Ocean, Coastal, and Great Lakes Observations, Mapping, and Infrastructure
Strategic Action Plan
Full Content Outline

Objective: Strengthen and integrate Federal and non-Federal ocean observing systems, sensors, data collection platforms, data management, and mapping capabilities into a national system and integrate that system into international observation efforts.

I. Overview of the Priority Objective

- Our ability to understand weather, climate, ocean, geological/geophysical, and living marine resource processes and dynamics, to forecast key environmental conditions, and to strengthen ocean management decision-making at all levels is informed by a sound knowledge base and the integration of new tools and data.
- Efficient and effective coordination of tools, continued development of new tools and infrastructure, and their integration into a cohesive, unified, robust system is becoming increasingly difficult as more and more data collection and processing systems come on line.
- New observation technologies supported by robust infrastructure give us the ability to observe and study global processes at all scales, and advance our knowledge and understanding of the ocean, our coasts and the Great Lakes.
- The actions in this outline are intended to support acquisition and delivery of the knowledge and understanding needed to make progress on the other eight national priority objectives and further implement the National Ocean Policy.

II. Context and Continuity

- To be fully successful, the actions in this plan must be considered and implemented within the broader context of the other eight priority objectives in the National Ocean Policy. Observations, mapping, and infrastructure provide the means to gather information necessary to make progress in all areas of the policy's implementation.
- Meeting the objectives of the National Ocean Policy requires:
  - Geospatial information (data, charts and interpretive maps) obtained through coordination and leveraging of ocean and coastal mapping programs, resources and capabilities among federal and non-federal entities, including where appropriate, international collaborations.
  - Systems and associated infrastructure to improve data collection for national priority objectives, including the means to develop and test new technologies.
  - A framework for data integration across a diverse range of specialties and locations that will improve coordination for decision-making.
- Addressing our ability to observe the ocean, our coasts, and the Great Lakes and to deliver data needed to support informed decisions is an ongoing effort. This plan highlights the near-term

actions that will be undertaken now and lays the foundation for continuing efforts in the mid- and long-term.

- Ultimately this and successive plans are intended to result in progress in the following areas:
  - A nationally integrated system of ocean, coastal, and Great Lakes observing systems.
  - Delivery of data on key ocean, coastal, and Great Lakes variables.
  - Effectiveness of unmanned vehicles and satellite remote sensing platforms.
  - Improved capabilities and reduced gaps in the National Oceanographic Fleet of ships and related facilities.
  - Improved data management, communication, access, and modeling systems for the timely integration and dissemination of data and information products.
- These areas form the focus of the actions identified in this plan.

III. Body of the Plan

A. Action 1 – Examine the status of the National Oceanographic Fleet.
Provide a status report on the National Oceanographic Fleet, and identify ways to improve its utilization to achieve the priorities of the National Ocean Policy. The National Oceanographic Fleet is comprised of the federally-owned oceanographic ships operated by both Federal and academic organizations.

1. Why Do This
- The National Oceanographic Fleet is essential to achieve the priorities of the National Ocean Policy.
- This action seeks to identify fleet capabilities and gaps, and to improve coordination and management of existing fleet resources to close some of these gaps.

2. Timeframe – Near-term

3. Outcomes
- Identification of National Ocean Policy at-sea survey (oceanographic and living-marine resource) and research missions, especially in the Arctic.
- The current National Oceanographic fleet's status, capacities, and capabilities become the basis for planning survey and research work.

4. Milestones
- Report on National Ocean Policy at-sea survey (oceanographic and living-marine resource) and research missions priorities.
- Update the "Federal Oceanographic Fleet Status Report."
- Complete analysis and selection of fleet effectiveness performance measurements.
- Complete evaluation of a prototype platform allocation planning tool.

- Assess the capabilities for oceanographic ships to support multi-mission agency activities in the Arctic.

5. Gaps and Needs in Science and Technology
- New ship designs to improve operational efficiencies at sea.

B. Action 2 – Examine the status of unmanned and satellite remote sensing systems.
Provide a status report on the use and application of unmanned and satellite remote sensing systems, and identify ways to improve utilization of these systems, to achieve the priorities of the National Ocean Policy. The current inventory of federal and non-federal unmanned systems includes Unmanned Undersea Vehicles (both tethered and autonomous), Unmanned Air Systems, and Unmanned Surface Vehicles.

