National Estuarine Research Reserve System 2004-2005 Accomplishments Report

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Message from Laurie McGilvray Estuarine Reserves Division Chief

Last October at the National Estuarine Research Reserve System Annual Meeting in Kennebunk, Maine, I noted significant accomplishments of the reserve system and set forth a vision for what we would accomplish this year. It is exciting to reflect back on just how much we have achieved.

This year, the System-wide Monitoring Program is ten years old. It has grown from a modest water quality and weather monitoring program to a backbone element of the Integrated Coastal and Ocean Observing System. With substantial funding from the National Ocean Service and Coastal Services Center and thoughtful planning, we will realize our vision of having real-time data available for the management community, as well as increased access for scientists and students in the next eighteen months. We also are developing some exciting partnerships with other observing system programs such as NOAA's National Water Level Observational Network.

The Coastal Training Program was an energizing new idea in 1998. This year, we have twenty-two reserves delivering high-quality programs to a wide variety of audiences. These programs, which are often oversubscribed, have become a tremendous way to connect science to communities near reserves and throughout coastal states. Thanks to their understanding of local audiences and communities, experienced CTP staff have been able to respond quickly to major challenges such as tsunami planning on the West Coast and hurricane response on the Gulf Coast.

Raising awareness and understanding of estuaries and providing resources to teachers and students has been a focus of the reserve system education programs. EstuaryLive provides teachers and students with a virtual field trip to research reserves. This year more than 15,000 students and teachers participated in the broadcast, which included segments at three reserves and three National Estuary Program sites. The estuaries.gov website and the newly launched "estuaries tutorial" on the National Ocean Service website have become outstanding resources for teachers. The number of "hits" to the estuaries.gov website increased 154% this year.

This has been a time of real growth for the reserve system and 2006 promises to be equally exciting with the addition of the Mission Aransas NERR in Texas. I encourage you to read through this report to find out more about the accomplishments of the reserve system.

Laurie McGilvray
Chief, Estuarine Reserves Division

System Mission and Goal Statement

The National Estuarine Research Reserve System is a network of protected areas established for long-term research, education and stewardship. This partnership program between NOAA and the coastal states protects more than one million acres of estuarine land and water, which provides essential habitat for wildlife; offers educational opportunities for students, teachers and the public; and serves as living laboratories for scientists.

The System carries out this mission to preserve, protect and understand our Nation's diverse estuarine ecosystems under the following operational goals:

1. Improve coastal decision making by generating and transferring knowledge about coastal ecosystems
2. Enhance and expand the National Estuarine Research Reserve System
3. Increase awareness, use, and support of the reserve system and its estuarine science, education, and stewardship programs

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Program Overview

As a federal-state partnership, NOAA and coastal state partners collaborate to set common priorities and develop system-wide programs.

Graduate Research Fellowships

Each reserve can fund up to two Graduate Research Fellows per year. The fellowship offers qualified master's degree and Ph.D. candidates with an opportunity to conduct research that focuses on enhancing coastal zone management. Fellows conduct their research within a National Estuarine Research Reserve and gain hands-on experience by participating in their host reserve's research and monitoring programs.

System-Wide Monitoring

Each reserve monitors water quality, weather, and biological indicators using standard protocols. Coastal managers use this monitoring data to make informed decisions on local and regional issues, such as "no-discharge" zones for boats and measuring the success of restoration projects. As a system-wide activity, this monitoring program improves the nation's understanding of how human activities and natural events impact coastal ecosystems.

Coastal Training Program

The NERRS' Coastal Training Program offers education and training for professionals that make decisions about coastal resources on a regular basis. Audiences range from elected officials, regulators, and land developers to community groups, environmental non-profits, and private industry. The Coastal Training Program ensures that community members have the up-to-date scientific information and skill-building opportunities they need to make decisions about coastal resources. Reserves conduct audience assessments to ensure that programs target needs of priority audiences.

K-12 Education

In addition to targeting coastal decision makers, most reserves provide K-12 education, ranging from hands-on field experiences for students to professional teacher development programs, using established curricula aligned with state standards. Reserve educators provide regularly scheduled public programs and special events, and they partner with schools, community-based organizations and volunteers to deliver high quality programs. A key activity is the EstuaryLive program and Estuary Day activities aimed at raising awareness of K-12 students via the Internet.

Stewardship

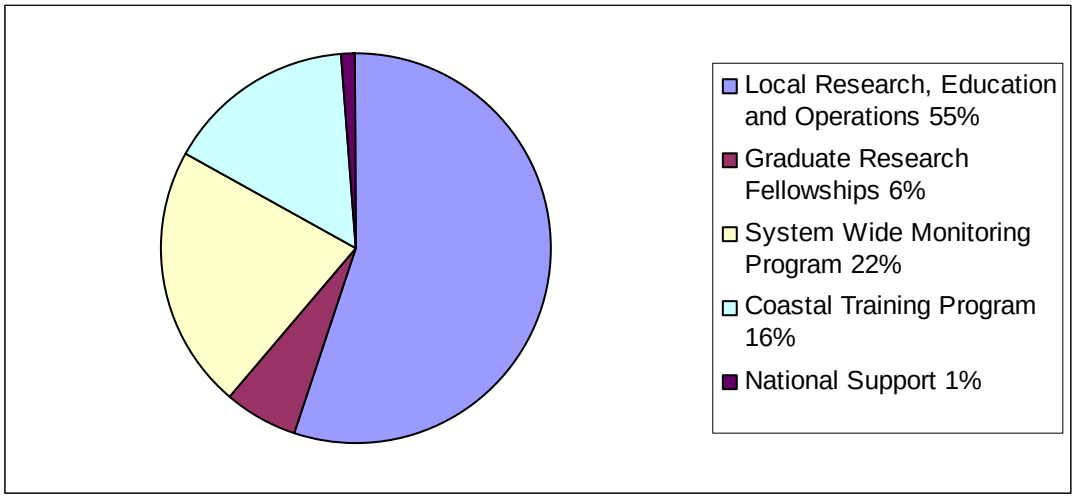
Stewardship in the National Estuarine Research Reserve System provides long-term protection of natural resources within the system's twenty-six reserves and serves to model responsible management practices to coastal communities.

