

Report to Congress On

**National Coastal
Management Performance
Measurement System**



Purpose of Report

The National Coastal Management Performance Measurement System is part of an ongoing effort by the National Oceanic and Atmospheric Administration (NOAA) to work with the states to assess the effectiveness of the Coastal Zone Management Act (CZMA). This report specifically responds to Congressional requests to develop an assessment of the national impact of coastal management programs, and to report to the Appropriations Committees on progress in meeting the objectives of the CZMA. This direction was given in the Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Acts of 2001, 2002, and 2003 – P.L. 106-553, 107-77, and 108-7. With this report, NOAA is initiating the National Coastal Management Performance Measurement System to implement a consistent framework for regularly reporting on the progress in meeting the goals of the CZMA by the National Coastal Management Program and the National Estuarine Research Reserve System.

The report summarizes the process for developing coastal management indicators, identifies suggested coastal management indicators, and outlines an implementation plan for the National Coastal Management Performance Measurement System. Overall, the National Coastal Management Performance Measurement System will inform both federal and state coastal managers about the effectiveness of program actions within the context of national goals of the CZMA.

The primary goal of this system is for NOAA to work with the states to track indicators of effectiveness of the coastal management programs and reserves at the national level. Because state coastal resources and development challenges vary across the nation, and management programs and reserves are designed to meet state and local priorities, NOAA worked with the states to develop program specific indicators as needed to supplement the national indicators. The aim of this system is to provide relevant and applicable information for state and local management decisions.

In addition to the assessment of management outcomes, NOAA will prepare annual assessments of activities funded under the CZMA. NOAA is also working with the states and other federal agencies and stakeholders to develop a consistent framework for a national state of the coast report that will serve as a report card on the condition of America's coastal resources.

Acknowledgements

Sincere appreciation and thanks to the representatives from the coastal states and reserves for their many hours of hard work and participation on the performance measurement workgroups.

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National Coastal Management Performance Measurement System

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Ocean and Coastal Resource Management

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LIST OF ACRONYMS

CZMA	Coastal Zone Management Act of 1972, as amended
NOAA	National Oceanic and Atmospheric Administration
NCMP	National Coastal Management Program
NERRS	National Estuarine Research Reserve System

EXECUTIVE SUMMARY

Since passage of the Coastal Zone Management Act (CZMA) in 1972, the federal government has worked with the states to support the development and implementation of coastal management programs in 34 of 35 eligible coastal and Great Lakes states and territories (hereinafter “states”) covering 99 percent of the nation’s coast, as well as the establishment of 26 reserves in 21 coastal states and territories within the National Estuarine Research Reserve System (NERRS). Regular evaluations of each state management program and reserve as well as independent studies have provided evidence that the partnership between the states and the National Oceanic and Atmospheric Administration (NOAA) has been successful in achieving the goals of the CZMA. Because the CZMA provided the states flexibility to tailor programs to their unique resources and issues, it has been difficult to quantitatively demonstrate the national impact of these programs. Thus, NOAA has sought to quantify program performance at the national scale through the development of the National Coastal Management Performance Measurement System.

The primary goal of the National Coastal Management Performance Measurement System is to track indicators of effectiveness of the coastal management programs and reserves at the national level. The system consists of a suite of performance indicators to track how well the states are achieving CZMA objectives and contextual indicators to track environmental and socioeconomic factors influencing program actions. This quantification of coastal management outcomes over time will not only respond to Congressional requests for improved accountability, but it will also facilitate adaptive management, enhance communication, and inform planning and resource allocation decisions by federal and state coastal managers. Because each coastal management program and reserve is dealing with different priorities and resources, program-specific indicators may need to supplement the national indicators to provide more applicable information for state and local management decisions.

Beginning in 2001, NOAA contracted with the H. John Heinz III Center for Science, Economics and the Environment to develop a framework for the National Coastal Management Performance Measurement System. The Heinz Center panel concluded six broad-based categories, or focus areas, captured the major CZMA objectives and, more importantly, the success or failure of these areas could and should be measured. The panel also identified a set of dimensions, or subthemes, of each focus area to help explain how coastal management activities can influence the objectives of the CZMA. The report recommended the development of specific indicators for each dimension.

NOAA led collaborative work groups and studies involving coastal management programs and reserves to develop a performance measurement system providing flexibility to accommodate varying management structures and differing coastal priorities across coastal states. For the National Coastal Management Program (NCMP), which focuses on planning and management of coastal resources, the six focus areas of the Heinz Center framework (coastal habitats, coastal hazards, coastal water quality, coastal dependent uses, public access, coastal community development), and government coordination and decision-making were the chosen categories of indicators. The indicators for the NERRS reflect their focus on education, research, and stewardship of the protected area within the coastal zone. Most of the indicators will be collected by all programs and thereby allow aggregation across programs to provide a national or regional picture. However, some of the indicators will provide flexibility for varying priorities and coastal environments.

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To report information collected through the National Coastal Management Performance Measurement System, NOAA will produce three reports. These reports include: an annual progress report prepared by NOAA to document tasks, projects, and accomplishments achieved through funding provided under the CZMA; a national performance measurement report identifying trends related to the national focus areas; and a national state of the coast report.

NOAA, in coordination with coastal states, has strived to design a performance measurement system that will provide enough information to determine the effectiveness of coastal management programs and reserves in achieving on-the-ground outcomes without imposing a cumbersome data collection and reporting requirement. While indicators have been identified, many questions remain about how the indicator data will be collected and compiled and how much money, technical assistance, and staff time will be needed at the state and federal levels to support this data collection and compilation. To answer these questions, a phased approach will be used for initial implementation of the National Coastal Management Performance Measurement System. Phase I of NCMP implementation will use a pilot study approach to implement a majority of the performance indicators in coastal management programs in a subset of states. The NERRS will phase in implementation over time in reserves, with Phase I limited to indicators with known data available.

The following performance measures will be examined during the pilot phase:

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National Coastal Management Program	
Suggested Contextual Indicators	
Population in coastal zone	
Employment in coastal zone	
Infrastructure investment in coastal zone	
Water quality	
Endangered species identified in coastal zone	
Invasive species identified in coastal zone	
Area subject to coastal hazards	
Population subject to coastal hazards	
Coastal land cover change	
Habitat of particular concern, as identified by each state	
Type and quantity of commercial and recreational shellfish areas	
Coastal dependent employment	
Coastal dependent businesses	
Suggested Performance Indicators*	
Coastal Habitats	Coastal Community Development
Coastal habitats mapped	Open space acquired/protected
Habitat of particular concern impaired by human activity	Waterfront redevelopment plans/programs
Habitat of particular concern restored	Restrictions on public investment in fragile or hazardous areas
Habitat of particular concern impacted by invasive species	Coastal Dependent Uses
Coastal areas protected through acquisition	Planning/management mechanisms to place priority on coastal water dependent uses
Watershed or ecosystem management plans and/or programs	Planning/management mechanisms to place priority on major facilities related to defense, energy, fisheries, and ports
Coastal Hazards	Government Coordination and Decision-Making
Coastal zone mapped for multiple hazards	Approved Coastal Management Programs
Setbacks or other locational requirements employed by state or local governments	Approved National Estuarine Research Reserves
Communities with enhanced codes to reduce structural damage	Approved Coastal Nonpoint Source Pollution Control Programs
Communities with post-disaster redevelopment plans	Approved Coastal and Estuarine Land Conservation plans
Communities designated 'disaster resistant' or Project Impact	Permits issued
Coastal Water Quality	Projects reviewed for federal consistency
Extent of Coastal Nonpoint Pollution Control Program implementation	Financial assistance to local governments
Closure of public beaches	Technical assistance to local governments
Closure of classified shellfish areas	Partnerships with local governments, agencies, and other institutions
Presence and nature of beach monitoring programs	Publications developed/distributed
Public Access	Participants in workshops
Access areas acquired	Public awareness
Accessways developed/improved	Public meetings held or persons attending
States with access guides	Participation in stewardship programs
Quality of experience	Research undertaken or supported

* Categories of performance indicators based on CZMA Section 303 objectives.

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National Estuarine Research Reserve System
Suggested Contextual Indicators
Population change and development trends
Climate change and variability
Extreme weather events
Nutrient loading
Invasive species introduction
Level of public knowledge about the function and importance of estuaries
Land cover
Habitat distribution
Habitat quality
Abiotic water quality
Weather monitoring
Nutrient levels
Biological monitoring
Public polling
Suggested Performance Indicators*
Goal 1 - Improve coastal decision-making by generating and transferring knowledge about coastal ecosystems
Habitats and ecological conditions monitored and characterized
Understanding of local conditions through research staff projects
Level of use of reserves by outside researchers and Graduate Research Fellows
Number of new estuarine technologies and scientific tools being tested in the reserves
Participation in estuarine ecosystem analysis (i.e., habitat change analysis)
Education programs offered for students, teachers, general public
Awareness of estuarine function and importance
Use of science based information in coastal decision-making by participants in the Coastal Training Program
Goal 2 - Enhance and expand the National Estuarine Research Reserve System
Functional habitat restored in reserves
Number of reserves functioning with an up-to-date management plan
Acres protected by reserves
Number of reserves operating with facilities that are adequate to promote research, education and stewardship programs
Number of new reserves designated consistent with NERRS policy of biogeographic and typological representation
Goal 3 - Increase awareness, use, and support of the reserve system and its estuarine science, education, and stewardship programs
Number of outside scientists using reserves for conducting estuarine research
Number of journal articles, news articles, and other publications featuring reserve education and research programs
Number of state and local officials visiting reserves each year
Number of conferences and events where reserve scientists and education is presented

* Goals from the NERRS strategic plan, which are derived from CZMA Section 315 objectives.

Before expanding to full implementation, NOAA will use the knowledge gained through Phase I to select indicators for the final system. Phase I results will also assist in refining data collection and

EXECUTIVE SUMMARY

reporting methods, assessing the compatibility of data when aggregated across coastal management programs and reserves, and identifying resources to support implementation at the local, state, and federal levels. NOAA will report back to Congress on the results of Phase I and the steps needed to implement the system nationwide.

The National Coastal Management Performance Measurement System is based on long-term monitoring, observations, and data collection so trends in coastal resource use and management impacts can be better understood. With appropriate support, the National Coastal Management Performance Measurement System will become a powerful tool for management of the nation's coastal zone and for demonstrating the success of the CZMA in preserving, protecting, and restoring coastal resources and sustaining coastal communities throughout the United States for this and future generations.

INTRODUCTION TO COASTAL MANAGEMENT

THE COASTAL ZONE MANAGEMENT ACT

Through passage of the Coastal Zone Management Act (CZMA) in 1972, Congress declared as national policy to “preserve, protect, develop, and where possible, to restore or enhance the resources of the Nation’s coastal zone for this and future generations.” The CZMA established a framework for a federal and state coastal management partnership to balance economic growth with coastal protection. The National Coastal Management Program (NCMP) and the National Estuarine Research Reserve System (NERRS) work together to achieve the goals of the CZMA. The term *CZMA programs* will be used throughout this report to refer to both national programs – the NCMP and the NERRS - that are implemented under the CZMA and administered by NOAA. The term *coastal management programs* is used to refer to state partners that have approved coastal management programs under the CZMA and the term *reserves* is used to refer to federally designated estuarine areas established under the CZMA.