1. Why Do This
- Air and sea unmanned systems already available from federal and non-federal partners can extend or multiply the reach of survey (oceanographic and living-marine resource) and research missions.
- The potential for these systems to aid in science and emergency response activities.

2. Timeframe – Mid-term

3. Outcomes
- Improved and more cost effective data collection to meet National Ocean Policy survey and research mission requirements.

4. Milestones
- Report on National Ocean Policy Priority Objective observation requirements suitable for accomplishment with unmanned systems.
- Complete an inventory of available federal and non-federal unmanned systems.
- Complete analysis and selection of unmanned system utilization performance measurements.
- Complete evaluation of a prototype unmanned system inventory and planning tool.
- Assess the potential of developing unmanned sub-ice data collection vehicles.
- Report on regulatory restrictions or obstacles that limit use of federal and non-federal unmanned systems, and identify ways to enable better use of these systems to achieve NOP priorities.

5. Gaps and Needs in Science and Technology
- Access to regulated airspace for unmanned aerial vehicle operations.
- Improved battery technology for unmanned or autonomous underwater vehicles.
- Integration of unmanned systems into multi-purpose observing systems.

- Coordination of autonomous operations of individual and swarms of unmanned systems.
- Sustained critical global and regional ocean time series observations.

C. Action 3 – Use advanced observation and sampling technologies to observe and study global processes.
Use advanced observation and sampling technologies currently funded to observe and study global processes at all scales and to further develop observational capabilities.

1. Why Do This
   - Short- to mid-term observing projects that utilize innovative observing tools and infrastructure provide significant advances in knowledge and understanding of the ocean, the coast, and the Great Lakes. These programs serve as a test-bed for addressing the science and technology gaps across the national priority objectives and the strategic action plans.
   - These activities are related to and will be coordinated with those listed under the Strategic Action Plan for Informing Decisions and Improving Understanding.

2. Timeframe – Mid-term

3. Outcomes
   - Scientific technique for integrating short-term data with sustained long-term ocean observing.
   - Scientific technique for integrating coastal and ocean, remote and in situ, physical and biological observations, and relating these observations to socio-economic data.
   - Real-time ocean data from the Ocean Observatories Initiative observing system for use in implementing the National Ocean Policy.
   - New scientific information for exploring the complexities of land, ocean, atmosphere, ice, biological, and social interactions.

4. Milestones
   - Implement data and/or modeling techniques which support a global mapping capability for seasonal changes in, for example, ocean surface topography, currents, waves, winds, phytoplankton content, nutrients, sea-ice extent, rainfall, sunlight reaching the sea, and sea surface temperature.
   - Release of report on Opportunities in Ocean Observations and Ecosystem Health.
   - Complete an inventory of unique national coastal and ocean facilities (and associated data) that fall outside normal assessments.

5. Gaps and Needs in Science and Technology
   - Improved battery technology for unmanned vehicles and moored buoy sensor systems.

- Improved data communication technology from moored buoy sensor systems.
- Improved optical and biological sensors.
- Improved understanding of interrelations between the physical ocean phenomenon, the ocean observational data and the data identifying socioeconomic impacts.

D. Action 4 – Implement the Integrated Ocean Observing System (IOOS).
Implement IOOS to sufficient functional capability to provide standardized data discovery and access to a minimum set of ocean observing data from federal and non-federal sources.

1. Why Do This
    - IOOS initial capability will provide long-term, sustained, verified and validated ocean observations to meet the data needs of the National Ocean Policy
    - In particular, it will contribute to the extensive data needs for monitoring requirements of ecosystem-based management, water quality and sustainable practices on land, changing conditions in the Arctic, and ecosystem restoration and protection, as well as the Coastal and Marine Spatial Planning (CMSP) decision-making processes and the inform decisions and improve understanding strategic area.

2. Timeframe – Mid-term

3. Outcomes
    - A sustained IOOS that is responsive to and reflects priorities identified across federal agencies, regional planning entities, and state and local stakeholder communities.
    - Coordinated development that advances the individual and shared objectives of, and provides for integration across, targeted observing efforts including, for example, biological (e.g. Ocean Biographic Information System) and water quality (National Water Quality Monitoring Network) communities.
    - Improved access to standardized data to support the following societal goals: maritime commerce, safety at sea, weather and climate forecasts and effects, national and homeland security, sustainable living marine resources, and monitoring ecosystem health.