Stewardship is a functional role with varying implementation strategies at each reserve. Typically, stewardship programs at any given reserve involve aspects of research, monitoring,

education, policy, and implementation of resource management actions. Many reserves have stewardship coordinators that work as an integrated team with other staff. Since reserve resources are often affected by activities on adjacent waters and watershed lands, stewardship involves close cooperation with stakeholders outside the reserve.

Budget Allocations – 2004-2005

Funding allocations for FY 2004 and 2005 reflect the national priorities outlined in the reserve system's strategic plan and in its Congressional mandates. NOAA provides 70 percent of reserve system funding, and the states are required to match 30 percent. Monies for land acquisition require a 50:50 federal-state match. In FY 2004, the reserve system expended $35.8 million in federal funding, and in FY 2005, this figure was $32.4 million. In FY 2004, the Reserve System was allocated $19.7 million in federal construction and land acquisition funds, and in FY 2005 $16.3 million were available for this purpose. The chart below represents the allocation of the remaining $16.1 million in federal program implementation funds for FY 2005.



New Program Developments

Draft Strategic Plan

The Strategic Committee has worked for months with ERD staff to develop a new strategic plan for the National Estuarine Research Reserve System to more clearly reflect the system's activities in the context of performance measures and the statutory requirements of the Coastal Zone Management Act. The new goals more evenly reflect the balance of NERRS activities in education, research and stewardship. The draft plan was being circulated to the NERRS in fall 2005 with adoption expected by the beginning of calendar year 2006.

Performance measures

In 2004, the National Estuarine Research Reserve System developed draft performance measures for the System as a whole, and for individual program sectors. A performance measure workgroup of NOAA Estuarine Reserves Division and Reserve staff critically reviewed the current NERRS strategic plan and drafted performance measures to support the goals and objectives therein. Great attention was paid to the necessity of performance measures that quantify and evaluate the NERRS' priority programs, and the speed with which reserve staff will be able to collect these indicators.

In the fall of 2005, the National Estuarine Research Reserve System updated their five year strategic plan. This plan focuses on reserve contributions to understanding and transferring information about four key coastal management issues: 1) land use and population trends; 2) habitat loss and alteration; 3) water quality degradation; and 4) biological threats such as invasive species and over-harvesting. A set of performance measures that correspond to the objectives of this plan are being drafted to supplement ongoing performance data collection.

The Coastal Training Program of the National Estuarine Research Reserve System began collecting performance measurement baseline information for 14 indicators in 2005. This baseline information will be used to create minimum standards and performance targets for the training program.

NERRS Partnership Developments

The National Estuarine Research Reserve System is a network of highly successful local, state, and federal partnerships. In addition to each reserve's working partnership between NOAA and a designated state resource agency, university, or nonprofit organization, several Reserves have begun to participate in pilot programs linking NERRS programs with those of other state and federal entities. One example of a partnership that links the NERRS System Wide Monitoring Program (SWMP) with other national data sets is a recent collaboration between the Wells NERR in Wells, Maine, and NOAA's Center for Operational Oceanographic Products and Services (CO-OPS). This partnership demonstrated the benefits of collaboration to produce improved data products for coastal managers and other user groups. In August 2005, CO-OPS installed a new tide station within the Wells Reserve. The station is a component of NOAA's National Water Level Observation Network (NWLON), and produces detailed tide, water level, and weather information within the Reserve. This NWLON station was co-located with one of the Wells NERR SWMP stations, resulting in better data characterization of the site, and more detailed information for supporting coastal management decisions, research programs, restoration projects, and education programming. The data from these instruments is sent via telemetry over the NOAA GOES satellite, providing additional support for the growing national Integrated Ocean Observing System (IOOS). This is the first station of its kind established in the NERRS, and further collaborations between CO-OPS and NERRS are anticipated.

In addition, the NERRS is working with NOAA's National Geodetic Survey (NGS), to position geodetic markers at reserve sites around the United States. Geodetic markers are precisely positioned physical monuments that serve as reference points for the National Spatial Reference

System (NSRS), a network of geodetic markers and satellites throughout the United States and its atmosphere. The NSRS lets us navigate safely by land, air or water; identify changes in the Earth's environment; and track the movement of environmental pollutants. So far, the Old Woman Creek NERR in Oregon, the Wells NERR in Maine, and the Guana Tolomato Matanzas NERR in Florida have worked with the NGS to establish geodetic markers within their boundaries. Reserve staff can use these markers to:

- verify the accuracy of Global Positioning System (GPS) equipment;
- validate spatial references for surveying, mapping and remote sensing control;
- teach about latitude and longitude;
- make measurements for phenomena like coastal erosion, subsidence, and accurate gauging of sea level rise.