Since 1972, the network of state and territory coastal management programs has steadily grown, as has the number of estuarine areas under the NERRS. The National Oceanic and Atmospheric Administration (NOAA) has worked with the states to support the development and implementation of coastal management programs in 34 of 35 eligible coastal and Great Lakes states and territories (hereinafter “states”) covering 99 percent of the nation’s coast, as well as the establishment of 26 reserves in 21 coastal states and territories within the NERRS.

INTRODUCTION TO COASTAL MANAGEMENT

NATIONAL COASTAL MANAGEMENT PROGRAM

The NCMP is a voluntary partnership between coastal states and the federal government. NOAA works with eligible states to develop comprehensive coastal management programs tailored to the unique resources, conditions, and needs of each state, while advancing the broad national goals of the CZMA. Although the nature and structure of coastal management programs vary from state to state, they are guided by the following national goals:

- Protect and restore significant coastal resources;
- Prevent, reduce, or remediate polluted runoff to coastal waters;
- Improve public access to the coast;
- Minimize the loss of life and property in coastal hazard areas;
- Promote sustainable growth in coastal communities;
- Provide for priority water-dependent uses; and
- Improve government coordination and decision-making.

The CZMA calls for the 34 participating states to implement coastal planning and management programs and for the federal government to provide program oversight, policy guidance, technical assistance, and financial resources to assist state programs (Fig. 1). Federal funding to the states for the NCMP is distributed according to a formula considering coastal population and length of coastline. States leverage federal funding by matching federal dollars with an equal amount of state and local funds.

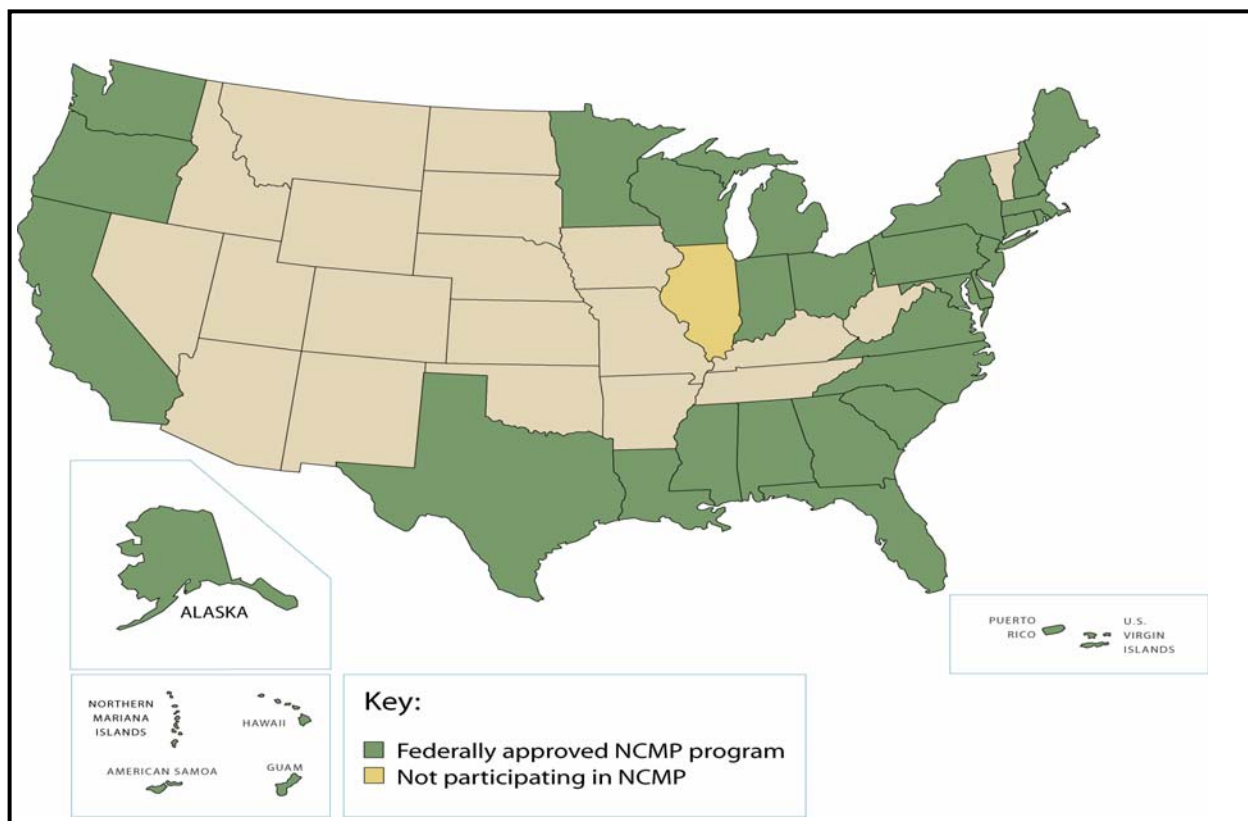


Figure 1: Map of States with Approved Coastal Management Programs

INTRODUCTION TO COASTAL MANAGEMENT

NATIONAL ESTUARINE RESEARCH RESERVES

Established by the CZMA, NERRS is a partnership program between NOAA and the coastal states. NOAA coordinates the design and implementation of system-wide programs in research, monitoring, training, and education. In addition, NOAA provides funding, national guidance, and technical assistance to individual reserves. State partners provide 30% matching funds for NOAA monies dedicated to operating reserves and facilities construction, and 50% match for land acquisition. Sites are managed by a lead state agency or university in collaboration with local partners.

Through integrated research and education, each reserve works with local communities and regional groups to develop strategies to address natural resource management issues, such as non-point source pollution, habitat restoration, and invasive species. Reserves provide adult audiences with training on estuarine issues of concern in their local communities and offer field classes for K-12 students and support teachers through professional development programs in marine education. Reserves also provide long-term water quality monitoring as well as opportunities for both scientists and graduate students to conduct research in a “living laboratory.”

Reserves represent different biogeographic regions of the United States as reference sites for research, monitoring, and education. There are 11 major biogeographic regions around the coast, with 29 subregions. Designed to include sites representing all 29 biogeographic subregions, the reserve system currently represents 18 of those subregions (Fig. 2).

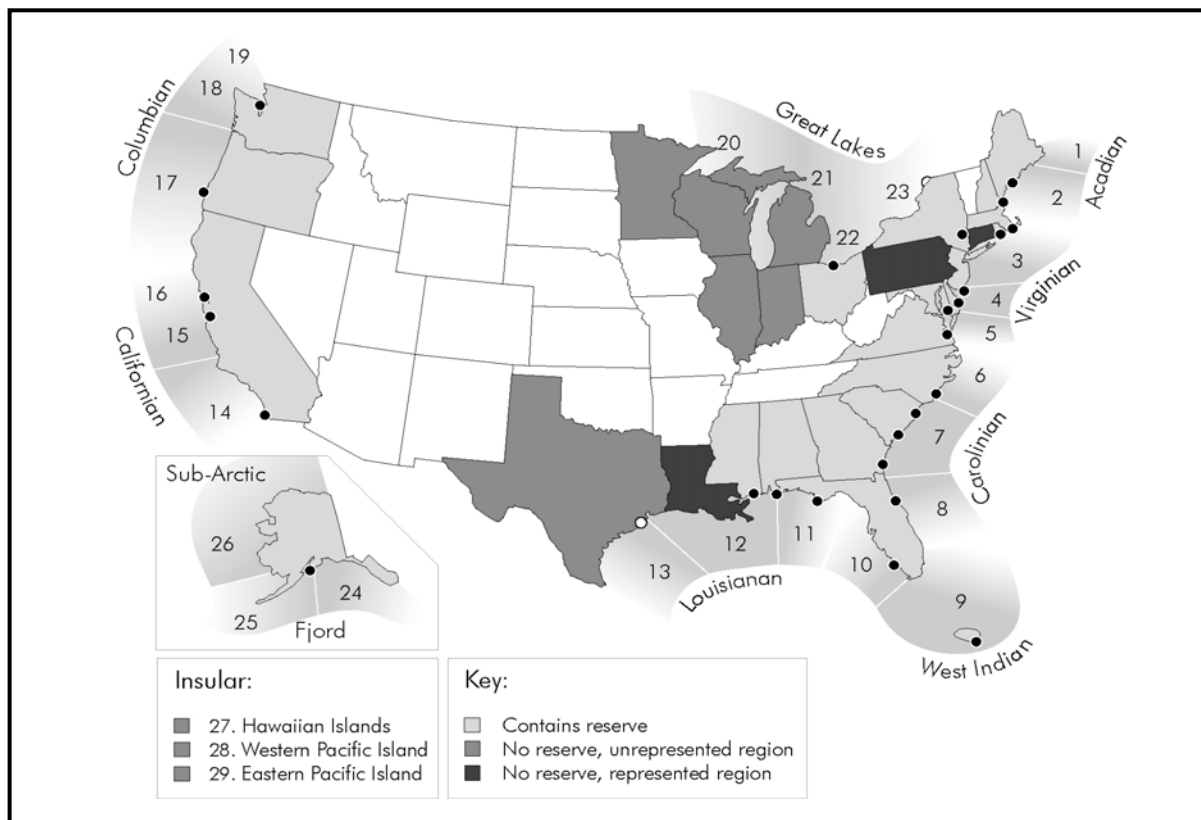


Figure 2: Map of National Estuarine Research Reserves and associated biogeographic regions

OVERVIEW OF THE NATIONAL COASTAL MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM

OVERVIEW

Coastal development, habitat protection, port vitality, sea level rise, and public access to beaches are but a few of the issues facing the Nation's coastal resources, communities, and industries. Coastal managers must be able to assess the status and trends of coastal resources and communities effectively and efficiently; set goals for the protection, maintenance, and improvement of resources; and monitor the success of management strategies. The National Coastal Management Performance Measurement System will provide a mechanism through which CZMA programs can collect information on coastal conditions and monitor the effectiveness of their management actions. Coastal management programs and reserves will collect and report on different, but complementary, sets of indicators due to their different goals and responsibilities under the CZMA. While a coastal management program focuses on planning and management of resources and uses for the entire designated coastal zone, a reserve focuses on education, research, and stewardship of a protected area within the coastal zone.

As described below, the National Coastal Management Performance Measurement System is intended to provide a meaningful framework to use available information and build upon existing reporting and evaluation requirements. The system will begin with pilot projects to assess how selected performance indicators will support meaningful assessments of complex and diverse coastal management and reserve programs.

WHAT IS THE NATIONAL COASTAL MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM?

The National Coastal Management Performance Measurement System serves as a mechanism for quantifying the national impact of the CZMA by tracking and aggregating indicators of the effectiveness of the CZMA programs. An *indicator* is a parameter providing a simplified view of a more complex phenomenon, or provides insight about a trend or event that cannot be directly observed. Indicators, when incorporated into a performance measurement system, can be used to both quantify change and to simplify complex information. *Performance measures* include three components: indicators of performance, units of measure, and baseline information. Measurement units and baseline information will be determined during Phase I of implementation to craft performance measures. The baseline relevant to a selected indicator will be established for each coastal management program and reserve after the initial collection of data. The system will be tailored both to be relevant to individual coastal management program and reserve efforts and to be suitable for aggregating into regionally and nationally relevant information.