4. Milestones
    - Release IOOS certification standards.
    - Provide an independent cost estimate to implement the Integrated Ocean Observing System.
    - Implement the "National Water Quality Monitoring Network for U.S. Coastal Waters and Their Tributaries" design, which represents an integrated, multi-disciplinary approach, leveraging State and other diverse sources of data, information, and programs and linking observational capabilities from land-to-sea.

This is a preliminary document that constitutes an important but interim step toward completion of the full strategic action plan.

5. Gaps and Needs in Science and Technology
- Improved socio-economic information to quantify benefits of a long-term sustained global ocean, coastal, and Great Lakes capability and to refine products delivered to better meet needs.
- Advancements in ability to synthesize outputs from models of different scales.
- Common data management practices to effectively and efficiently utilize data from multiple, disparate collection systems and long-term data stewardship.

E. Action 5 – Coordinate and leverage ocean and coastal mapping efforts.
Coordinate and leverage ocean and coastal mapping programs, resources, capabilities, and capacities among federal and non-federal entities, for the provision of mapping data, value-added decision-support products, and state-of-the art mapping technologies.

1. Why Do This
- Coordination and leveraging across mapping efforts will more efficiently and effectively meet National requirements for ocean and coastal mapping services, data, products, capabilities, tools, technologies, and research and development.
- Addressing these requirements supports and advances priority objectives of the National Ocean Policy.

2. Timeframe – Long-term

3. Outcomes
- Better informed decision-making as a result of improved user access to and identification of authoritative ocean and coastal mapping data.
- Improved coordination in defining ocean and coastal mapping data gaps and efficiencies in allocating mapping acquisition resources.
- Improved support for ocean and coastal decision-makers through improved mapping data integration and product development coordination.

4. Milestones
- Complete development of a national ocean and coastal mapping inventory that will serve as a clearinghouse for mapping data and interpretive information and a registry of data acquisition activities.
- Develop an annual national ocean and coastal mapping/data acquisition plan.
- Make mechanisms available for leveraging the expertise, personnel, platforms, sensors, processing capabilities, etc. of federal and non-federal partners.

5. Gaps and Needs in Science and Technology
- Autonomous air, surface and underwater technologies to support acquisition of mapping data.

- Ability to efficiently acquire seafloor data in shallow, turbid water and efficiently and accurately measure topography and shallow bathymetry in wetland and marsh environments.
- Improvements in automated seafloor and land characterization techniques.
- Improvements in capabilities to merge multiple source seafloor and land data and create seamless environmental characterizations.

F. Action 6 – Develop an integrated observation data management system.
Develop an integrated physical, biological, chemical, geological/geophysical, ecological and observation data management system as part of the larger, overarching observing infrastructure to support the national priority objectives.

1. Why Do This
- Meeting the data and information requirements of all the priority objectives in an integrated and collaborative manner will help enable the delivery of end-to-end data services including data collection, management, stewardship, integration, and product dissemination via Web based sources. This will maximize the utility of ocean and coastal observing capacity for the Nation.

2. Timeframe – Long-term

3. Outcomes
- National, enterprise-wide data and information management, archive, access, and long-term stewardship systems and supporting policies that ensure the full value of the Nation's investment in ocean, coastal, and Great Lakes data and information.
- A national data management and stewardship system that promotes the use of authoritative observations and mapping data.
- Support for an operational integrated National Information Management System by identifying existing systems and integrative functions and based on authoritative data to support coastal and marine spatial planning (CMSP).

4. Milestones
- Define Federal and non-Federal partners' data and information management, archive, access, and long-term stewardship systems modeled on the *U.S. IOOS®: A Blueprint for Full Capability*.
- Ensure data collected from existing systems are submitted to the relevant national archive centers for long-term stewardship in a manner that supports the National Information Management System and other activities, and are easily retrievable in a format useable for decision-making.
- Ensure mapping data are readily accessible through Federal geospatial systems, through support of the inventory work of the Interagency Committee on Ocean and Coastal Mapping.

- Agree to, among international stakeholders, formats for data transmission via the Global Telecommunications System (GTS), metadata and version control, as well as best practices for observing and quality.

5. Gaps and Needs in Science and Technology
- Improved data interoperability between observing networks to facilitate sharing across agencies and partners.
- Common data management practices to effectively and efficiently utilize data from multiple, disparate collection systems and long-term data stewardship.