Social Science

In FY2003, four NERRS sites, Waquoit Bay, Apalachicola Bay, Weeks Bay, and Grand Bay, were involved in a project to make U.S. Census and Bureau of Economic Analysis Data available to coastal managers on the internet. In 2004, as a result of this work the National Ocean Service Special Projects Group developed and launched a website titled "Spatial Trends in Coastal Socio-economics," (STICS). Visitors to the website can read an account of how the NERRS and the Special Projects Group worked together to develop the site, and geo-referenced socio-economic data can be downloaded for the Waquoit Bay, Apalachicola Bay, and Weeks Bay Reserves. NERRS and NOAA Special Projects Office staff presented this pilot project at the 2004 Coastal Program Managers Meeting and the 2004 American Geographers Association national meeting. For more information, please visit the STICS website at: http://marineeconomics.noaa.gov/socioeconomics/.

Estuarine Reserve Division staff led an effort to collect project ideas for the National Ocean Service Social Science Plan. Through brainstorming sessions with staff from the Office of Ocean and Coastal Resources and state partners, a list of seven priority projects were submitted to the plan. Submitted project topics include: a socio-economic analysis of coastal land conservation, shoreline management, and coastal development; a project to encourage social science fellowship applications for the NERRS Graduate Research Fellowship program; a project to develop a best practice handbook for public involvement in National Ocean Service activities; and a project to conduct a baseline study on knowledge, attitudes and behaviors about coastal resource management topics and issues.

Finally, the Ohio Coastal Training Program in August 2005 conducted a workshop titled "Social Assessment in Coastal Regions: Tools and Applications" to address the need for greater understanding and application of social science concepts and methods in natural resource management. The more than two dozen natural resource managers who participated were introduced to the concept of social assessment, which is a systematic means of data collection and analysis that results in a characterization of the social environment in which resource management decisions are made.

Intranet

ERD staff developed and published a new NERRS Intranet site to share planning documents, work group notes and agendas, directories and other internal information. The password-protected site at https://www8.nos.noaa.gov/nerrsintranet/home.aspx is available to all NERRS and ERD staff. Other contents include organizational charts, downloadable graphics and fact sheets, event calendars and an acronym dictionary. ERD staff plan to work with NERRS staff to develop additional content for the Intranet site.

Program Accomplishments

Education

K-12 Estuarine Education Program (KEEP)

Education coordinators have made big strides in conceptualizing and developing a framework for a system-wide education and teacher development program called the K-12 Estuarine Education Program (KEEP). The 2003 study *Inventory and Assessment of K–12 and Professional Teacher Development Programs in the NERRS* called for the reserve system to generate more of a nationwide presence in educating the public about estuaries. KEEP aims to help students become better stewards of estuaries, better prepare teachers for teaching about estuaries, use direct to the internet technologies to reach a broader audience, and increase awareness of the vital role that estuaries play in coastal ecosystems. The KEEP program will respond to a growing demand and fill a unique niche that other education programs focused on estuaries have not yet filled.

Educators and managers expressed strong support for KEEP in discussions at the NERRS Fall and Winter Meetings in 2004 and 2005. NERRS Educators are working on refining the concepts in KEEP, developing an action plan and a fundraising strategy. For a description of the different components of KEEP contact Glen "Alex" Alexander, education Coordinator for the Padilla Bay NERR or Atziri Ibanez, ERD National Education Coordinator.

EstuaryLive

The Reserve System successfully implemented EstuaryLive – an internet field trip for teachers and students to learn about estuaries – in 2004 and 2005. In total, between both events, teachers and students “visited” 11 reserves and learned about a variety of topics such as the impacts of hurricanes on blue crabs, how Pacific salmon contribute to the region’s cultural identity, what makes an urban estuary unique, how wetlands are being restored, and much more. In addition, participants, through a comparison broadcast, got to compare estuaries and the plants and animals that live in some of the reserves. During the 2005 Estuarylive broadcast more than 15,000 students and teachers participated directly in EstuaryLive via the Internet and a number of public television networks, cable systems and other institutions provided access to the programs for as many as a million viewers.

In both years, two of the participating reserves were affected by hurricanes right before the EstuaryLive broadcast. On September 16, 2004 the eye of Hurricane Ivan crossed into Baldwin County, Ala., from the Gulf of Mexico. The Weeks Bay reserve was affected, but decided to proceed with the EstuaryLive broadcast by making several changes to the previously planned script. The resulting broadcast from Weeks Bay NERR made an important contribution in educating about the impacts of Hurricane Ivan. Participants learned about hurricanes, the path of Hurricane Ivan, and the importance of monitoring.

In 2005, Hurricane Katrina had a serious impact on Grand Bay NERR, scheduled to host an EstuaryLive broadcast just a few weeks later. But again the reserve staff decided to proceed with the program by relying on EPA's Mobile Bay Estuary Program in Alabama. This broadcast also demonstrated the enormous flexibility and potential of direct-to-the internet technology that allows viewers around the world to learn about up-to-the-minute events and communicate directly with those involved. The Grand Bay NERR and Mobile Bay NEP segment allowed students to learn what a hurricane is, how people should prepare for storms, how hurricanes affect coastal ecosystems, how birds and other animals respond to storms and the impact on shellfish from storms.

