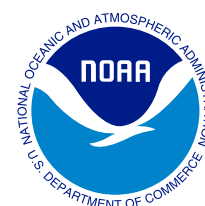




The National Estuarine Research Reserve System

Strategic Plan 2017-2022

NOAA Office for Coastal Management



Introduction

Estuaries are among the nation's most biologically rich and economically important ecosystems. These unique transition zones form where rivers meet the sea and Great Lakes. They provide social, economic, and environmental benefits for the entire country. These benefits, however, are dependent upon healthy, well-functioning estuarine habitats. This strong correlation between the health of estuaries and society's economic and social well-being means that coastal conservation is driven by both ecological and societal needs.

Because estuaries are located in a highly dynamic environment with significant populations, commerce, and environmental change, they are also one of the most vulnerable ecosystems. Significant human and natural impacts threaten the important services they provide, requiring a science-based, integrated management approach to protecting estuaries, both today and for future generations.

The National Estuarine Research Reserve System is meeting this need. Over the next five years, the reserve system will advance estuary and coastal watershed management by delivering cutting-edge research, data, and tools to decision-makers. The system will continue to serve as a test bed for innovative science, management, and restoration strategies, offering opportunities for teachers, school children, and community members to increase education, stewardship, and protection of these valuable resources. These efforts will help preserve our estuaries and the ecosystem services they provide now and in the future.

Estuaries are valuable to the nation in several important ways. They provide the foundation for industries that rely on estuarine habitats, such as fisheries, tourism, and commerce. They protect communities from damaging storms, filter polluted runoff, and provide habitat for important wildlife. They sustain jobs and livelihoods, and perhaps most importantly, they help define who we are as people. Some of the ways that estuaries are valuable to us include

- **Recreation and tourism**, by generating 8 to 12 billion dollars in the U.S. each year.
- **Food**, by providing habitat for more than 75 percent of the nation's commercial fish catch, and an even larger percentage of recreational catch.
- **Protection of our environment**, by serving as filters, creating clean water for recreation and environmental health. They also capture and store carbon and other greenhouse gasses, helping to mitigate climate change and its impacts.
- **Jobs and income**, by supporting 40 percent of all American employment. Coastal counties make up only 13% of the country's land area, but they generate half of the nation's gross domestic product.

Who We Are

The National Estuarine Research Reserve System is a leader in estuarine research, stewardship, and education, fostering resilient coastal communities across the nation. Established by the Coastal Zone Management Act of 1972, as amended, the reserve system is a state-federal partnership between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. This partnership is 29 research reserves strong. The system protects over 1.3 million acres of estuarine land and waters across the country for the purpose of advancing and applying knowledge of estuaries to improve coastal management and stewardship. These estuaries are relatively undisturbed and of strong ecological integrity. They represent the variety of habitats found across the nation, allowing for transfer of management approaches and protection strategies throughout the reserve system.

NOAA's Office for Coastal Management administers the program by providing guidance, coordination, technical assistance, and funding. State partners manage reserve resources, implement programs locally, and provide funds to match the federal investment. Each reserve in the national system serves as a community center, promoting locally relevant, integrated approaches to coastal management. They do this by collaborating with stakeholders, scientists, land management professionals, and educators. In this way, NOAA and the reserves are local, regional, national, and, at times, international partners responding to coastal communities' most pressing management needs and emerging issues.

The reserve system is an integral part of NOAA, helping to address the National Ocean Service's priorities, including stewardship, recreation, and tourism, preparedness and risk reduction, and safe and efficient transportation and commerce. In particular, reserves directly assist communities by bringing information and enhancing capabilities to help them prepare, respond to, and recover from immediate and potentially life-threatening events, such as hurricanes and long-term issues like recurrent flooding. Additionally, the reserves contain important natural, cultural, and historic resources that contribute to the coastal tourism and recreation industry.

How We Work

The reserve system was founded on the principle that long-term protection of estuaries provides a stable platform for research, education, and management practices that will benefit the country's estuaries and coasts. Reserve staff possess expertise in research, education, training, and stewardship, working collaboratively as teams and with a variety of partners to address the complex coastal issues facing their communities.