The system will measure the on-the-ground results of coastal management through a combination of *performance indicators* and contextual information, referred to throughout this report as *contextual*

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indicators. The system includes *outcome performance indicators*, or indicators revealing changes in the state of coastal resources over time. A simple example of an outcome indicator is the number of public access areas acquired. To complement outcome indicators, the system also includes *output performance indicators* to measure the goods and services CZMA programs provide to influence outcomes. An example of an output indicator is the number of journal articles, news articles, and other publications featuring reserve education and research programs.

The system also incorporates *contextual indicators* that provide a more comprehensive picture of the environmental and socioeconomic circumstances that may greatly influence actions of the CZMA programs. Water quality, population, and development trends serve as examples of contextual indicators. NOAA recognizes that the CZMA programs may have little impact over these circumstances, but they can be very important to assessing effectiveness and influencing program performance. Contextual indicators may also be useful in identifying emerging issues and areas for further research and education. The environmental and socioeconomic contextual indicators in combination with performance indicators make up the National Coastal Management Performance Measurement System (Fig. 3).

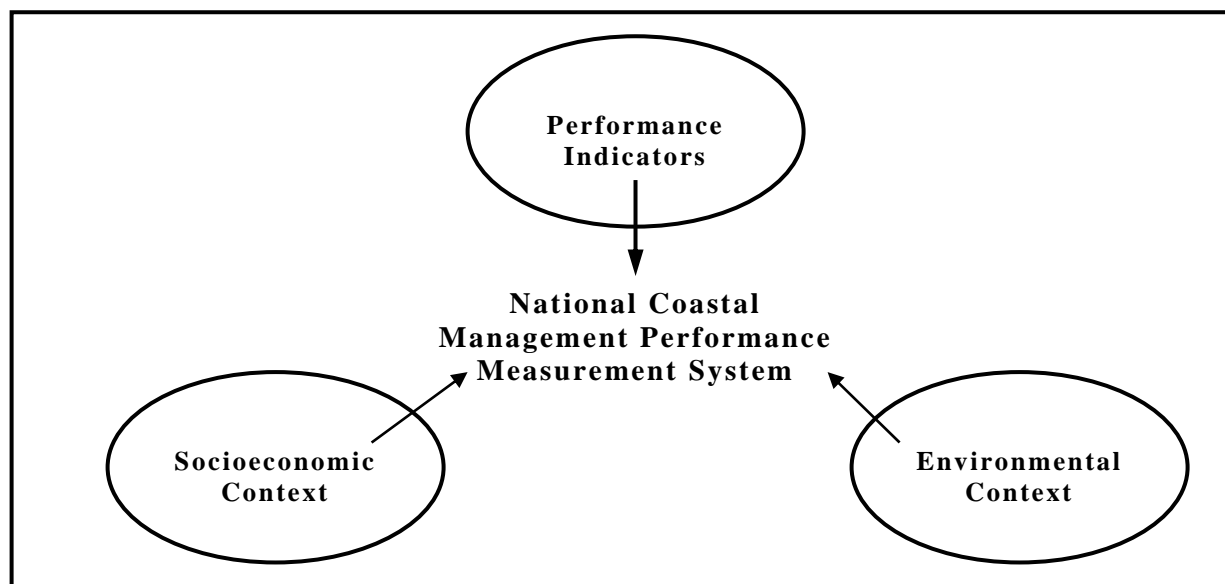


Figure 3: Diagram of the National Coastal Management Performance Measurement System

ENHANCING EXISTING EVALUATION EFFORTS

Since the adoption of the CZMA in 1972, NOAA has evaluated the performance and progress of coastal management programs and reserves in carrying out their approved programs, as provided by CZMA Sections 312 and 315. To meet this requirement, NOAA reviews each coastal management program and reserve for compliance with NOAA guidance and the approved coastal management

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program or reserve management plan approximately every three years. The Coastal Zone Enhancement Program in CZMA Section 309 provides for enhancement grants to coastal management programs to develop program improvements to address changes in the coastal environment and emerging issues. Each state undertakes a periodic assessment of the status of each area of national significance in the state to develop strategies to address priority issues. Similarly, guidance for the NERRS requires each reserve to update its management plan every five years to address research and education needs as well as resource management issues.

While these evaluations provide useful information about program activities, accomplishments, and deficiencies, tracking and reporting of on-the-ground results is currently not a requirement of the CZMA and the information collected through the evaluations cannot be quantified to reflect these on-the-ground impacts of management. Through these evaluation findings and biennial reports to Congress, however, NOAA reports measures of success primarily in terms of activities conducted and process outputs (e.g. types of laws passed, number of coastal development activities reviewed, and funding allocated to certain types of projects), and identification of best practices and case studies of effective projects that work to achieve the objectives of the CZMA.

While the partnership between the coastal management programs and reserves and NOAA has been successful in achieving the goals of the CZMA, quantifying those successes at the state and national scale presents a challenge. Development and implementation of the National Coastal Management Performance Measurement System will provide a mechanism for quantifying, through specific indicators, the effectiveness of coastal management programs and reserves in achieving the objectives of the CZMA. To the extent possible, this system will use information and reports currently provided in connection with program grant submissions, performance reports, Section 309 enhancement strategies, management plans, and Section 312 and 315 program evaluations.

LINKING EVALUATION WITH EFFECTIVENESS IN INFLUENCING ON-THE-GROUND CHANGE

NOAA has designed the National Coastal Management Performance Measurement System to use ecological, socio-economic, and management performance information in an adaptive management process (Fig. 4). Management activities should respond to trends in coastal conditions and adapt, if necessary, as more is learned about ecological and human processes affecting coastal resources. Adaptive management is a process that encourages observation and monitoring to adapt and improve natural resource management. Because there is uncertainty around how humans and the environment interact, the adaptive management process is designed to be flexible.

Figure 4 shows how the National Coastal Management Performance Measurement System will contribute to the adaptive management process. Specifically, the system will: (1) inform the “define the problem” step through NOAA’s efforts to work with the states to identify relevant information and contextual indicators; (2) available baseline and assessment information will be identified and used to “monitor the results,” and (3) relevant performance indicators will be chosen and used to “evaluate program effectiveness.”

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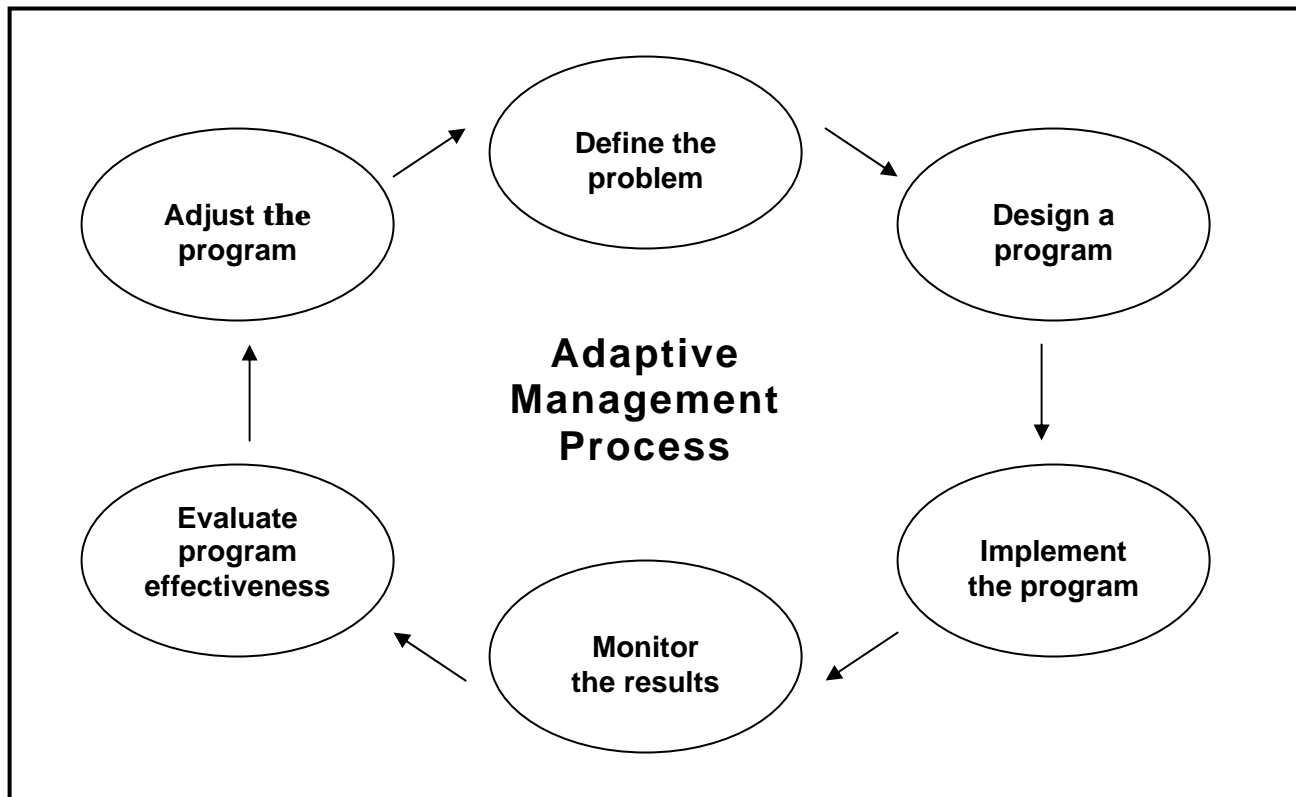


Figure 4: Adaptive management feedback loop

PROVIDING BENEFITS AT THE NATIONAL AND STATE LEVELS

In addition to strengthening the connection between CZMA programs and demonstrable impacts on coastal resources and the coastal economy, the National Coastal Management Performance Measurement System will benefit CZMA programs in various ways. First, the National Coastal Management Performance Measurement System will facilitate adaptive management within the coastal management community. Second, it will have significant impacts at both the state and federal levels, as outlined below.

At the national level, the system may:

- increase accountability for existing and future program implementation and funding;
- identify gaps and enhance existing evaluation and assessment methods;
- identify national trends in coastal resources and uses to inform Congress of policy and funding needs;
- identify needs of state and local coastal management communities so programs can be modified to better address those needs;
- promote increased awareness and understanding of national coastal issues; and
- illustrate some of the national benefits of the NCMP and NERRS.

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At the state level, the system may:

- support adaptive management by assisting coastal managers in assessing conditions, selecting strategies to address problems, planning and implementing actions, monitoring results, and applying the lessons learned to subsequent management decisions;
- provide feedback on program expenditures, operations, and on-the-ground results;
- facilitate better planning and resource allocation decisions;
- provide information to raise the awareness of state legislators and the public about coastal management successes and needs; and
- promote development of program-specific indicators by the coastal management programs and reserves to enhance localized decision-making.

Overall, the National Coastal Management Performance Measurement System will inform both federal and state coastal managers about the effectiveness of program actions. As previously noted, the primary goal of this system is to track indicators of effectiveness of the coastal management programs and reserves at the national level, and therefore program-specific indicators may need to supplement the national indicators to provide more information for state and local management decisions.