Outreach

The NERRS has a tremendous reach through its network of experienced educators in place throughout the nation. During 2004 reserves engaged over 80,000 students in K–12 education programs, and 3,000 teachers in professional development programs. EstuaryLive alone reached approximately one million viewers during the broadcast. More than 13,600 students participated directly in EstuaryLive in 2004, and more than 15,000 in 2005.

NERRS Educators played a significant role in sponsoring, organizing, presenting, and/or exhibiting at the following conferences (selected sample):

- 2004 and 2005 National Marine Educators Association Conference
- National Science Teachers Association (NSTA) National and Regional Conventions

In addition, educators led several presentations, lectures/field trips or tours at their interpretation centers, at other facilities and in the field that expand the reach of the program and raise awareness about the reserve's work, the NERRS and the importance of estuaries.

Education Websites

In the past two years, NERRS educators launched two redesigned websites. In 2004, the completely redesigned www.estuaries.gov proved to be quite effective in supporting the EstuaryLive program. In previous years, participants had to visit several Websites to get all information regarding the broadcast. Now, through the estuaries.gov site participants can register for the program, download educational materials, learn about the program's technology, and actually watch the field trips. The whole Web site was given a new look, updated, and the entire program moved from www.estuarylive.org, a Web site owned by Marine Grafics, to www.estuaries.gov. Use of www.estuaries.gov increased by 154%.

In 2005, NERRS Educators launched a redesigned NERRS website for education that can be found at http://nerrs.noaa.gov/Education/welcome.html. The site was redesigned to provide teachers access to information about estuaries and the education programs offered by the National Estuarine Research Reserves. The site now includes curriculum, distance learning programs, professional development opportunities, downloadable power point presentations, a section on data resources, and more. Through this redesigned website teachers interested in teaching about estuaries can also:

- contact an Education Coordinator from a Reserve who can help respond to questions;
- provide educational materials and resources specific to the estuary in which they work;
- introduce the research that is being done in the estuary;
- and talk about the different opportunities available at the reserve.

Educators will continue to improve the site as a useful resource for teachers interested in teaching about estuaries.

Estuaries Tutorial

The NERRS Website Subcommittee collaborated with NOAA's Ocean Service to develop an Estuaries Discovery Kit at http://oceanservice.noaa.gov/education/kits/estuaries/welcome.html. This Estuaries Tutorial is an overview of estuarine habitats, the threats facing them, and efforts to monitor and protect estuaries nationwide. It includes photographs from various NERRS sites, videos, illustrations, and interactive graphics to enhance the text and bring understanding to concepts that may be difficult to visualize. Designed for educators and students at the high school level, they are written in easy-to-read, non-technical language, and include a roadmap to resources, and formal lesson plans for educators.

Collaboration

The NERRS Education Sector has taken the first steps in becoming an important contributor of educational products that will use NERRS/SWMP - IOOS data. As part of KEEP, NERRS educators will generate an Estuaries 101 Curriculum that will be used by all reserves participating in the KEEP program. This curriculum consists of several components, including one focused on the use of the SWMP data. NERRS obtained funding (80K) from the Office of Education and Sustainable Development (OESD) to assess how K-12 teachers and students can use SWMP/IOOS data. This assessment will help inform potential development of one component of the Estuaries 101 Curricula and will help inform NOAA's Education Council in the development of a NOAA strategy for linking IOOS data streams with teachers and students in select regions.

A smaller group of educators worked in collaboration with NERRA to draft and submit a proposal to the OESD. This proposal aimed to develop the *SWMP Education Initiative*, which would focus on grades 9-12 and include: (1) the development and testing of curriculum materials; (2) the design and development of a web-based educational interface for student use of data streams; and (3) training for teachers to ensure ready access to, and meaningful use of, SWMP data, all products that would complement the system-wide Estuaries 101 Curricula.

The NERRS has now started to raise its profile as an important contributor of data, educational products and teacher training. Participation in events such as the Annual Meeting of the Digital Library for Earth System Education (DLESE) and MBARI have also been important in formalizing partnerships and building a teacher network that will help develop and pre-test some of the educational products the NERRS will put forward in the near future.

Finally, several reserves have taken important steps to develop a variety of educational products that rely on the use of the SWMP data. For more information on all these products go to http://nerrs.noaa.gov/Education/DataResources.html and download the paper titled Utilizing Data from NOAA's Observing Systems to Achieve Environmental Literacy".

Coastal Training Program

During the March 2005, Winter Coastal Training Program (CTP) sector meeting, the NERRS CTP coordinators created governance procedures that offer the CTP community an easy-to-use decision making process for system-wide policy issues and products. CTP coordinators are also participating in a system-wide mentoring initiative to help new CTP coordinators build their CTP programs based on successful workshop models and staff experience at reserves where the program has been up and running for a number of years.

In addition to expanding the CTP program across the NERR System, the CTP coordinators and ERD staff have been working to develop a set of performance measures to monitor and evaluate the outputs and results of the CTP program within coastal communities across the nation. A performance monitoring manual was completed and baseline data from CTP events is being used to develop system-wide performance requirements for CTP. A performance monitoring workgroup is working to recommend performance requirements during the coming year.