Nationally, the reserve system is unique in its approach to serving coastal community needs through its implementation of system-wide programs in monitoring, training, and education. This approach ensures consistent protocols and comparable outcomes applied at local, regional, and national scales, serving to better understand, protect, and manage estuarine systems. Currently, there are three system-wide programs: the System-Wide Monitoring Program, the Coastal Training Program, and the Teachers on the Estuary Program. The integration of locally relevant programs with system-wide approaches fosters innovation and allows for comparison of coastal conditions across the nation. This approach also ensures seamless delivery of NOAA products and services, and serves as a national platform for research and education.

Both as a system and as individual reserves, the National Estuarine Research Reserves espouse common principles that guide how we work. These principles serve to

- Engage and inform local citizens, teachers, students, and communities in science-based stewardship of coastal estuaries and watersheds;
- Conduct high-caliber science and use science-based collaborative approaches to address complex coastal management problems;
- Create meaningful partnerships to enhance program success and estuary health;
- Lead by example through innovating, testing, and applying best management practices, planning approaches, and behaviors;
- Facilitate the use of best available science to make informed management decisions; and
- Seek to understand and utilize stakeholder needs to guide program implementation.

What We Work On

The reserve system employs its unique approach to three strategic areas of great importance to coastal communities: environmental change, water quality, and habitat protection. Environmental challenges are exacerbated in coastal counties, where over half of the U.S. population lives. In these areas, residents have a direct impact on land use changes and ecosystems, affecting the health of the ecosystems and the services they provide. Over the last five years, the reserve system has strategically addressed these issues and has equipped decision-makers and residents with valuable information to help manage and steward coastal resources. A few outcomes from the last plan included

- Advancing a better understanding of how to best communicate climate change and its impacts, mitigating the impact of human activities on water quality, and guiding methods of development that minimize impact to habitats;
- Increasing the capacity of the System-Wide Monitoring Program to track changes in local water levels, inundation patterns, and the impact of these trends on coastal vegetated habitats;
- Developing an index tool for assessing relative sensitivity of marshes to sea level rise, and a tool to assess habitat vulnerability by integrating both anthropogenic and environmental stressors on estuarine habitats; and
- Creating and implementing the Teachers on the Estuary Program to improve teachers' and students' understanding of the environment. Strategies included using local examples and providing resources and experience to support the incorporation of estuary and watershed topics into classroom teaching.

Environmental change is occurring rapidly, affecting communities differently throughout the country. In the future, impacts will be exacerbated by threats from sea level and lake level change, inundation and flooding from storms, and changes to freshwater flows. Coastal flood damages are expected to increase significantly during the 21st century, as sea levels rise and socioeconomic development increases the number of people and value of assets in the coastal floodplain. The reserves are poised to study the impacts on and vulnerabilities of estuaries and coastal communities, support adaptation strategies, and mitigate impacts through greenhouse gas reduction and carbon sequestration.

Water quality and quantity is vital for coastal ecosystems and communities to thrive. The most recent assessment by NOAA, the U.S. Environmental Protection Agency, and the U.S. Department of Agriculture indicates that estuaries are threatened by eutrophication and algal blooms that are strongly influenced by population growth and land use practices. The System-Wide Monitoring Program is a foundational component in understanding trends in estuaries. The program provides information to local municipalities that is critical in assessing flooding risks, evaluating conditions contributing to harmful algal blooms, informing decisions on local public health risks and advisories, determining regulatory policies for nutrient criteria, and managing invasive species. As a place-based network of protected areas, the reserve system is uniquely positioned to build on its success and address these issues through the goals and objectives in this plan.

Habitat protection is essential, given that each year, more than 80,000 acres of coastal wetlands are lost. This figure has increased from 60,000 acres per year, calculated during the previous study. Development, human activities, salt-water intrusion, and inundation are primary causes for this loss, highlighting the need for increased wetland protection and restoration activities. The reserves are well suited to map, monitor, and study habitat changes, as well as develop, implement, and test protection and restoration approaches. The system allows for transferability of these best practices through coastal training and community education programs.

The Strategic Plan

Vision: Resilient estuaries and coastal watersheds where human and natural communities thrive.

Mission: To practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas.

PROTECTING PLACES

Goal: Enhance and inspire stewardship, protection, and management of estuaries and their watersheds in coastal communities through place-based approaches.

Objective 1: Coastal practitioners will enhance resiliency of reserves and their watersheds by improving the protection and function of coastal habitats.