DEVELOPMENT OF THE NATIONAL COASTAL MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM

AUDIENCES

The primary audiences for the National Coastal Management Performance Measurement System are Congress, interested stakeholders, and the federal and state CZMA partners. Due to the varying management structures and priorities across individual programs, the national indicators suggested in this report are intentionally broad with the goal to inform Congress and the public of trends in national coastal resources and in the effectiveness of common management strategies employed by CZMA programs. This information also will assist NOAA and coastal managers in better understanding the links between coastal environments and economies and management actions. National performance indicators may encourage coastal management programs and reserves to identify program-specific goals and indicators.

PRIMARY CHALLENGES IN SHAPING THE PERFORMANCE MEASUREMENT SYSTEM

Diverse coastal management structures

The flexibility afforded to coastal states by the CZMA in shaping the structure of coastal management and reserve programs has been essential to the success of the Act. Several types of coastal management program structures and authorities exist, including, for example, direct program control (strong lead agency), networked control (multiple agencies), and local control and implementation. Most coastal management programs include a hybrid of these various structures and authorities. While direct control coastal management programs are centralized, networked programs link existing natural resource programs together to frame the state's coastal management program. This mix of programs translates into varying forms of direct or indirect control, and shared or diffused authority in influencing environmental outcomes.

Programs that rely largely on regulatory authority, as a result, may have greater potential to influence environmental outcomes linked to those authorities. The success of networked programs efforts that are more focused on planning and coordination may be better measured in terms of outputs reflecting their facilitation and governmental coordination role. For networked programs especially, many of the decisions determining actual outcomes may be made in a resource agency separate from the coastal program office, or in local government offices with coastal responsibilities. Thus, to the extent CZMA goals and objectives are implemented through networked agencies or performed through partnerships with other groups, the performance measurement system will track the outcomes and outputs attributable to both the approved program and its partners.

Similarly, reserves are managed by a variety of organizations within the states. Reserve partners include state coastal zone management agencies, state environmental protection or wildlife departments, universities, and non-profit organizations. Most reserves consist of a single protected estuarine area, but six reserves have multi-component sites where several distinct properties are managed within one reserve. In a few instances, different entities manage the individual components

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with overall program coordination by the reserve lead agency. Each partner organization has site-specific management, reporting, evaluation, and performance expectations driven by their agency or organization, in addition to more uniform requirements from NOAA guidance and regulations.

To address this challenge, the system proposed in this report will be developed more fully through pilot projects with a variety of program types and geographic locations. Cost-effective ways to capture the results of networked agency efforts will be identified, as well as indirect impacts and outcomes generated as a result of other programs and authorities identified in each state's approved coastal management program or each reserve's management plan.

Differing coastal management priorities

The CZMA articulates broad objectives (e.g., “provide for...public access to the coasts for recreation purposes”) with the intention to give coastal management programs and reserves flexibility in defining objectives based on needs and priorities specific to their coastal zone. While one critical goal of the performance measurement system is to identify the national impact of coastal management, it is important that the National Coastal Management Performance Measurement System recognize the individual priorities of each coastal management program and reserve. Nevertheless, common objectives can be identified because the goals of the individual programs originate from the objectives of the CZMA and the NERRS strategic plan.

Existing mechanisms identify different priorities, including CZMA Section 309 Coastal Zone Enhancement Program assessments from coastal management programs and five-year management plans from reserves. The National Coastal Management Performance Measurement System is designed to reflect and consider the priorities in these state and locally based plans. While it is challenging to identify a suite of national indicators that can be measured by all coastal management programs, providing potential indicators from which programs can choose in order to reflect individual priorities and coastal features will allow some aggregation across programs to provide a national or regional picture. Existing reserve system-wide programs in monitoring, training, and research make it easier to design common performance indicators that can be aggregated nationally.

Understanding the full impacts of coastal management

One of the hallmarks of the CZMA has been the development of plans and standards to support compatible, coastal dependent development while protecting coastal resources and restricting inappropriate development. State coastal management agencies also work to coordinate permit reviews and to provide guidance to developers to revise projects or activities to have less impact on coastal and ocean resources. Unfortunately, it is very difficult to assess and quantify the outcomes of programs premised on prevention, because it is difficult to quantify harm or impacts to coastal resources that have not occurred, such as large-scale development projects that were revised to mitigate impacts by avoiding the filling of wetlands or ensuring public access.

DEVELOPMENT OF THE NATIONAL COASTAL MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM

Thus, to effectively report on impacts not easily quantifiable, the indicators in the National Coastal Management Performance Measurement System may need to be supplemented with other, more qualitative information such as case studies. The combination of performance measures and case studies will more completely portray the effectiveness of coastal management programs and reserves in achieving the goals and objectives of the CZMA.

Connecting management actions to environmental changes

Establishing a clear connection between management actions of CZMA programs and changes in the condition of coastal resources or uses is often difficult. For example, deterioration of water quality may be caused by activities upstream of the designated coastal zone or reserve boundary. As previously discussed, programs may have little or no control over many very significant external factors that influence the use and management of coastal resources. Understanding the environmental, political, and economic circumstances affecting management actions is necessary. Thus, under the National Coastal Management Performance Measurement System, NOAA will track environmental and socioeconomic information to provide context within which specific management actions and their relation to outputs and outcomes can be assessed.

Delineating responsibility for coastal impacts

The CZMA programs work alongside many federal and state programs that manage coastal resources. For example, programs under the Clean Water Act, Magnuson-Stevens Fisheries Conservation and Management Act, Outer Continental Shelf Lands Act, Endangered Species Act, Marine Mammal Protection Act, National Marine Sanctuaries Act, and the Oil Pollution Act have significant impacts on coastal waters, lands, and resources. States and local governments also carry out a variety of resource management and economic development programs that impact the coasts.

Because coastal management programs and reserves are not the only programs affecting the coast, it is difficult to assign sole responsibility to these programs for the overall condition of the coasts. While many environmental outcomes result from partnerships with other government agencies and private organizations, the purpose of the performance measurement system is not to compare the relative contribution of the CZMA programs with those of other programs. Instead, the performance measurement system is designed to assess the contributions made by the coastal management programs and reserves towards the goals of the CZMA. Thus, the performance indicators identified for the National Coastal Management Performance Measurement System align with responsibilities specific to coastal management programs and reserves, as articulated through the CZMA and the NERRS strategic plan.

DEVELOPMENT OF THE NATIONAL COASTAL MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM

AN INTEGRATED CZMA PERFORMANCE MEASUREMENT SYSTEM

I. LAYING THE FOUNDATION

Several efforts over the past 12 years have influenced the development of the National Coastal Management Performance Measurement System (Appendix A). The National Coastal Management Performance Measurement System had its genesis in the NOAA-commissioned 1999 CZMA Effectiveness Study.¹ The study concluded that while NOAA and the states had been largely effective in advancing the broad objectives of the CZMA, the evidence was largely based on programs and processes established as well as other output and anecdotal information. The authors found little quantitative information for assessing the on-the-ground impacts of program efforts and activities. The study recommended the development of coastal management performance indicators and Congress amend the CZMA to require a national outcome monitoring and reporting system. CZMA reauthorization bills introduced in the 107th and 108th Congresses both included language calling for the development of such a system, but they were never adopted. The Appropriations Committees also embraced performance measurement, calling on NOAA to “prepare an assessment of the national impact of this program and submit such assessment to the Committee on Appropriations” and to report on the benefits generated by these programs.

The resulting impact study conducted by OCRM was submitted to Congress in 2001 and concluded that the CZMA had been successful in encouraging the establishment of coastal management programs to comprehensively plan activities and balance the uses of the coastal zone. In addition, case studies provided evidence the Act had also been successful in encouraging participation and cooperation among all interests. The report also highlighted how the lack of a comprehensive set of indicators hindered more quantitative analysis and recommended that NOAA establish a mechanism to better assess the national impacts of the CZMA.²

To respond to the recommendations, NOAA initiated two specific efforts to develop an appropriate performance measurement mechanism for the coastal management programs and the reserves. First, NOAA contracted with the H. John Heinz III Center for Science, Economics, and the Environment in 2001 to study indicators of program effectiveness for the coastal management programs. The Heinz Center convened a panel of coastal experts representing industry, academia, government, and the environmental community. The panel worked over 18 months to develop a framework for identifying performance indicators and held constituency meetings in Texas and Maryland to “ground truth” the recommended framework. Second, a 2002 baseline study established what indicators were being collected at the estuarine research reserves and proposed an organizational structure for selecting and

¹ Hershman, M.J., J.W. Good, T. Bernd-Cohen, R.F. Goodwin, V. Lee, and P. Pogue. 1999. The effectiveness of coastal zone management in the United States. *Coastal Management* 27(2): 113-138.

² Report to Congress on the National Impacts of the Coastal Zone Management Program. 2001. National Oceanic and Atmospheric Administration.

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analyzing indicators.³ One observation in the baseline study was that reserves varied greatly in their existing performance indicators, but NERRS system-wide programs provided common activities and therefore common indicators for tracking performance. Recommendations from the baseline study were incorporated into the updated 2002 NERRS Strategic Plan.

With knowledge gained from these efforts as well as from various state and federal performance-based budgeting efforts, NOAA developed the National Coastal Management Performance Measurement System. The system is composed of two components to reflect the differing, but complementary, goals of the NCMP and the NERRS in carrying out the CZMA. Coastal management programs were created primarily for planning and management of coastal resources and uses, while the reserves were created to provide a protected area for long-term research, education, and stewardship. In addition, while the coastal management programs identified a list of potential indicators to reflect the broad objectives of CZMA Section 303, the reserves identified indicators to reflect the NERRS strategic planning goals and objectives, based on CZMA Section 315.

The NCMP and NERRS components of the National Coastal Management Performance Measurement System both include contextual indicators and performance indicators. This complementary structure will ensure, while the performance measurement system represents progress towards the CZMA objectives, the unique responsibilities and accomplishments of coastal management programs and reserves are highlighted.

II. NATIONAL COASTAL MANAGEMENT PROGRAM

1. The National Coastal Management Program Framework

The Heinz Center proposed a framework for identifying performance indicators for the coastal management programs using six *focus areas*, or major goals, based on CZMA Section 303:

- Coastal habitats
- Coastal hazards
- Coastal water quality
- Coastal dependent uses
- Public access
- Coastal community development

³ Benoit, J.R., R.F. Delaney, and C. Riley. Establishing Baseline Information on Environmental Indicators and Performance Measures for the National Estuarine Research Reserve System. 2002. The University of Massachusetts Boston, Urban Harbors Institute.

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Although CZMA Section 303 contains additional objectives, including government coordination and public participation, the Heinz Center panel concluded the six broad-based focus areas captured the major CZMA objectives and, more importantly, the success or failure of these areas could and should be measured. Each of the focus areas was further subdivided into *dimensions* to help show how management activities can impact the status of coastal and ocean resources. For example, the coastal hazards focus area included dimensions that reflect inventorying hazards, assessing vulnerability, mitigating risk from hazards, and preventing future loss from hazards. The dimensions were then used to help identify contextual and performance indicators.

To identify specific indicators using the Heinz Center framework, NOAA convened a workgroup in January 2003. The workgroup included NOAA staff and representatives from eight coastal management programs. Using the list of indicators collected through NOAA pilot studies and the state performance measurement surveys categorized into the framework's focus areas, the group worked for eight months to identify potential indicators to propose to the larger coastal management community.

