

Wells National Estuarine Research Reserve Management Plan 2013–2018



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Wells National Estuarine
Research Reserve

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Wells National Estuarine
Research Reserve

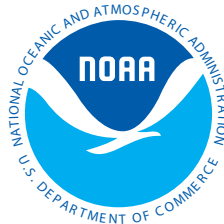
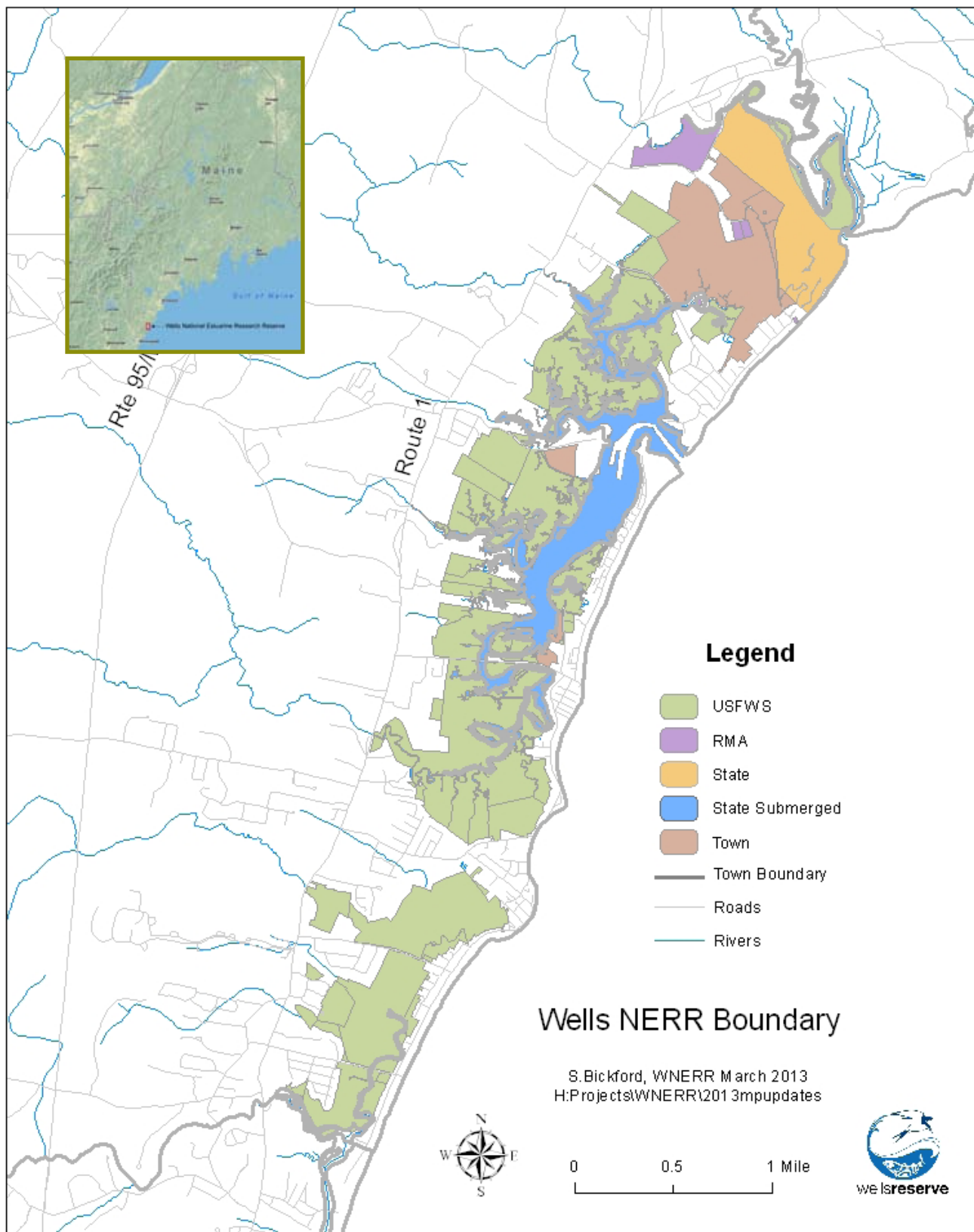


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Overview

Introduction to the Wells Reserve

The Wells National Estuarine Research Reserve (NERR) was designated a National Estuarine Research Reserve by the National Oceanic and Atmospheric Administration (NOAA) in 1984.