A couple of examples illustrate the success of CTP during the past year:

Nitrogen Monitoring and Management, Elkhorn Slough NERR

One of the most difficult challenges facing coastal managers is monitoring and managing nutrient runoff, particularly nitrogen from human land use practices. Excessive nitrogen in estuarine water can lead to explosive, damaging algae growth that can result in fish kills from depleted oxygen levels and interferes with the growth of native submerged aquatic vegetation.

In 2003 and 2004, Elkhorn Slough NERR in central California hosted two workshops on nitrogen monitoring for managers and researchers actively engaged in nutrient management in the region. The workshops were presented by nutrient cycling experts from the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), a partner organization with NERRS based at the University of New Hampshire. They showed participants the latest GIS-linked biogeochemical model used to guide nutrient management decisions in the Elkhorn Slough watershed. The model provides spatially explicit simulations

of biogeochemical processes that control nutrient cycling and subsequent trace gas and nutrient releases to air and water.

The presenters introduced the decision-support tool ES-DNDC (Elkhorn Slough – Denitrification-Decomposition) and in the followup workshop they provided an update on user interface improvements and refinements to the model, as well as detailed training on installing and using ES-DNDC to assess management alternatives.

Participants left the workshops with their own copy of ES-DNDC and, by contributing data and aiding in ongoing validation activities, they have helped improve the model. The Santa Clara Water District subsequently adopted the CICEET-sponsored model as a way to allot tax incentives to encourage responsible management.

Disaster Recovery, Post-Katrina, Weeks Bay NERR, Alabama

Within days after the catastrophic Hurricane Katrina ravaged the Gulf Coast in September 2005, the Weeks Bay NERR in Alabama hosted a national Web-based teleconference in the Coastal Training auditorium on Disaster Recovery. The Web conference gave a dozen local and regional government officials, researchers and NGOs a chance to participate and get answers to questions about disaster recovery and loss mitigation. The program was free for participants in Florida, Alabama, Mississippi, Louisiana and Texas.

The conference was organized by the American Planning Association. Experts and experienced practitioners addressed best practices for disaster recovery in the context of planning. The conference focused on emergency permitting, envisioning the next steps, rebuilding local businesses, historic preservation, and FEMA long-term recovery planning.

The disaster recovery conference is an example of using NERRS resources in partnership with others to deliver science-based information broadly to coastal decision makers in response to an urgent need. Participants at the Weeks Bay event praised the session for the range of the subject matter and for answering questions specific to the Alabama-Mississippi coast while much of the attention was still focused on New Orleans. Participants also suggested additional topics for future training in planning for disaster recovery.

Research and Monitoring

Graduate Research Fellowships

In FY 04 ERD supported 47 Graduate Research Fellows (GRF) - 22 returning, and 25 new fellows. The incoming GRF class for FY 05 consists of 46 fellows, 22 returning and 24 new fellows, and marks the ninth year of the GRF program. The San Francisco Bay NERR started their first year with the GRF program in 2005. The FY 06 GRF Request for Proposals was published in the Federal Register and posted to several websites. Recruitment activities for incoming GRF applicants continue to encourage applicants from Minority Serving Institutions (MSI's). There are 26 available GRF slots for FY 06.

Since the GRF Program began in 1997, ERD has funded 208 research fellows. Fellows from more than 56 universities have conducted their research within the reserve system. The program has attracted students from all over the country, including states where reserves do not exist, such as Wyoming, Hawaii and Texas.

More than half of the fellowship projects have focused on either habitat restoration/conservation or nutrient dynamics/non-point source pollution. The remaining projects have focused on invasive species/biodiversity, and economic, sociological, and/or anthropological research applicable to estuarine ecosystem management. Fellows regularly present their research at national, regional, and local scientific conferences including the Estuarine Research Federation conferences, the Ecological Society of America conferences, and the American Society of Limnology and Oceanography. It is anticipated that within the coming year, ERD will begin to collect data on what previous GRF's are now accomplishing as well as begin to discuss refining the focal research areas for the program to better reflect NERR research priorities.

SWMP Update:

In 1995, the NERRS established a System-wide Monitoring Program (SWMP; pronounced "swamp"), a phased monitoring program that focuses on three different ecosystem characteristics: abiotic water quality and meteorological parameters (Phase 1); biological monitoring (Phase 2); and land use and habitat change monitoring (Phase 3). Many reserves have been collecting Phase 1 parameters for ten years, and in 2005 the San Francisco Bay NERR, designated in 2003, completed the system-wide coverage of SWMP Phase 1 when it came on board with two water quality monitoring stations and one weather monitoring station. In 2004, NERRS initiated the second phase of SWMP with the central objective of characterizing biotic diversity in the reserves' estuarine ecosystems by assessing community composition and species abundance and distributions. At present, 16 NERRs are participating in biomonitoring efforts to demonstrate the protocols developed for emergent marsh and submerged aquatic vegetation. NERRS staff are currently planning for SWMP Phase 3, the land use and habitat change initiative, which focuses on tracking and evaluating changes over time in coastal and estuarine habitat as they relate to changes in watershed land use practices.

To celebrate SWMP's tenth anniversary, Estuarine Reserves Division staff collected accounts of successful SWMP data applications in coastal water quality analysis, estuarine restoration, coastal storm analysis, state and federal regulatory activities, and education programs for K-12 students, the public, and coastal decision makers. ERD produced a report that summarizes these key data applications from around the country and tracks the history and development of the SWMP over the past decade. With a NOAA investment of $3.4 million in fiscal year 2005, SWMP is providing valuable short- and long-term data to researchers, natural resource program managers, coastal educators, and other coastal decision-makers. For a copy of the 10th Anniversary Report, please contact Susan White, Research Coordinator, NOAA Estuarine Reserves Division, at Susan.White@noaa.gov.