In the process, the workgroup modified the framework when necessary to reflect issues of importance to coastal management in practice. The primary change included adding a focus area to capture processes important to the success of coastal management programs. Adding the "government coordination and decision-making" focus area captured the remaining CZMA Section 303 objectives, such as public participation and coordination, and highlighted the importance of specific tools and strategies in achieving on-the-ground changes.

The following criteria guided the workgroup when choosing indicators:

- Indicators should tie closely to the objectives of the CZMA.
- Indicators reflecting outcomes are preferred over input or output indicators.
- Indicators should be broad enough to allow flexibility among different types and priorities of programs.
- Indicators should reveal information of importance to target audiences.

2. Linking Suggested Performance Indicators with CZMA Objectives

The suggested performance indicators presented below are the results of the workgroup's effort to identify indicators using the Heinz Center framework. Most of the indicators will be based on information already collected by or easily accessible to all coastal management programs, and thereby allow aggregation across programs to provide a national or regional picture. However, some of the listed indicators will provide subcategories from which coastal management programs may choose in order to provide flexibility for varying priorities and coastal environments in the coastal states.

Only the potential indicators are listed below (e.g., public access sites acquired). Final performance measures will include a specific unit of measurement (e.g., miles of access ways acquired) and baseline information (2,500 miles in 2004) for comparing changes over time that are relevant to each state. The

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lists of suggested indicators presented below will be refined and narrowed during the initial stages of implementation, as collecting data on some indicators may prove infeasible or of insufficient value to be included in the final system.

CONTEXTUAL INDICATORS

Importance – Population growth, coastal development, pollution, port vitality, erosion, sea level rise, and demand for public access are but a few of the factors affecting coastal management decisions and exert pressure on the health of coastal ecosystems. Most pressures are associated with human activities consuming resources, modifying habitat, or releasing pollutants. Contextual indicators describe or measure the pressures directly or indirectly influencing the condition of the environment and therefore influence the management strategies that can be developed in response. The coastal management programs have little or no control over most of these indicators. For those indicators that the programs seek to influence, they do not have primary authority or responsibility.

Suggested Context Indicators -

- Population in the coastal zone
- Employment in the coastal zone
- Coastal dependent employment
- Coastal dependent businesses
- Infrastructure investment in the coastal zone
- Water quality
- Endangered species identified in the coastal zone
- Invasive species identified in the coastal zone
- Area subject to coastal hazards
- Population subject to coastal hazards
- Coastal land cover change
- Habitat of particular concern, as identified by each state
- Type and quantity of commercial and recreational shellfish areas

PERFORMANCE INDICATORS

A. COASTAL HABITATS

Objective - “The protection of natural resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone.” (CZMA Section 303(2)(A))

Importance - The CZMA recognizes coastal habitats of the United States support a significant and under-recognized element of this nation’s biological diversity, from the kelp beds of the Pacific Ocean to the salt marshes of the Atlantic. Coastal habitats also supply vital nutrients supporting many

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terrestrial species, from shorebirds to bears. Along with their ecological value, the economic value of these habitats is becoming better recognized. Commercial fisheries alone are a \$3.6 billion-a-year industry in the United States.⁴ Coastal habitats also provide services such as recreation, food production, and buffers during coastal storms. However, coastal habitats are being degraded and lost at alarming rates. In the United States, coastal counties make up only 11% of the land area in the lower 48 states, but population density is nearly five times that of the rest of the country. By 2025, 75% of the U.S. population is expected to live within 50 miles of the coast. With this growth, coastal habitats will be increasingly threatened by development, shoreline modification, and increased harvest pressure.⁵

Suggested Performance Indicators -

- Coastal habitats mapped
- Habitat of particular concern impaired by human activity
- Habitat of particular concern restored
- Habitat of particular concern impacted by invasive species
- Coastal areas protected through acquisition
- Watershed or ecosystem management plans and/or programs

B. COASTAL HAZARDS

Objective – “The management of coastal development to minimize the loss of life and property caused by improper development in flood-prone, storm-surge, geological hazard, and erosion-prone areas and in areas likely to be affected by or vulnerable to sea level rise, land subsidence and saltwater intrusion, and by the destruction of natural protective features such as beaches, dunes, wetlands, and barrier islands.” (CZMA Section 303(2)(B))

Importance – The coastlines of the United States are vulnerable to a variety of natural hazards including tropical storms, hurricanes, flooding, shoreline erosion, tornadoes, and tsunamis. The impacts of natural hazards are becoming increasingly costly and devastating. Experts believe disaster losses continue to rise due to a combination of factors including a rise in the number of hazard events and increased human exposure in hazardous locations.⁶

Suggested Performance Indicators -

- Coastal zone mapped for multiple hazards

⁴ National Marine Fisheries Service, NOAA, U.S. Department of Commerce. Fisheries Statistics and Economics. <http://www.st.nmfs.gov/> [02-05-02].

⁵ The Coastal Management Act: Developing a Framework for Identifying Performance Indicators. 2002. The H. John Heinz III Center for Science, Economics and the Environment.

⁶ The Coastal Management Act: Developing a Framework for Identifying Performance Indicators. 2002. The H. John Heinz III Center for Science, Economics and the Environment.

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- Setbacks or other locational requirements employed by state or local governments
- Communities with enhanced codes to reduce structural damage
- Communities with post-disaster redevelopment plans
- Communities designated as ‘disaster resistant’ or Project Impact*

C. COASTAL WATER QUALITY

Objective – “The management of coastal development to improve, safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters.” (CZMA Section 303(2)(C))

Importance - The CZMA addresses water quality as part of routine program implementation as well as part of the Coastal Nonpoint Source Pollution Control Program, implemented by states to restore and protect coastal waters. Good water quality is essential for healthy coastal ecosystems. However, based on the National Coastal Condition Report, approximately 34% of estuarine areas have poor conditions for aquatic life, while 33% have unacceptable levels for human-related uses.⁷ Many coastal water quality problems result from pollution in the form of pathogens, toxic materials, or excess nutrients. Water pollution degrades coastal resources and can result in beach closures, consumption advisories on fish and shellfish, increases in harmful algal blooms, and loss of habitat.

Suggested Performance Indicators -

- Extent of Coastal Nonpoint Pollution Control Program implementation
- Closure of public beaches
- Closure of classified shellfish areas
- Presence and nature of beach monitoring programs

D. COASTAL DEPENDENT USES

Objective – “Priority consideration being given to coastal-dependent uses and orderly processes for siting major facilities related to national defense, energy, fishery development, recreation, ports and transportation, and the location, to the maximum extent practicable, of new commercial and industrial developments in or adjacent to areas where such development already exists.” (CZMA Section 303(2)(D))

Importance - Historically, coastal communities relied upon coastal-dependent uses of their shorelines, such as commercial fishing and shipping. Today, coastal-dependent uses are threatened with

* Project Impact is an initiative by the Federal Emergency Management Agency to engage communities at high risk from natural hazards in hazard mitigation and preparation.

⁷ U.S. Environmental Protection Agency, 2001. National Coastal Condition Report (EPA-620/R-1/005). Office of Research and Development, Office of Water: Washington, DC 20460.

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displacement and are giving way to non-coastal-dependent uses, such as residential development. Coastal dependency is clearest in the case of economic activities that must have access to coastal waters to function, such as commercial docks and facilities. Coastal dependent uses clearly have a significant economic value. Maritime commerce accounts for 95% of U.S. trade. In 2000, commercial fish landings totaled 9.1 billion pounds and \$12.7 billion per year; recreational harvest in the same year totaled 254 million pounds. In 2001, there were over 12,000 marinas, boatyards, and other boating facilities nationwide. There were also nearly 10 million registered boats in the U.S. The CZMA encourages states to preserve existing coastal-dependent uses, reserve appropriate vacant lands for coastal dependent uses, and to balance the competing demands on finite coastal resources and suitable sites.

Suggested Performance Indicators -

- Planning/management mechanisms to place priority on coastal water dependent uses
- Planning/management mechanisms to place priority on major facilities related to defense, energy, fisheries, and ports

E. PUBLIC ACCESS

Objective – “Public access to coasts for recreation purposes.” (CZMA Section 303(2)(E))

Importance - The CZMA gives states a tool to provide and improve coastal public access. Between 1972 and 1984, the amount of public recreational lands along the coast increased by 27%, though not enough to keep up with the increasing demand for such lands.⁸ Visitor data from federal and state parks on or near the coasts show a dramatic increase in attendance. The growing pressure on existing facilities has also led to declining quality. Increasing private development along the coast blocks shoreline access to the public. With increasing population and tourist visitation, the demand for coastal access is increasing at the same time that available beachfront access itself is declining.

Suggested Performance Indicators -

- Access areas provided
- Accessways developed/improved
- States with access guides
- Quality of recreational experience

⁸ The Coastal Management Act: Developing a Framework for Identifying Performance Indicators. 2002. The H. John Heinz III Center for Science, Economics and the Environment.

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F. COASTAL COMMUNITY DEVELOPMENT

Objective – “Assistance in the redevelopment of deteriorating urban waterfronts and ports, and sensitive preservation and restoration of historic, cultural, and esthetic coastal features.” (CZMA Section 303(2)(F))

Importance – In earlier decades, the populations of many coastal cities would typically rise and fall with seasonal tides of tourists. In the past 15 years, however, what were once seasonal resort towns have seen increasing year-round resident populations and booming economies. As people moved to coastal communities, so did more businesses and jobs. Approximately 50% of all new residential, industrial, office, retail, and recreational buildings are constructed in coastal areas.⁹ At the same time coastal communities are struggling with unparalleled growth, they are burdened with abandoned brownfields and other legacies of industrial pollution limiting areas available for development and revitalization. Changing economic realities, deteriorating infrastructures, and the general lack of economic investment have taken their toll on traditional working waterfront communities. Without planning considering ecological, cultural, historic, and esthetic values as well as the need for economic development, communities can be overwhelmed by development that is incompatible with their goals and needs.

Suggested Performance Indicators -

- Open space acquired/protected
- Waterfront redevelopment plans/programs
- Restrictions on public investment in fragile or high hazard areas

G. GOVERNMENT COORDINATION AND DECISION-MAKING

Objective – The goals of improved government coordination and decision-making were incorporated throughout Section 303 of the CZMA. Section 303(2)(G) - "the coordination and simplification of procedures in order to ensure expedited governmental decision-making ... "; Section 303(2)(J) - "assistance to support comprehensive planning, conservation, and management ... and improved coordination between State and Federal coastal zone management agencies and State and wildlife agencies"; Section 303(4) - "to encourage the participation and cooperation of the public, state, and local governments, and interstate and other regional agencies, as well as the Federal agencies having programs affecting the coastal zone ... "; and Section 303(5) - "to encourage coordination and cooperation with and among the appropriate Federal, state, and local agencies ... in collection, analysis, synthesis, and dissemination of coastal management information, research results, and technical assistance" (CZMA Section 303)

Importance – Indicators for government coordination and decision-making describe or measure the actions of management programs across the six focus areas, as they reflect the mechanisms by which coastal management programs influence progress toward outcomes in the other focus areas. They may

⁹ Pew Oceans Commission. 2003. America's Living Oceans: Charting a Course for Sea Change. Pew Oceans Commission, Arlington, Virginia.