The Wells Reserve is the only NERR in Maine and one of two located in NOAA's Acadian Biogeographic Region. It is situated on the southern Maine coast and comprises 2,250 acres of upland fields and forests, riparian areas, salt marshes, dunes, beaches, and submerged lands within the watersheds of the Little River, Webhannet River, and Ogunquit River. Parcels of conserved land owned by the U.S. Fish and Wildlife Service; the Town of Wells; the Maine Department of Agriculture, Conservation and Forestry; and the Wells Reserve Management Authority make up the Reserve.

In addition to the conservation land, the Wells Reserve includes two building campuses that support the Reserve's mission: 1) Laudholm Farm, a cluster of buildings on the National Register of Historic Places, that serves as the center for visitors and for the research, education, and stewardship programs; and 2) the Alheim Commons, a property that includes two facilities that house visiting scientists, educators, and resource managers.

Part of a National System

The Wells Reserve is part of the National Estuarine Research Reserve System (NERRS). Created by the Coastal Zone Management Act of 1972, the NERRS provides a network of representative estuarine ecosystem areas suitable for long-term research, education and stewardship. More than one million acres of estuarine lands and waters are currently included within the 28 federally designated reserves. Administered by the Estuarine Reserves Division (ERD) at the National Oceanic and Atmospheric Administration (NOAA), the reserve system is a federal-state partnership. NOAA and coastal state partners collaborate to set common priorities and to develop system-wide programs. Additionally, NOAA provides support for state partners and national cohesion of the NERR System. State partners carry out locally relevant and nationally significant programs at individual reserves and provide day-to-day management of resources and programs.

Individual reserves represent specific biogeographic regions of the United States. A biogeographic region is an area with similar plants, animals, and climate. There are 11 major biogeographic regions around the coast and 29 sub-regions. The Reserve System is designed to include sites representing all 29 biogeographic subregions, with additional sites representing different types of estuaries. The Reserve System currently represents 19 of those sub-regions. Each reserve implements education, research, and stewardship programs relevant to its bioregion and to the state in which it is located.

Purpose and Scope of the Plan

The heart of this Management Plan is composed of a description of our major programs, and their objectives and strategies for the next five years.. It seeks to address pressing coastal management issues, which closely mirror those of the NERR System. They include: Climate change and its impacts on coastal ecosystems and communities; development pressures, population growth, and land use changes; habitat fragmentation and degradation; and water quality degradation.

This is the fourth edition of the Wells National Estuarine Research Reserve Management Plan. The first was approved by NOAA in April 1985, the second in June 1996, and the third in September 2007. This document is an update of the 2007 plan.

Since the adoption of the last management plan, the Wells Reserve has implemented all of its core and system-wide programs, plus secured many science, education, and conservation grants that greatly expanded our value to southern Maine communities. We acquired a key parcel of land and building that will someday serve as our education center, made significant repairs to its Life Estate buildings, renovated a small outbuilding on the Alheim Commons campus for use as meeting and office space, constructed an environmental chamber for year-round research, created and installed new Visitor Center exhibits, created a new information kiosk and six interpretive trail signs, and helped partners acquire two significant parcels of land in the Reserve's targeted watersheds. We also established many new partnerships with communities and organizations.

This 4th edition of the Management Plan serves as the primary guidance document for the operation of the Wells Reserve's core and system-wide programs

in research and monitoring, education and coastal training, and resource management and stewardship. In addition, it provides guidance on the acquisition of land to be added to the Reserve, and on the construction and renovation of buildings that support NERR programs. The Management Plan also guides the Reserve in important related programs, such as volunteerism and outreach to communities to encourage stewardship of coastal resources in southern Maine. This Plan includes important background on the Reserve, including the setting, history, rules and regulations, cooperative agreements between the Reserve and its partners, and other information.