STRATEGIES

- Develop reserve vulnerability assessments to understand risks from natural and man-made stressors in order to improve adaptation and mitigation planning.
- Complete a system of reserve habitat maps and ensure all reserves are monitoring the impacts of inundation and sea and lake level change to identify vulnerable habitats and evaluate landscape change.
- Evaluate and employ the use of unmanned aircraft systems to increase accuracy of habitat mapping.
- Provide information about ecosystem services and apply knowledge in resilience-related training events to support protection and restoration of coastal habitats.
- Provide information and reference sites to enhance restoration planning, implementation, and monitoring.
- Maintain and enhance protection and management of reserve lands, waters, and facilities to support the function of estuaries and reserve operations.

Objective 2: Communities and individuals will have an enhanced connection to estuaries and coastal ecosystems in order to promote stewardship and care of the resource.

STRATEGIES

- Create and enhance volunteer programs that contribute to reserve goals, facilitate outreach, and inspire connection to estuaries in their communities.
- Facilitate community access to opportunities for engagement and connection to estuaries through facilities and trails.

Objective 3: The reserve system will strategically expand the number of representative estuaries across the country, serving to improve the nation's coastal management.

STRATEGIES

- Educate and engage key stakeholders on system priorities for expansion and on the designation process.
- Expand the number of reserves to increase representative types of estuaries across the nation.
- Support acquisition and inclusion of additional lands and waters to reserve boundaries to increase ecosystem protection and understanding of estuarine environments.

APPLYING SCIENCE

Goal: Improve the scientific understanding of estuaries and their watersheds through the development and application of reserve research, data, and tools.

Objective 1: The reserve system will maintain and expand monitoring of relevant and emerging biophysical and socioeconomic parameters, increasing their capacity to track the effects of changes in land use, coastal development, and climate.

STRATEGIES

- Maintain and enhance the System-Wide Monitoring Program to collect long-term data on water quality, weather, biological communities, habitat, land-use, and cover characteristics.
- Develop additional monitoring modules to address emerging issues, including climate stressors such as ocean acidification.
- Increase reserve capacity to collect, synthesize, and deliver environmental indicators data; monitor changes and trends in ecosystem health and preparedness based on user needs.
- Develop and distribute annual reserve and national synthesis products, including ecological status and trends reports.
- Conceptualize and pilot a socioeconomic data observing system in one or more regions, as well as a national, system-wide approach.
- Leverage and apply NOAA partnerships, funding, and expertise to integrate biophysical and socioeconomic data, thereby providing the foundation for interdisciplinary and ecosystem services research.
- Increase data sharing and coordination among regional partners, such as Integrated Ocean Observing System Regional Associations and National Association of Marine Laboratory member organizations, to realize a seamless network that spans nearshore and offshore waters and transcends geographical and organizational boundaries.

Objective 2: Reserves and coastal researchers will increase their collaborative research to address the needs of decision-makers and stakeholders.

STRATEGIES

- Conduct collaborative research projects that engage natural resource managers across multiple sectors to address decision-makers' and stakeholders' needs.
- Engage undergraduate and graduate students in collaborative research opportunities.
- Maintain and strengthen partnerships with research institutions to advance estuarine science at reserves.
- Increase capacity and knowledge of collaborative research and tools, and transfer successful approaches.

Objective 3: Scientific, management, and educational audiences will know about and effectively use reserve research, data, and products to understand the effects of climate and land-use change on estuaries, ecosystem services, and human well-being.

STRATEGIES

- Communicate collaborative research results and monitoring trends through peer-reviewed publications; syntheses of physical, biological, and geochemical data; and training and technical assistance for decision-makers.
- Incorporate System-Wide Monitoring Program data and applications into system-wide education and training programs, including Teachers on the Estuary programs and Estuaries 101.
- Integrate use of monitoring and vulnerability assessment data within the reserve system's Coastal Training Program to inform ecosystem-based management approaches within coastal communities.
- Assess the needs of partners and stakeholders to effectively target communication and knowledge-transfer activities through reserve training, tools, and technical assistance.

EDUCATING COMMUNITIES

Goal: Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watersheds, and coastal communities.

Objective 1: Coastal residents and visitors will increase their awareness and ability to improve stewardship of estuaries, coastal watersheds, and their communities.