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use dollars or other programmatic measures such as meetings held, partnerships developed, research sponsored, reports produced, or assessments conducted to gauge the level of activity to achieve the objectives of the CZMA. Data for these indicators will be collected within each focus area when appropriate and then compiled to describe overall program activity. Together, these indicators will capture important data on planning, resource allocation, intermediate accomplishment toward long-term goals, ongoing activities to enforce environmental policies, and the development of partnerships to address management needs at the local, state, and national levels.

Suggested Performance Indicators -

- Approved Coastal Management Programs
- Approved Coastal Nonpoint Source Pollution Control Programs
- Approved National Estuarine Research Reserves
- Approved Coastal and Estuarine Land Conservation Program plans
- Special Area Management Plans implemented
- Type and nature of permitting programs that apply in the coastal zone
- Permits issued
- Projects reviewed for federal consistency
- Assistance to local governments
- Partnerships with local governments, agencies, and other institutions
- Publications developed/distributed
- Participants in workshops
- Public awareness
- Public meetings held or persons attending
- Participation in stewardship programs
- Research undertaken or supported

III. NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

1. The National Estuarine Research Reserve Framework

The 2002 baseline assessment recommended that the National Estuarine Research Reserves collect consistent performance measures and a set of socio-economic and environmental indicators to set the context of reserve programs. A workgroup of NOAA and reserve field staff refined a measurement framework for the NERRS in early 2003. The framework chosen by the workgroup and approved by the NERRS is the pressure-state-response model (Fig. 5). In this framework, contextual indicators are separated into indicators tracking “pressures” effecting the resource and community and indicators monitoring the “state” or natural and social conditions in and around reserves. Performance measures corresponding to the NERRS strategic plan demonstrate reserve progress in responding to important trends in estuaries and coastal communities.

The workgroup is currently involved in an inclusive process for choosing contextual indicators and performance measures, guided by the pressure-state-response framework and the NERRS strategic

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plan. Indicators selected by the NERRS using the pressure-state-response framework are appropriate for the mission of the reserves as protected areas designated to promote estuarine research, education and stewardship in pursuit of the objectives of the CZMA. Indicators collected by reserves will add a layer of detail about these protected areas to compliment the broader set of indicators collected by coastal states.

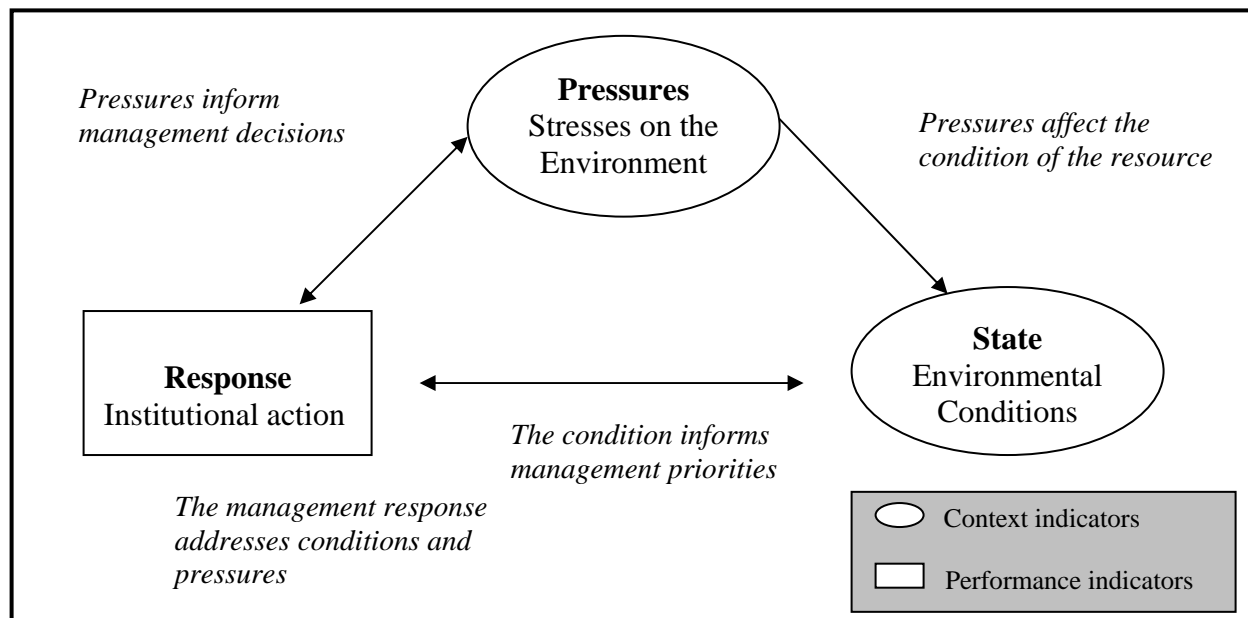


Figure 5: The pressure-state-response framework links contextual and performance indicators.

Contextual Indicators

To adapt to the most pressing local issues and assess the long-term impacts of program actions, monitoring information on resources and situations outside the direct control of reserve management must be collected, organized, and used to shape reserve plans and new research and education initiatives. Contextual indicators monitor the biological, physical, chemical, and community conditions and stresses in and around the estuary. Pressure contextual indicators provide coastal managers with information on the natural and human induced stresses, such as population growth, changes in land cover, or climate change and variability. State contextual indicators monitor ecological and socio-economic conditions within the estuaries and/or surrounding watersheds, such as dissolved oxygen, habitat distribution, or salinity.

Performance Indicators

Performance indicators track management actions taken to address the pressures on the resources and the condition of the resources. When the reserve system has collected sufficient information about trends in the pressures on estuaries and the condition of the reserves, these trends will be used to set research, outreach, education, and stewardship agendas through strategic planning. The objectives in the strategic plan become the way the system is attempting to respond to environmental and social

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realities. Performance indicators reporting progress toward these objectives and goals become the response indicators of the performance measurement system.

2. Linking Suggested Performance Indicators with CZMA Objectives and NERRS Strategic Plan

Having data about the condition of the estuaries, trends in pressures on the estuaries, and the effectiveness of reserve actions will inform the next round of strategic planning. The performance measures workgroup is currently engaged in two simultaneous tasks to help select suggested indicators for the performance measurement system: (1) prioritizing pressure and state contextual indicators, and (2) choosing performance indicators corresponding to objectives in the strategic plan.

CONTEXTUAL INDICATORS

The types of contextual information that will likely be collected by the NERRS are outlined below:

Pressure Indicators:

- Population change and development trends
- Climate change and variability
- Extreme weather events
- Nutrient loading
- Invasive species introduction
- Level of public knowledge about the function and importance of estuaries

State Indicators:

- Land cover
- Habitat distribution
- Habitat quality
- Abiotic water quality
- Weather monitoring
- Nutrient levels
- Biological monitoring
- Public polling data

PERFORMANCE INDICATORS

The performance indicators presented below are response indicators for tracking progress toward the goals set out in the NERRS Strategic Plan. Final performance measures will include a specific unit of measure that can be collected across the system. By early 2004, a list of performance measures to demonstrate progress toward strategic goals and objectives will be in place.

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GOAL 1 - IMPROVE COASTAL DECISION MAKING BY GENERATING AND TRANSFERRING KNOWLEDGE ABOUT COASTAL ECOSYSTEMS

Objective – “Designation of the area as a reserve will serve to enhance public awareness and understanding of estuarine areas...” (CZMA Section 315 (b)(2)(C))

Objective - “The Secretary shall develop guidelines for the conduct of research within the system that shall include (1) a mechanism for identifying and establishing priorities among the coastal management issues that should be addressed through coordinated research within the system...” (CZMA Section 315 (c))

Suggested Performance Indicators -

- Habitats and ecological conditions monitored and characterized
- Advanced understanding of local conditions through research staff projects
- Level of use of reserves by outside researchers and Graduate Research Fellows
- Number of new estuarine technologies and scientific tools being tested in the reserves
- Participation in estuarine ecosystem analysis (i.e., habitat change analysis)
- Increase in education programs offered for students, teachers, general public
- Increased awareness of estuarine function and importance
- Increased use of science based information in coastal decision-making by participants in the Coastal Training Program

GOAL 2 - ENHANCE AND EXPAND THE NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

Objective – “The Secretary may designate an estuarine area as a national estuarine reserve if the area is a representative estuarine ecosystem that is suitable for long term research and contributes to the biogeographical and typological balance of the system.” (CZMA Section 315 (b)(2)(A))

Objective – The Secretary may make grants for purposes of acquiring lands, for purposes of managing a reserve and constructing appropriate reserve facilities. (CZMA Section 315 (e)(1)(i) & (ii))

Suggested Performance Indicators -

- Amount of functional habitat restored in reserves
- Number of reserves functioning with an up-to-date management plan
- Increase in acres protected by reserves
- Number of reserves operating with facilities adequate to promote research, education and stewardship programs
- Number of new reserves designated consistent with NERRS policy of biogeographic and typological representation

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GOAL 3 - INCREASE AWARENESS, USE, AND SUPPORT OF THE RESERVE SYSTEM AND ITS ESTUARINE SCIENCE, EDUCATION, AND STEWARDSHIP PROGRAMS

Objective – “Designation of the area as a reserve will serve to enhance public awareness and understanding of estuarine areas...” (CZMA Section 315 (b)(c))

Objective – “The Secretary shall take such action as is necessary to promote and coordinate use of the system for research purposes...” (CZMA Section 315 (d))

Suggested Performance Indicators -

- Number of outside scientists using reserves for conducting estuarine research
- Number of journal articles, news articles, and other publications featuring reserve education and research programs
- Number of state and local officials visiting reserves each year
- Number of conferences and events where reserve science and education is presented

IV. LINKING THE TWO COMPONENTS OF THE NATIONAL PERFORMANCE MEASUREMENT SYSTEM

The NCMP and NERRS components of the performance measurement system both include contextual indicators and performance indicators. The NERRS component splits the contextual indicators into pressure and state indicators to further categorize the information and to make analysis of the information using the pressure-state-response framework meaningful to future strategic planning efforts.

The NCMP and NERRS data will work together to make the performance measurement system more robust and useful. The data from the NCMP indicators will inform reserve managers about coastal issues influencing the reserves, including coastal hazards, coastal habitat, coastal community development, and coastal public access. It will also indicate areas where additional training, education, and research are needed. Information collected from the NERRS indicators will complement and feed into specific NCMP indicators, especially in the areas of coastal water quality and coastal habitats.

Performance indicators provide an indication of how well a program is progressing toward the goals and objectives it was designed to achieve. Thoughtful design, use, and adaptation are critical to the value of indicators as a management and communication tool. Ultimately, NCMP and NERRS will work together to evaluate the effectiveness of activities and resource allocations and to communicate the results to target audiences.

IMPLEMENTATION OF THE NATIONAL COASTAL MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM

NOAA, in coordination with coastal states, has strived to design a performance measurement system providing enough information to determine the effectiveness of CZMA programs in achieving on-the-ground outcomes without imposing cumbersome data collection and reporting requirements. While indicators have been identified, many questions remain about how the indicator data will be collected and compiled. These questions can only be answered by moving out of the conceptual phases of identifying frameworks and indicators and progressing toward trial projects involving a representative but limited number of programs and indicators.

SHORT-TERM IMPLEMENTATION

I. OVERVIEW

A phased approach will be used to start the process of implementing a National Coastal Management Performance Measurement System. Phase I of NCMP implementation will use a pilot study approach to implement a majority of the performance indicators in a subset of states. The NERRS will phase in its indicators over time, with Phase I limited to indicators with known data available.