Administrative

The Wells Reserve is unique in the NERR System, as it is the only Reserve unaffiliated with a State natural resource agency or university. Instead, it is a public/private partnership whose administrative oversight is vested in the Reserve Management Authority (RMA). This independent state agency was established in 1990 to support and promote the interests of the Wells Reserve. The RMA has a Board of Directors composed of representatives having a property, management, or program interest in the Wells Reserve. RMA members represent the U.S. Fish and Wildlife Service; the Town of Wells; Laudholm Trust; the Bureau of Parks and Lands and the Maine Coastal Program within the Maine Department of Agriculture, Conservation and Forestry; and the National Oceanic and Atmospheric Administration. A Governor-appointed scientist with an established reputation in the field of marine or estuarine research also serves on the RMA. The Director reports to the RMA, which has quarterly board meetings.

Facilities and Construction

The Wells Reserve strives to provide staff and collaborators with safe, comfortable buildings and equipment required to accomplish Reserve education, research, and stewardship program strategies; to provide visitors with facilities in which to learn about coastal ecosystems; and to preserve the buildings' architectural heritage in the context of accommodating 21st century uses as an estuarine research and education center. Reserve facilities used for these purposes are in two locations: Laudholm Farm, a complex of more than a dozen historic buildings and one building built in 2001;

and the Alheim Property, an adjacent parcel holding three buildings one-half mile from Laudholm Farm.

The Wells Reserve requires specific facilities for a broad range of programs and activities. Facilities needed include offices for staff and visiting educators and researchers, laboratories for scientists and students, a maintenance and repair shop, storage areas, interpretive exhibit areas, classrooms, a gift shop, a welcome area, a public library, meeting rooms, spaces for public events, and living spaces for visiting scientists, educators, and natural-resource managers.

Public Access

The Wells Reserve offers public access to its grounds and facilities for environmental education, scientific research, and outdoor recreation. It also provides a gathering place for its partners and for select private activities. The Reserve is open every day and has more than 40,000 visitors annually.

Interpretive Education

The goal of the education program is to design, implement, and support quality science-based programs that promote stewardship of the Gulf of Maine and coastal environments through understanding and appreciation of ecological systems and processes.

The Reserve is a regional center for education, training, and outreach on coastal, estuarine and watershed ecology. Education programs at the Wells Reserve inform and engage audiences on the functions and values of coastal ecosystems and ways to manage those systems' sustainability. Education programs translate research into readily available information, promote stewardship of coastal resources, and provide a conduit for research findings to coastal decision makers and communities. Current and future education focus areas for the Reserve include the docent program, interpretive walks, events, lectures, childrens' programs, internships and field studies, school programs, exhibits and interpretive trails, publications, teacher trainings, and outreach to community groups and schools.

Coastal Training Program

A significant component of the Reserve's education and outreach efforts is the Coastal Training Program. Through this system-wide initiative, the Wells Reserve provides decision-makers in Maine communities

with science-based information to encourage the wise stewardship of coastal resources. This is done through workshops, seminars, conferences, and the establishment of community partnerships, as well as the development and distribution of information on appropriate topics. CTP is also the major science-translation venue of the Wells Reserve, collaborating closely with the Research Program.

Research and Monitoring

The Wells Reserve research program studies and monitors natural and human-induced change in Gulf of Maine estuaries, coastal habitats, and adjacent coastal watersheds, and produces science-based information needed to protect, sustain, or restore them.

Reserve scientists participate in research, monitoring, planning, management, and outreach activities locally, regionally, and nationally. The program supports field research along Maine's southwest coast from the Kennebec River to the Piscataqua River. Current and future focus areas for the research program include estuarine water quality, salt marsh habitats and natural communities, distribution and abundance of fish and shellfish, salt marsh degradation and restoration science, climate change and effects on ecosystems.

A major program component of the Wells Reserve is the System-Wide Monitoring Program (SWMP) and its links to regional and national ocean and coastal observing systems. This program monitors for various water quality parameters, weather, biological change, and landscape change.

