaches to incorporate natural and social science perspectives and information in ongoing research, and policy development to support ecosystem-based management and restoration.
- More quantitative data on ecosystem processes, functions, and services, such as for different landscape and habitat types and under different environmental conditions.
- More broadly accepted methods for determining monetary and non-monetary values of ecosystem services that are relatively inexpensive and easy to implement and for the public to understand.