This limited scope approach will allow the National Coastal Management Performance Measurement System to be further refined and finalized. The goals of Phase I are to:

- develop and submit to Congress the first annual accomplishments report;
- identify how indicators could be used;
- identify potential sources of data and delineate data collection responsibilities between coastal management programs, reserves, and NOAA;
- refine data collection and reporting methods;
- assess the compatibility of reported data when aggregated among coastal management programs and reserves; and
- identify resources needed to support federal and state efforts to implement the system; collect and evaluate data, identify gaps, and complete reporting requirements for developing a synthesized picture of national progress on a routine basis.

Coordination is critical to ensure effective use of resources and development of a performance system reflecting coastal management at the local, state, and national levels. Throughout each step of this process, the NCMP and NERRS will work together through a coordination committee to ensure coordination and information sharing.

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II. SHORT-TERM TIMELINE

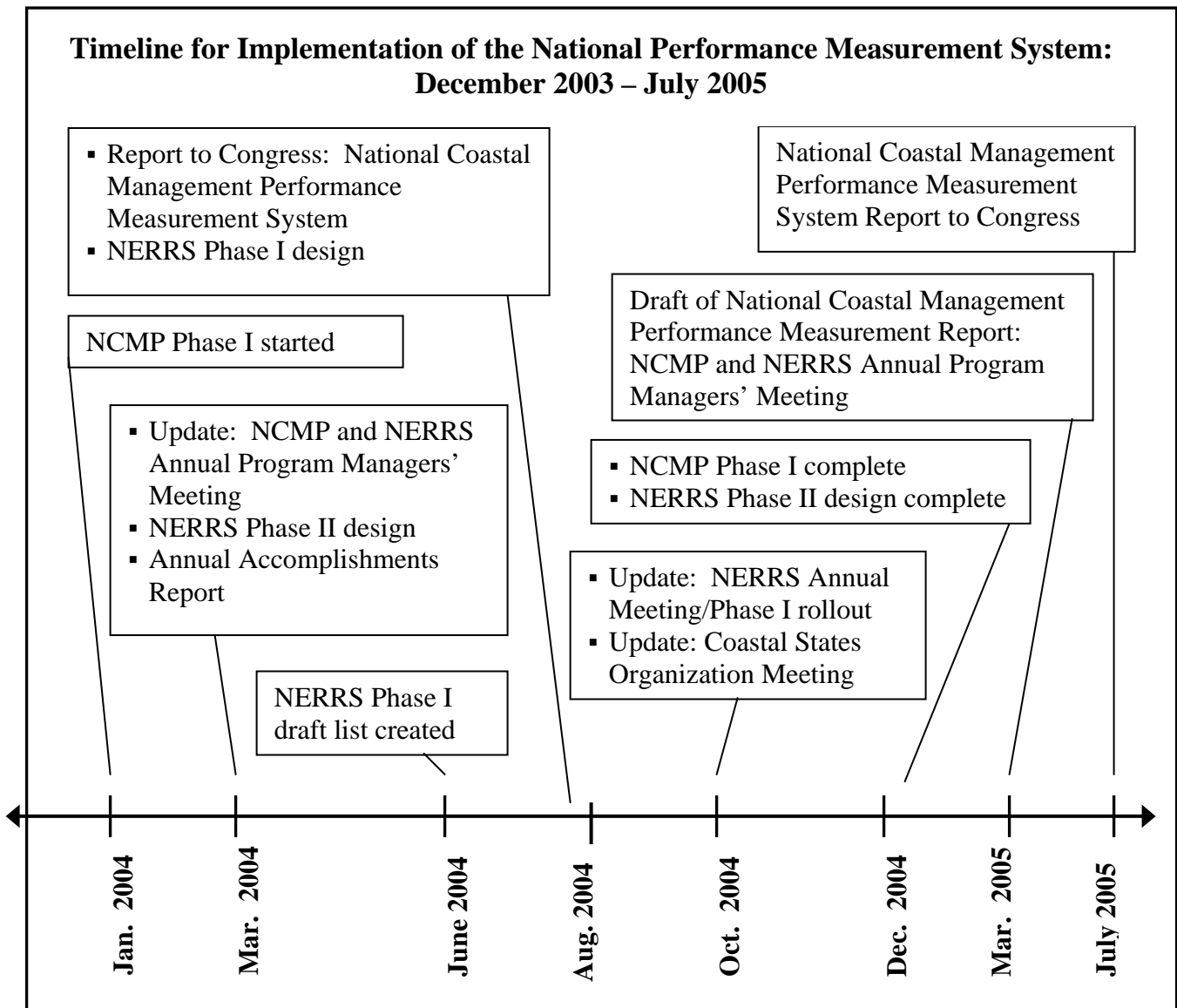


Figure 6: Short-term timeline for implementation of the National Coastal Management Performance Measurement System

III. NATIONAL COASTAL MANAGEMENT PROGRAM

As Phase I of the National Coastal Management Performance Measurement System, NOAA will work with a select number of coastal management programs to conduct year-long pilot projects in 2004. The pilot states will be chosen to represent the geographic and organizational variation of state programs. NOAA will work with the pilot programs and necessary experts to specifically define the

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indicators, including identifying an appropriate measurement unit. In each pilot state, available data and information on proposed indicators will then be collected. Several indicators, such as the level of public awareness of coastal issues and the quality of experience at coastal public access sites, will be postponed since standardized surveys may need to be developed and conducted throughout the states. NOAA will provide technical assistance to the pilot states for collecting and reporting on state-specific indicators.

At the same time state-specific data are collected in the pilot projects, NOAA will collect data on contextual indicators from nationally available datasets or from data readily available to the coastal management programs. Examples of indicator data that can be extracted from national datasets include population and employment in the coastal zone. NOAA will also extract data for performance indicators from existing reports provided by the coastal management programs. These indicators include the number of states with approved Coastal Nonpoint Source Pollution Control Programs and approved Coastal and Estuarine Land Conservation Program plans.

Throughout the pilot projects, NOAA and the participating coastal management programs will assess the time and resources spent to collect and report data at both the state and federal levels. This assessment will determine the feasibility and usefulness of collecting information on certain indicators and provide insight during selection of indicators for the final system.

States volunteering in the pilot project will be expected to bear the costs of the yearlong implementation, aside from technical assistance and guidance provided by NOAA. After the pilot project is completed, NOAA and the coastal states will evaluate their ability to fund data collection efforts in all 34 coastal management programs.

IV. NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

To assure the proposed indicators will provide the system with useful information for adaptive management and for communicating reserve priorities, the NERRS will adopt a phased approach. With the beginning of each phase, the reserve system will articulate how the indicators will be used and will evaluate the data collection, management, and analysis challenges particular to the indicators selected.

The NERRS is already collecting many of the indicators presented in this section. The reserves will begin collecting the rest of the Phase I indicators by the summer of 2004 and will use the pressure-state-response framework to analyze the indicator data in 2004 planning activities. Phase I indicators include:

Contextual Indicators:

- Population growth in census tracts adjacent to reserves
- Changes in major industry in reserve watersheds between 1970-2000
- Major weather events in each of the biogeographic regions
- Water quality (temperature, salinity, pH, dissolved oxygen, turbidity, water depth)

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- Weather (temperature, wind speed and direction, relative humidity, barometric pressure, rainfall, and photosynthetically active radiation)
- Nutrient levels (ammonium, nitrate, ortho-phosphate, and chlorophyll a)

Performance Indicators:

- Percent of reserves operating with an up-to date management plan
- Percent of reserves submitting quality controlled and quality assured water quality and weather monitoring data
- Number of contact hours of training offered to coastal decision-makers through the Coastal Training Program
- Percent of Coastal Training Program participants reporting the intent to apply science-based information at work
- Number of Graduate Research Fellows conducting research within the system
- Number of applicants to the Graduate Research Fellows program

The next phases of NERRS implementation will require additional resources to identify and collect appropriate contextual pressure and state contextual indicators. During the strategic planning process in 2002, reserve management identified a draft list of important contextual pressures affecting estuarine resources and management. The list includes a mix of environmental, political, and social topics. Reserves do not have experience working with social science research and will require assistance to build social science capacity at a local level.

Reserves are already tracking contextual indicators through the System-Wide Monitoring Program. The System-Wide Monitoring Program tracks short-term variability and long-term changes in estuarine waters to understand how human activity and natural events change ecosystems. The System-Wide Monitoring plan has identified important elements of future monitoring including habitat change analysis and biological monitoring. Each new monitoring program requires significant investment in planning; launching pilot studies; and staff, equipment, and data management and analysis as the monitoring program is expanded to include every reserve. Reserves will continue to phase in priority monitoring programs and management performance indicators as resources become available.

LONG –TERM IMPLEMENTATION

I. OVERVIEW

Coastal management programs and reserves will continue to work together to integrate the list of suggested indicators into an informed process for adaptive management as resources permit. The results of Phase I will be carefully considered by the NCMP and NERRS before implementing future stages of indicator development and collection. These first steps will be used to eliminate duplication of efforts, examine where and how communication between the programs could be improved, and identify the resources needed to collect and analyze a full suite of indicators at a national scale.

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II. NECESSARY STEPS FOR FULL IMPLEMENTATION

Five general steps will be taken to fully implement the National Coastal Management Performance Measurement System:

- 1) refine indicators and develop measures using Phase I results
- 2) collect and analyze indicator data
- 3) develop products to ensure indicator information reaches and is understood by coastal managers and target audiences
- 4) incorporate the indicator information into planning and management programs
- 5) review and revise the performance measurement system to better inform management decisions

Implementing a full suite of indicators to track coastal management performance and contextual factors affecting the coasts will take time and require regular evaluation. Therefore, planning, coordination, and identifying resource needs are critical steps throughout implementation.

During each step of this process, NCMP and NERRS will work together to ensure coordination and information sharing.

Refinement of indicators

Using the lessons learned from Phase I, NOAA will work with the coastal management programs and reserves to choose the best indicators for inclusion in the national system. Once indicators have been chosen according to their usefulness and feasibility, measurement units (e.g. acres, miles) will be added to convert indicators into measures. These measures can then be used to establish baselines for each coastal management program and reserve. These baselines may then be used to set targets and benchmarks by the CZMA programs.

Baseline information will be initially limited to the pilot states. Complete baseline information will be available once all coastal management programs have collected a first round of data. It is expected not all programs will have data for the entire suite of indicators available and additional time and resources will be required to develop data sources and/or observational tools, technologies, and methods.

Data collection and analysis

Once fully implemented, CZMA programs will collect and report the majority of data through existing reporting mechanisms, and NOAA will compile and analyze the data. While coastal management programs and reserves will collect and compile some data, other information will come from various partners in other state agencies, local governments, non-governmental organizations, and universities. Data that can be gleaned from existing national datasets will be collected and compiled by NOAA. Some indicators will require surveys and assessments to track changes in awareness and behaviors of the coastal public.

As the indicator system expands into full implementation, NOAA will develop data management tools through which information from CZMA programs can be compiled and shared. While the purpose of this database will be to collect and analyze data for the National Coastal Management Performance

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Measurement System, the goal is to make this data and supplemental information available and useful to coastal management programs and reserves.