Resource Management and Stewardship

The Wells Reserve strives to exemplify wise coastal stewardship through sound natural resource management within its boundary and through its partnerships in the communities of southern Maine. The diverse habitats encompassed by the Wells Reserve support distinct plant and animal communities that require specific stewardship approaches. Woodlands and fields are fairly resilient to human use, while salt marshes, sand dunes, vernal pools, and certain upland and riparian habitats are more sensitive to human impacts. Some parts of the Reserve are relatively pristine, while other areas—including early successional farm fields—are under ecological stress associated with past land-use practices and the spread of invasive species.

Rare native plants and animals require specialized management approaches. Deer population levels have contributed to the spread of invasive plants and human health issues associated with Lyme disease. Because of its habitat diversity, and management challenges, the Wells Reserve natural environments serve as an excellent location to experiment with various innovative resource management activities, to conduct research, and to offer education programs.

The Reserve is also active in promoting coastal stewardship in the communities of southern Maine. Through its community-based stewardship program efforts, the Reserve encourages individuals and organizations to recognize connections between land-use actions and environmental quality and to take responsibility for protecting coastal watersheds. This is accomplished through working with groups and municipalities on watershed management, land conservation planning and assistance and habitat restoration.

Boundary and Acquisition

The Wells Reserve seeks to permanently conserve lands necessary to protect Reserve resources, thereby ensuring a stable environment for research and education. Over the next five years the Reserve will identify and prioritize parcels of land within the Webhannet River, Little River, and Ogunquit River watersheds. The Wells Reserve will seek to accomplish the following: 1) work with partners including U.S. Fish and Wildlife Service, Town of Wells, Kennebunk/Kennebunkport/Wells Water District, Great Works Regional Land Trust, and the Laudholm Trust to develop conservation strategies and funding; 2) cooperate with partners to maximize the protection of natural resources of highest value to the Reserve's programs; and 3) develop and implement the best options to permanently conserve identified lands. The Coastal and Estuarine Land Conservation Program (CELCP) and its relation to the protection of land within the Reserve's targeted watersheds is part of this Plan.

Volunteers

One of the great strengths of the Wells Reserve is its spirit of volunteerism, which was essential to the establishment of the Reserve and remains a key to delivering programs and operating the site. The Reserve's volunteer programs engage a diverse corps

of more than 400 people who contribute over 15,000 hours annually to advancing the Wells Reserve's mission. Volunteer programs are directed through a close collaboration with Laudholm Trust.

The Wells Reserve volunteers fill many roles and accomplish many tasks. They greet visitors, answer phones, teach school groups, tend the grounds, patrol trails, scrape and paint, proofread, do mailings, enter research data, distribute program information, lead nature walks, develop educational materials, assist ad hoc committees, monitor water quality, and raise funds. Many volunteers serve on standing advisory committees that meet regularly to guide Reserve staff on research, education, building, library, and resource management programs and issues. In addition, volunteers are involved with projects through collaborations

with the Rachel Carson National Wildlife Refuge, Maine Sea Grant, local schools, businesses, York County Audubon, and other partners.

Communications

The communications program ensures the Wells Reserve can raise the profile of research findings, increase attendance for interpretive programs, drive stronger site visitation, enhance the success of local conservation organizations, and help people connect their everyday actions to the health of their environment. This is largely accomplished through traditional media, targeted communications for constituents, and online outlets including a comprehensive website and presence in social media venues.



The Webhannet River estuary is edged in part by dense, largely seasonal, residential development.

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Introduction

The Value of Estuaries

Estuaries are coastal areas where salt water from the sea mixes with fresh water from rivers. They comprise some of the most productive ecosystems on Earth. Whether they are called a bay, a river, a sound, a bayou, a harbor, an inlet, a slough, or a lagoon, estuaries are the transition between the land and the sea.

Estuaries are dynamic ecosystems that provide essential habitat for plant and animal life. They serve as nurseries for numerous plant and animal species, some of which humankind depends on. Wetlands on the shores of estuaries help protect human communities from flooding. They act as buffers against many coastal storms that would otherwise flood developed inland areas.

Estuaries also serve as filters: many pollutants produced by humans are filtered from the waters as they pass from upland areas through the plant communities of estuaries. This filtering process protects coastal waters. Estuaries provide important recreational opportunities, such as swimming, boating, wildlife-watching, hiking, sightseeing, and photography.