IOOS Update

In 1998, the National Ocean Research Leadership Council (NORLC) was charged by Congress with the task of developing and implementing a national Integrated Ocean Observing System (IOOS). The NORLC created an office called Ocean.US in 2000 to carry out this task. This group is working with NOAA and other entities to develop an integrated national observation system for the United States' coastal zone built upon federal monitoring efforts and regional coastal and ocean observing systems that monitor the state and characteristics of the United States' coasts, oceans, Great Lakes, and estuaries. The system will be a coordinated network of observation platforms and data management, analysis, and modeling systems that acquire and disseminate data on past, present, and future states of the United States' ocean and coastal areas.

The NERRS System-wide Monitoring Program (SWMP) has been identified as a national backbone component for IOOS due to the Reserve System's broad coverage of estuarine and coastal habitats. The NERRS SWMP water quality and meteorological monitoring data is a particularly valuable component of the IOOS network as it is one of few contributing members that will deliver important estuarine data. The NERRS data can be used to provide information to support a number of IOOS goals including: sustaining living marine and estuarine resources, protecting and restoring healthy coastal marine and estuarine ecosystems, improving modeling and predictions about the consequences of coastal climate change, and mitigating the effects of coastal storms and other natural hazards. Users will include coastal resource managers, scientists, educators, mariners, and emergency responders.

Telemetry

A portion of the NERRS IOOS funding is currently financing development of a telemetry system that will stream SWMP data in a common format that is compatible with IOOS. The data will be transmitted to the NERRS Central Data Management Office in South Carolina using NOAA's system of Geostationary Operational Environmental Satellites (GOES) for near-real-time access via the Internet.

In April 2005, the NERRS telemetry committee, consisting of NERRS staff and external federal agency staff from the United States Geological Survey (USGS) and NOAA, reviewed a range of technical strategies for NERRS SWMP data telemetry. The strategy chosen ensures that all reserves will use a common data format, data control platform (DCP), and the GOES primary transmission mechanism for streaming data to the CDMO via the Internet. This approach will provide uniformity across the system and 24-hour, 7 days per week support for all NERRS data served in support of IOOS activities. This approach also allows the reserves to continue using their existing telemetry infrastructure systems to transmit SWMP data to the CDMO as back-up systems, in case data is lost through an interruption in the primary GOES telemetry system.

CDMO Update

To ensure accurate, high quality SWMP data, the Reserve System established a Centralized Data Management Office (CDMO) in 1995. The CDMO is housed at the North Inlet-Winyah Bay NERR in South Carolina. CDMO staff develop, implement, and manage the basic infrastructure

and data protocol of the NERR SWMP and provide quality assurance and quality control across the system. The CDMO supports data training programs to make sure reserve staff are familiar with standard operating procedures and uniform water quality and weather data collection methodology.

The CDMO is responsible for making NERRS SWMP data available for public use. This federally-mandated service is important to numerous user-groups within local, state, and federal government, academic, and private sectors, particularly since environmental data collection efforts are expensive to implement and maintain. The CDMO staff assimilate individual reserves' SWMP data into a system-wide web portal where data and metadata from each reserve's archive can be accessed and exchanged. The CDMO has thus far reviewed, archived, documented and made available: nine years of historical water quality data, three years of historical meteorological data, and two years of historical nutrient data. The SWMP data are sent by CDMO to NOAA's National Ocean Data Center for annual archiving.

CDMO staff provide technical support services for NERRS staff, and outside individuals, via telephone, email, and individual and group training workshops. CDMO staff developed a NERR SWMP Data Management Manual to outline data acquisition, pre-processing, validation, archival, editing, metadata and submission methods for NERRS staff, and they work with the NERRS Data Management Committee to review case-by-case questions as they arise.

Conservative estimates for the volume of data the CDMO handles each year are:

- 13.5 million data points for the water quality monitoring program (4 stations collecting 8 parameters every half hour at each of 26 reserves)
- 34.4 million data points per year for the meteorological monitoring program (1 station collecting 25 parameters at quarterly, hourly, and daily intervals at each of 26 reserves)
- 31,104 data points per year for the nutrient monitoring program (4 stations collecting monthly grab samples and 1 station collecting monthly diel (24-hour sample period) of 6 parameters at each reserve)

Coastal Journal Special Issue

In the Fall of 2004, the *Journal of Coastal Research* published Special Issue 45, entitled 'NERRS Research and Monitoring: A Nationally Integrated Program.' This publication is the outgrowth of many years of research and monitoring conducted at 26 National Estuarine Research Reserve System (NERRS) program sites. The 16 papers comprising this special issue represent an array of studies by individuals from academia, state and federal government agencies, and independent research institutions. The Estuarine Reserves Division of NOAA authorized the production of this publication through the NERRS program.

Stewardship

Restoration Science

The Restoration Science Workgroup focused this past year on working in partnership with other NOAA programs to develop regional strategies to address restoration science issues and a NOAA institutional framework to support, among other things, implementation of a restoration science program within the NERRS. Regional planning for restoration science approaches have been initiated in many regions of the country in partnership with other NOAA program regional representatives. Additionally, efforts are underway to develop a NOAA Habitat Science Roundtable to support and guide NOAA regional collaborations that address compelling restoration and protection science issues throughout the country.