STRATEGIES

- Provide programs that increase coastal residents' awareness of the value estuaries provide, which includes mitigating the impacts of hazardous weather, climate change, and other environmental threats.
- Inspire and motivate coastal residents to actively work on reducing the impact of coastal hazards on their lives and property.
- Engage individuals and communities and enhance their participation in activities that conserve, restore, and protect natural resources.

Objective 2: Educators and students will better understand and use reserve system and NOAA resources for place-based and inquiry-based learning.

STRATEGIES

- Increase application of reserve-related conservation and stewardship concepts and activities into curricula, practices, and programs.
- Support educators' ability to meet state science standards by providing access to reserve education materials.
- Conduct K-12 teacher and student programs to increase estuary literacy and stewardship.

Objective 3: Coastal decision-makers and environmental professionals will understand and effectively apply science-based tools, information, and planning approaches that support resilient estuaries and coastal communities.

STRATEGIES

- Provide tools and technical assistance to support development of community adaptation and mitigation plans.
- Provide training and technical assistance to ensure communities understand what constitutes a resilient community and how to implement strategies that increase their preparedness.
- Characterize and analyze the content of and process for reserve training and technical assistance, establishing a national perspective and program identify that benefits individual reserves.
- Develop a better understanding of how natural and nature-based features can increase economic value to coastal communities through enhanced ecosystem services.
- Develop and practice disaster response plans to increase community preparedness for natural and man-made hazards.

Objective 4: The next generation of coastal professionals and environmental stewards will expand and be motivated through access to programs and facilities that facilitate research, resource management, and educational opportunities.

STRATEGIES

- Provide opportunities at reserves for NOAA and national scholarship participants to conduct student projects and receive academic mentorship.
- Improve knowledge and appreciation of estuaries and coastal resources through outdoor experiences and interpretive exhibits.
- Increase sustainability of reserve facilities and access points and encourage communities and individuals to adopt and apply environmentally-friendly practices.

Glossary

Coastal decision-maker: Individuals whose duties or activities include making decisions that affect the coast and its resources. Coastal decision-maker groups vary according to individual reserve priorities, but generally include groups such as local elected or appointed officials, managers of both public and private lands, natural resource managers, coastal and community planners, and coastal business owners and operators. They may also include watershed councils, professional associations, recreation enthusiasts, and researchers.

Collaborative research: Denotes research that involves scientists interacting with stakeholders within a formal and structured process; this is not to be confused with scientists collaborating with other scientists from different organizations or disciplines.

Ecosystem: A geographically specified system of organisms (including humans), and the environment and processes that control its dynamics.

Ecosystem services: Ecosystem services are results of ecosystem processes that confer benefits on human society.

Estuary: Body of water usually found where rivers meet the sea. There are also several types of entirely freshwater ecosystems that have many similar characteristics to the traditional brackish estuaries. For example, along the Great Lakes, river water with very different chemical and physical characteristics mixes with lake water in coastal wetlands that are affected by tides and storms just like estuaries along the oceanic coasts.

Estuary literacy: Knowledge and ability to apply the essential principles and fundamental concepts about the interconnectedness and interdependency of estuarine systems with other earth systems in both time and space.

Ocean acidification: The reduction in the pH of the ocean over an extended period of time, caused primarily by uptake of carbon dioxide from the atmosphere.

Resilience: The ability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.

Salt-water intrusion: The movement of salt-water into freshwater aquifers, which can lead to contamination of drinking water sources and other consequences.

System-wide: Denotes an activity or program that occurs at all reserves in the National Estuarine Research Reserve System and employs consistent approaches and protocols.

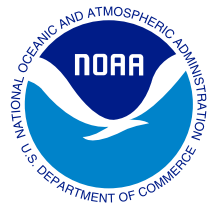
System-wide Coastal Training Program: The program provides training and technical assistance to a variety of coastal professionals who make choices about coastal resources and resource management in response to local management needs.

System-wide Teachers on the Estuary Program: The education program provides research and field-based professional development for educators to improve students' and teachers' understanding of the environment using local examples, resources, and field experiences.

System-Wide Monitoring Program: The monitoring program provides long-term data on water quality, weather, biological communities, habitat, land-use, and land-cover characteristics to detect and understand environmental change.

Vulnerability: The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.

Watershed: Land area from which water drains toward a common watercourse in a natural basin.



The National Estuarine Research Reserve System

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