Estuaries, however, are easily altered and degraded by human activities. Pollution, sedimentation, and other threats can damage the habitat that so many wildlife populations depend on for survival. Creating a greater understanding of estuaries among the citizens of the United States, and encouraging the stewardship of

these vital areas, is the focus of the National Estuarine Research Reserve System.

National Estuarine Research Reserve System

The National Estuarine Reserve System was created by the Coastal Zone Management Act (CZMA) of 1972, as amended, 16 U.S.C. Section 1461, to augment the Federal Coastal Zone Management (CZM) Program. The CZM Program is dedicated to comprehensive, sustainable management of the nation's coasts.

The reserve system is a network of protected areas established to promote informed management of the Nation's estuaries and coastal habitats. The reserve system currently consists of 28 reserves in 23 states and territories, protecting over one million acres of estuarine lands and waters.

Mission

As stated in the NERRS regulations, 15 C.F.R. Part 921.1(a), the National Estuarine Research Reserve System mission is: the establishment and management, through Federal-state cooperation, of a national system of Estuarine Research Reserves representative of the various regions and estuarine types in the United States. Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.

Goals

Federal Regulations, 15 C.F.R. Part 921.1(b), provide five specific goals for the reserve system:



Estuaries are rich and dynamic environments where rivers meet the sea, such as here at the Little River in Wells.

1. Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
2. Address coastal management issues identified as significant through coordinated estuarine research within the System;
3. Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
4. Promote Federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research; and
5. Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

NERR System Strategic Goals 2011–2016

Strategic planning has been an integral part of the National Estuarine Research Reserve System for nearly twenty years. The planning process is designed to bridge national program direction with on-the-ground coastal management needs through a representative and participatory process that supports NOAA's mission of science, service, and stewardship.

The Reserve System 2011-2016 strategic plan focuses its core strengths of research, education, and training on climate change, habitat protection, and water quality. In recognition that estuaries are biologically rich, economically valuable, and highly vulnerable ecosystems, the Reserve System adopted a Vision, "resilient estuaries and coastal watersheds where human and natural communities thrive" and a Mission, "to practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas." The following goals are outlined in the 2011-2016 Strategic Plan:

1. Protected Places: Estuaries and coastal watersheds are better protected and managed by implementing place-based approaches at Reserves.
2. Science: NERRS scientific investigations improve understanding and inform decisions affecting estuaries and coastal watersheds.
3. People: NERRS education and training increases participants' environmental literacy and ability to make science-based decisions related to estuaries and coastal watersheds.

Biogeographic Regions

NOAA has identified 11 distinct biogeographic regions and 29 subregions in the U.S., each of which

contains several types of estuarine ecosystems (15 C.F.R. Part 921, Appendix I and II). When complete, the reserve system will contain examples of estuarine hydrologic and biological types characteristic of each biogeographic region. As of 2012, the reserve system includes 28 reserves and one reserve in the process of designation (Figure 1). The reserves are listed below by biogeographic region and subregion with their designation date denoted in parentheses.

Reserve Designation and Operation

Under Federal law (16 U.S.C. Section 1461), a state can nominate an estuarine ecosystem for Research Reserve status so long as the site meets the following conditions:

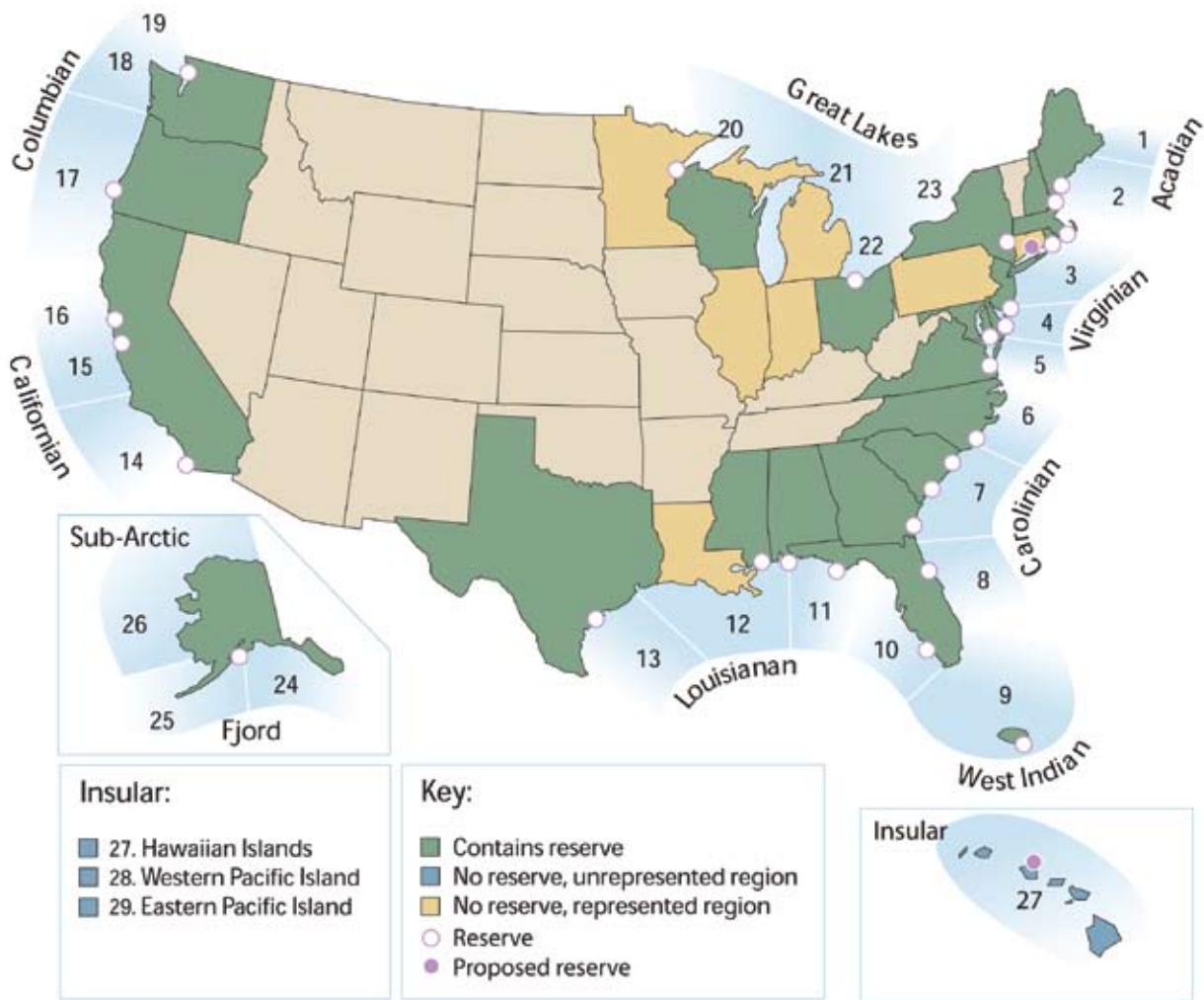
- The area is representative of its biogeographic region, is suitable for long-term research and contributes to the biogeographical and typological balance of the System;
- The law of the coastal State provides long-term protection for the proposed Reserve's resources to ensure a stable environment for research;
- Designation of the site as a Reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation; and
- The coastal State has complied with the requirements of any regulations issued by the Secretary [of Commerce].

Reserve boundaries must include an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation.

If the proposed site is accepted into the reserve system, it is eligible for NOAA financial assistance on a cost-share basis with the state. The state exercises administrative and management control, consistent with its obligations to NOAA, as outlined in a memorandum of understanding. A reserve may apply to NOAA's Estuarine Reserves Division (ERD) for funds to help support operations, research, monitoring, education/interpretation, training, stewardship, development projects, facility construction, and land acquisition.