Habitat Mapping and Change

The Habitat Mapping and Change Technical Committee was charged by the Habitat Mapping and Change Committee to develop a NERR system-wide habitat classification scheme. This year, the Technical Committee successfully developed, and five reserves have piloted, that scheme. The Technical Committee will be prepared at this annual meeting to report out results from the pilots and make recommendations on the adoption of a classification scheme, the process for adopting the scheme, and the continuing role of the technical committee. The HMC will decide on the next steps related to the adoption of the scheme, its system-wide implementation strategy, and initiation of the development of a long-term NERR Habitat Mapping and Change Plan.

CICEET

CICEET Stormwater Center

Planners, managers, and engineers who must meet the challenge of nonpoint source pollution often lack the information they need to make critical decisions. A new center came online in August 2004 to lend a hand. Funded by CICEET, the Center for Stormwater Technology Evaluation and Verification (CSTEV) is a groundbreaking program that provides scientific field testing and demonstration of stormwater treatment technologies.

“Many technologies claim to achieve desirable water quality and storm volume reduction, but few have had the benefit of independent scientific testing,” explains Robert Roseen, CSTEV co-director. “We test these treatment systems side-by-side, so we can make accurate comparisons, verify their effectiveness, and pass this information on to stormwater managers.”

Effective stormwater management and water quality depend on cooperation, which is why CSTEV engages researchers, municipalities, regulators, and technology developers in program oversight and participation. In fall 2004, the facility hosted Best Management Practice (BMP) workshops and tours for regional stormwater managers, engineering students, and members of the National Estuarine Research Reserve System.

A unique resource for regions with colder climates, the center's side-by-side testing of treatments will support stormwater managers in warmer climates as well. "Through the center, we can make direct comparisons between treatments," says William Reay, director of the Chesapeake Bay National Estuarine Research Reserve. "With so many technologies in one place, subject to the same conditions, we eliminate some of the doubt stormwater managers might have about research findings derived from various sources."

For more information, please contact Dwight.Trueblood@noaa.gov or visit the Center for Stormwater Technology Evaluation and Verification (CSTEV) website at: http://www.unh.edu/erg/cstev/index.htm

Program developments

Technology Development

CICEET issued a request for proposals in 2004 for its "Environmental Technology Development Program." The program funded ten new research projects. CICEET also successfully implemented a request for proposals for its technology "Proof of Concept" program. Eight projects were funded.

Technology Transfer

In 2004, CICEET issued a request for proposals for its "Technology Transfer" program, funding seven projects. CICEET helped sponsor the following meetings and workshops: Gulf of Maine Regional Priorities; 2nd National Conference on Coastal and Estuarine Habitat Restoration; and the Northeast Coastal Indicators Workshop.

Technology Promotion

CICEET promoted and advertised its program at the following conferences and meetings in 2004: 2nd National Conference on Coastal and Estuarine Habitat Restoration; NE Coastal Indicators Workshop; NERRS/NERRA Annual Meeting; and the Coastal Program Managers Meeting.

Partnerships

CICEET partnered with NOAA's Office of Response and Restoration and the Oilspill Response Institute in Alaska to jointly fund a research program focused on oil spill technologies for use in cold climates.

Highlights from around the System

System Expansion

Mission Aransas NERR, TX

Plans for the proposed Mission Aransas NERR on the southeastern coast of Texas have been moving along steadily. The proposed reserve is encompasses 200,137 acres of Aransas and Refugio counties, approximately 30 miles northeast of Corpus Christi. The site nomination document was completed by the University of Texas at Austin and approved by NOAA in September 2004. At that time, the Mission Aransas Estuary became the official location for the proposed NERR and UTMSI began developing an EIS and MP for the site. Habitats within the site include: coastal prairie, fresh and salt water marshes, and large, open bays with extensive tidal flats, seagrass meadows, mangroves, and oyster reefs.

The University of Texas at Austin, Marine Science Institute (UTMSI) began putting together a draft Environmental Impact Statement & Management Plan (DEIS/DMP) for the proposed Mission-Aransas NERR in 2004. This DEIS/DMP has been submitted for publishing and public hearings on the document are scheduled for November 2005. The FEIS/FMP is targeted for completion in December 2005 after the closing of the public comment period on the draft document, and reserve designation is expected to happen in the spring of 2006.

Key state, federal, and private partners with land and water interests within the proposed boundary are working to draft Memoranda of Understanding (MOU) that will guide the reserve's management and administration. The UTMSI and NOAA are drafting one MOU to guide the state-federal management partnership, and the UTMSI and its local partners are drafting a second MOU to guide local reserve partnerships.

Three public scoping meetings were successfully held in support of the proposed Texas NERR, and the University of Texas staff gave several presentations on the Texas NERR initiative at local conferences, user group meetings, and city council meetings. The University of Texas received support from land owners adjacent to the reserve boundary to remove a standard 1000 foot boundary setback and bring the reserve boundary up to their property lines, which demonstrates strong local support for the proposed reserve. In addition, the University of Texas received support from local, county, and city officials for future land acquisitions and the construction of education and outreach facilities.