Communicating the results

To report information collected through the National Coastal Management Performance Measurement System, NOAA will produce three reports. While the initial reports on indicators may have data gaps, improvements in observation and monitoring programs and technologies will enable improvements in future reports. The three types of reports are outlined below:

1. An annual progress report prepared by NOAA to document tasks, projects, and accomplishments achieved through funding provided to the NCMP and NERRS.

Inaugural report: March 2005

2. A triennial performance measurement system report compiled by NOAA to describe the trends in the data collected on the performance indicators. These indicators will assist NOAA in evaluating the performance of programs in furthering the goals and objectives identified by coastal management programs and reserves, and in the achievement of the national policy declared in CZMA Sections 303 and 315. Depending on the specific priorities of different programs, some indicators may be aggregated by state or region while others may be aggregated nationally. Case studies and narrative explanations will supplement the indicator results to provide additional information on the accomplishments achieved and the challenges faced by CZMA programs.

Inaugural report: July 2005 (Phase I only)

3. A triennial national state of the coast report developed by NOAA and other federal agencies to document the status and trends of coastal and estuarine indicators, based on data and information from various federal agencies and state partners, to provide a comprehensive analysis of the natural, economic, and cultural resources of the coast.

Inaugural report: December 2006

Incorporation of information into planning and evaluation

Indicator information will provide valuable information for strategic planning efforts by the CZMA programs. Several cycles of tracking indicators will provide a better understanding of trends in coastal resource and management issues, which will promote better-crafted measurable goals and objectives in strategic plans. By establishing a baseline through the performance measurement system, and by tracking trends over time, it will become easier for coastal management programs and reserves to establish targets for specific objectives.

At the state or reserve level, tracking coastal resources and management outcomes through the performance measurement system will allow assessment of the effectiveness of management actions and programs. While more specific indicators may need to be developed by individual programs or reserves to provide the level of feedback needed to inform state and local decisions, the information compiled for the National Coastal Management Performance Measurement System may highlight

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initial priorities to guide planning efforts. Tracking indicators over time will also help identify trends in coastal resources and may result in adjustment of state and reserve management plans and revisions to federal guidance. Indicator information will also be used to further inform the existing evaluation mechanisms, including the CZMA Section 312 evaluations.

Review and revision of the National Coastal Management Performance Measurement System

After Phase I of implementation and regularly thereafter, NOAA will evaluate the National Coastal Management Performance Measurement System to ensure its utility in assessing the effectiveness of CZMA programs. In this evaluation, NOAA will seek feedback from the coastal management programs and reserves to ensure the performance measurement system accurately captures the effects of program actions and to adapt the system to reflect changes in coastal management priorities and strategies.

CONCLUSION

There is a great need to understand the status of existing natural, cultural, and economic resources in coastal areas and how they are changing. To effectively manage the Nation's coastal zone, an understanding of the effectiveness of management strategies in addressing coastal issues and priorities is also needed to truly appreciate the influence of national, state, and local programs on coastal resources and uses. The National Coastal Management Performance Measurement System proposed in this report is structured to track on-the-ground outcomes of the NCMP and NERRS through a series of environmental context indicators and performance indicators.

The recommended National Coastal Management Performance Measurement System is based on long-term monitoring, observations, and data collection so trends in coastal resource use and management impacts can be better understood.

With appropriate support, the National Coastal Management Performance Measurement System will become a powerful tool for the management of the nation's coastal zone and for demonstrating the success of the CZMA in preserving, protecting, and restoring coastal resources and sustaining coastal communities throughout the United States for this and future generations.

Coastal Management Programs: State partners with approved coastal programs under the Coastal Zone Management Act.

Contextual Indicator: An indicator of environmental and socioeconomic circumstances that influence management but are often not within the direct control of the management agency.

CZMA Programs: Term referring to both the National Coastal Management Program and the National Estuarine Research Reserve System, created by the Coastal Zone Management Act.

Dimension: A subtheme of a focus area that reflects important types of management activities and guides the identification of indicators for illustrating the effectiveness of the management activities.

Indicator: A parameter that provides a simplified view of a more complex phenomenon, or provides insight about a trend or event that cannot be directly observed.

Outcome Indicator: An indicator of changes in the state of coastal resources resulting from management actions.

Output Indicator: An indicator of the products, goods, and services produced by the program.

Performance Indicator: An indicator that tracks how well a program is achieving its objectives.

Performance Measure: A goal-oriented statement that includes an indicator, a unit of measurement, and a baseline in order to track the effectiveness of a program in achieving its objectives.

Performance Measurement System: A suite of measures that tracks how well a program is achieving its objectives.

Pressure Indicator: A type of contextual indicator that measures natural and human-induced stresses on a resource or situation.

Reserves: Designated coastal areas protected under the Coastal Zone Management Act that compose the National Estuarine Research Reserve System.

Response Indicator: A type of performance indicator that tracks the effectiveness of a program's response to changes in the pressures on or the state of a resource or situation.

State Indicator: A type of contextual indicator that measures the condition of a resource or situation.

PAST EFFORTS THAT INFORMED THE NATIONAL COASTAL MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM

- **1991**- A study to evaluate the effectiveness of the CZMA and the progress of NCMP found that the NCMP has been successful in one of its key objectives – establishing a national program that incorporates state diversity. It concluded, while states were devoting most of their attention to the key issues of improving government decision-making and protecting coastal resources, they retained an interest in and ability to address other national interest areas where they existed and needed management attention.¹⁰
- **1997** - The Department of Commerce Inspector General reviewed the NCMP and concluded “only anecdotal evidence” could be cited to demonstrate accomplishments. Furthermore, “states have been unable to measure or evaluate ‘on the ground’ outcomes of the CZM program because the data necessary to make decisions has not been collected.” To remedy this, the Inspector General recommended NOAA develop a strategy to measure the effectiveness of the NCMP.¹¹
- **1999** – NOAA completed a comprehensive study of the effectiveness of coastal management programs was completed to meet the Department of Commerce Inspector General’s recommendation. Researchers concluded coastal management programs are effectively implementing the CZMA objectives examined. However, their conclusions relied primarily on assessments of policies, processes, and tools since quantitative information about on-the-ground results was rare. The researchers noted where coastal management programs do measure outcomes, different indicators are used by each state, virtually eliminating the possibility of comparing across states or making conclusions from a national perspective. Thus, the study concluded there was insufficient data for systematic, quantitative performance evaluation of coastal management programs, largely because of the lack of a common set of outcome indicators linking coastal management activities and decisions to national CZMA objectives. They recommended outcome indicators be developed and Congress amend the CZMA to require a national outcome monitoring and performance system.¹²
- **2001** - Responding to the recommendations of the effectiveness study, the 2001 Department of Commerce appropriations bill directed NOAA to prepare an assessment of the national impact of the CZMA. The resulting impact study concluded the CZMA had been successful in encouraging

¹⁰ Brower, D.J., J.H. Archer, D.C. Coates, D.R. Godschalk, M.I. Lugar, D.W. Owens, N. Armingeon, N. Grossman, B. Henderson, and A.K. Schwab. 1991. Evaluation of the national coastal zone management program. Center for Urban and Regional Studies, University of North Carolina, Chapel Hill.

¹¹ U.S. Department of Commerce. 1997. Final Report: National Oceanic and Atmospheric Administration, Coastal Zone Management and National Estuarine Research Reserve System Programs Require Management Attention to Increase Effectiveness. Inspection Report No. IPE-9044, Office of Inspections and Program Evaluation, December 1997.

¹² Hershman, M.J., J.W. Good, T. Bernd-Cohen, R.F. Goodwin, V. Lee, and P. Pogue. 1999. The effectiveness of coastal zone management in the United States. *Coastal Management* 27(2): 113-138.

the establishment of state programs to comprehensively plan activities and balance the uses in the coastal zone. In addition, case studies provided evidence that the Act has also been successful in encouraging participation and cooperation among all interests. However, the report highlighted a lack of a comprehensive set of indicators hinders more quantitative analysis and recommended NOAA establish a mechanism to better assess the national impacts of the CZMA.¹³

- **2001** - NOAA contracted with the H. John Heinz Center for Science, Economics, and the Environment to study indicators of program effectiveness. The Heinz Center convened a panel of coastal experts representing industry, academia, government, and the environmental community. The panel worked over 18 months to develop a framework for identifying performance indicators and held constituency meetings in Texas and Maryland to “ground truth” the recommended framework.
- **2001** - Noting the uncertainty about the types of data states were collecting in relation to the CZMA objectives, NOAA conducted a pilot project to determine how five coastal management programs were using indicators and to identify existing or potential indicators of program effectiveness.¹⁴ Through workshops in each state, indicators were documented for five CZMA goals – coastal wetlands, natural hazards, public access, deteriorating urban waterfronts and ports, and public participation. The pilot project revealed, across the five states, no standardized methods for measuring coastal program effectiveness existed, though four of the five states had identified coastal indicators. The project also identified a suite of potential indicators for each of the goal areas and articulated common incentives and concerns of the coastal management programs in participating in a national performance measurement system.
- **2002** - To expand the pilot project and inform the Heinz Center’s effort to develop a framework for identifying indicators, NOAA conducted a state performance measurement survey of all 34 coastal management programs to determine the current evaluation capacities of each program. The results revealed that 22 coastal management programs have or are developing some type of performance measurement system. However, most systems were at the state or department level rather than specific to the coastal management program. The survey also gathered information regarding the measurable goals and objectives and current indicators used by each coastal management program as related to seven CZMA goal areas – coastal hazards, coastal habitats, coastal water quality, public access, coastal dependent uses, coastal community development, and management and governance. Results revealed while most states set their goals to align with CZMA objectives, states use different indicators to track their effectiveness.¹⁵

¹³ Report to Congress on the National Impacts of the Coastal Zone Management Program. 2001. National Oceanic and Atmospheric Administration.

¹⁴ Office of Ocean and Coastal Resource Management and Special Projects Office. 2002. National Coastal Zone Indicators: An Assessment of Indicator Use and Potential in Five Coastal States. National Oceanic and Atmospheric Administration. Silver Spring, MD.

¹⁵ Survey results not yet published.

- **2002** - A baseline study of the NERRS established a record of what measures were being collected at reserves and proposed an organizational structure for selecting and analyzing indicators.¹⁶ One observation in the baseline study was reserves varied greatly in their existing performance measures, but reserve system-wide programs provided a common activity on which to report. Recommendations from the baseline study were incorporated into the updated 2002 NERRS Strategic Plan.
- **2003** - The Heinz Center panel published the framework to guide the identification of coastal management performance indicators.¹⁷ While the purpose of the framework was to organize information at the national level, the framework was also adaptable so state decision-makers could use it to shape a performance measurement system to assess their individual program's effectiveness. The panel also recommended that Congress require NOAA to develop a common set of indicators emphasizing outcomes to achieve the national objectives of the CZMA.

¹⁶ Benoit, J.R., R.F. Delaney, and C. Riley. Establishing Baseline Information on Environmental Indicators and Performance Measures for the National Estuarine Research Reserve System. 2002. The University of Massachusetts Boston, Urban Harbors Institute.

¹⁷ The Coastal Management Act: Developing a Framework for Identifying Performance Indicators. 2002. The H. John Heinz III Center for Science, Economics and the Environment.