Wisconsin and Connecticut have both submitted letters signed by their State Governors requesting the start of the site nomination process for a NERR in their respective states. Involved parties in both states are waiting for resources needed to start this process.

New Facilities

Growing demand for programs has overwhelmed the facilities at some sites, so expansion and improvement of education centers and laboratories has been a priority over the past two years.

Guana Tolomato Matanzas (GTM) NERR near St. Augustine, Fla. opened a new 21,000 square foot Environmental Education Center in September 2005. Funded largely by NOAA (more than $6 million), this facility includes a multi-media theatre, classrooms and meeting rooms, life-size animal exhibits, and a Nature Store operated by Friends of the GTM Reserve. Interpretive displays address many of the issues facing north Florida, from natural resource management to the inter-connectedness of people, plants and animals. The center will enhance all of the reserve's education, outreach, research and coastal training programs.

Chesapeake Bay Virginia NERR dedicated the 5,400 square foot Catlett-Burruss Research and Education Laboratory at the Virginia Institute of Marine Science in Gloucester Point in September 2005. NOAA contributed more than a million dollars for construction of the facility, which will support water quality monitoring of Chesapeake Bay and tributaries, research in watershed and shallow water habitats, and training programs for targeted groups of students, teachers and coastal decision makers. The lab is named for the Catlett-Burruss family, which has contributed generously to the Reserve and to VIMS over the years.

Padilla Bay NERR in Washington State opened two new wings on the Breazeale Interpretive Center in October 2005, adding a 100-seat classroom, office space, library, reception area, volunteer room, conference room and a large training and meeting room. The expansion significantly increases the capacity of the Interpretive Center to handle school groups and other individuals and organizations, including clients of the Coastal Training Program.

Delaware NERR completed two phases of a much needed expansion to its Visitor Center, adding a 3,000-square foot meeting center with a capacity for 100 people, a small conference room, restrooms with showers, and four small/offices and dorm facilities for visiting researchers. NOAA contributed more than $700,000 to help fund the expansion.

Kachemak Bay NERR dedicated the Alaska Island and Ocean Visitor Center, located at 95 Sterling Highway, in Homer, Ala in July 2004. This state-of-the-art interpretive, educational and research facility is shared with the Alaska Maritime National Wildlife Refuge. NOAA, the National Fish and Wildlife Service and the Federal Highway Administration financed the more than $14 million project. The 36,825 square foot facility provides the reserve with space for administration and support offices, research laboratories, and public interpretation and education displays and forums. The facility enables the reserve to improve the understanding and conservation of the marine environment.

Land Acquisition

The Tijuana River NERR acquired the last 20 acres of privately owned land in 2004. The property is moderately disturbed mulefat scrub/riparian habitat. It was originally targeted for purchase with NOAA funds but the California Coastal Commission purchased the property with state bond money. These funds were used as state match for other construction projects in the reserve.

Great Bay New Hampshire Land Acquisition Partnership

The Great Bay Resource Protection Partnership is a comprehensive approach to identify Great Bay's most critical habitats and to protect them. With The Nature Conservancy as lead acquisition agent, the partners also include the Audubon Society of New Hampshire, Ducks Unlimited, Great Bay National Estuarine Research Reserve, Natural Resources Conservation Service, New Hampshire Fish and Game Department, Society for the Protection of New Hampshire Forests, U.S. Environmental Protection Agency and U.S. Fish and Wildlife Service.

Major funding for the partnership has come from NOAA and the North American Wetland Conservation Act. As well as cash donations and the value of donated and discounted land sales. Since 1997, the partnership has protected more than 4,000 acres in the 24-town focus area, including shoreline frontage along Great Bay and important ecological areas in the watershed.

In 2005, the partnership completed two land conservation transactions that had been long-standing priorities:

- Shackford Point in Newmarket, an 86-acre tract at the mouth of the Lamprey River and Great Bay, including fields and forest, important waterfowl nesting areas and bald eagle roosting sites. "This property was one of the first to be identified as a priority for protection when the partnership began in 1994," said Bob Miller, recently retired Great Bay Project Director for The Nature Conservancy. "We've been actively working to protect this piece ever since."
- The Smith tract, 38 acres on Great Bay in Greenland, including important habitat for Canada geese, black ducks, mallard and other waterfowl. The tract abuts three other parcels protected by the partnership. Combined, the tracts create a 123-acre block of protected habitat on the Bay. The Smith parcel alone protects 1,121 feet of shoreline on Great Bay, and a total of 4,540 feet (almost one mile) with the other three parcels. "The work of the Great Bay Resource Protection Partnership has been critical in carrying out this responsibility," said U.S. Senator Judd Gregg. "The addition of the Smith Farm to the network of protected parcels here is another major success for the partnership."

Land Acquisition in the Blackbird Creek of the Delaware NERR

In 2003 an 8.6 acre parcel of land along Blackbird Creek was purchased to allow for canoe access to Blackbird Creek. This acquisition was followed up with two parcels added to the DNERR in late 2004 and early 2005 respectively. The two adjacent parcels total 147 acres and provide excellent access to Blackbird Creek. Over the past few years, the DNERR has been involved with the Blackbird-Millington Corridor Conservation Plan development. This process pulled together all land protection agencies and organizations in the area to map priority acquisitions and explore potential partnerships. As a result, the DNERR has developed relationships with the Nature Conservancy, the Conservation Fund and Delaware Wildlands.