NERRS Administrative Framework

ERD -- which is within NOAA's Office of Ocean and Coastal Resource Management (OCRM) -- administers the reserve system. The Division establishes standards for designating and operating reserves, provides



Acadian

1. Northern Gulf of Maine (Eastport to Sheepscot River)
2. Southern Gulf of Maine (Sheepscot River to Cape Cod)

Virginian

3. Southern New England (Cape Cod to Sandy Hook)
4. Middle Atlantic (Sandy Hook to Cape Hatteras)
5. Chesapeake Bay

Carolinian

6. Northern Carolinas (Cape Hatteras to Santee River)
7. South Atlantic (Santee River to St. Johns River)
8. East Florida (St. Johns River to Cape Canaveral)

West Indian

9. Caribbean (Cape Canaveral to Ft. Jefferson and south)
10. West Florida (Ft. Jefferson to Cedar Key)

Louisianan

11. Panhandle Coast (Cedar Key to Mobile Bay)
12. Mississippi Delta (Mobile Bay to Galveston)
13. Western Gulf (Galveston to Mexican border)

Californian

14. Southern California (Mexican border to Point Conception)

15. Central California (Point Conception to Cape Mendocino)
16. San Francisco Bay

Columbian

17. Middle Pacific (Cape Mendocino to Columbia River)
18. Washington Coast (Columbia River to Vancouver Island)
19. Puget Sound

Great Lakes

20. Lake Superior, including St. Marys River
21. Lakes Michigan and Huron, including Straits of Mackinac, St. Clair River, and Lake St. Clair
22. Lake Erie, including Detroit River and Niagara Falls
23. Lake Ontario, including St. Lawrence River

Fjord

24. Southern Alaska (Prince of Wales Island to Cook Inlet)
25. Aleutian Islands (Cook Inlet to Bristol Bay)

Sub-Arctic

26. Northern Alaska (Bristol Bay to Demarcation Point)

Insular

27. Hawaiian Islands
28. Western Pacific Islands
29. Eastern Pacific Islands

support for reserve operations and system-wide programming, undertakes projects that benefit the reserve system, and integrates information from individual reserves to support decision-making at the national level. As required by Federal regulation, 15 C.F.R. Part 921.40, OCRM periodically evaluates reserves for compliance with Federal requirements and with the individual reserve's Federally-approved management plan.

ERD currently provides support for four system-wide programs: the System-Wide Monitoring Program, the Graduate Research Fellowship Program, the K-12 Estuarine Education Program, and the Coastal Training Program. They also provide support for reserve initiatives on restoration science, invasive species, community education, and reserve specific research, monitoring, education and resource stewardship initiatives and programs.

Research and Monitoring Program

The reserve system provides a mechanism for addressing scientific and technical aspects of coastal management problems through a comprehensive, interdisciplinary, and coordinated approach. Research and monitoring programs, including the development of baseline information, form the basis of this approach. Reserve research and monitoring activities are guided by the reserve system research and monitoring plan 2011-2016 which identifies goals, priorities, and implementation strategies. This approach, when used in combination with the education and outreach programs, will help ensure the availability of scientific information that has long-term, system-wide consistency and utility for managers and members of the public to use in protecting or improving natural processes in their estuaries. Research within the reserves is designed to fulfill the reserve system goals as defined in program regulations (15 C.F.R Part 921(b)). These include:

- Address coastal management issues identified as significant through coordinated estuarine research within the System;
- Promote Federal, state, public and private use of one or more reserves within the System when such entities conduct estuarine research; and
- Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

Reserve System Research Funding Priorities

Federal regulations, 15 C.F.R. Part 921.50 (a), specify the purposes for which research funds are to be used:

- Support management-related research that will enhance scientific understanding of the Reserve ecosystem,
- Provide information needed by reserve managers and coastal ecosystem policy-makers, and
- Improve public awareness and understanding of estuarine ecosystems and estuarine management issues.

The reserve system has identified the following five priority research areas to complement the funding priorities outlined above:

1. Habitat and ecosystem processes
2. Anthropogenic influences on estuaries
3. Habitat conservation and restoration
4. Species management
5. Social science and economics

Reserve System Research Goals

The reserve system research and monitoring goals are embedded in Goal 2 of the Reserve System Strategic Plan 2011-2016, 'NERRS scientific investigations improve understanding and inform decisions affecting estuaries and coastal watersheds.'

Increase the use of reserve science and sites to address priority coastal management issues,' and are outlined in the 2006-2011 Reserve System Research and Monitoring Plan, currently under revision, and the NERR System-wide Monitoring Program Plan 2011. They include:

- Expand capacity to monitor changes in water quality and quantity, habitat, and biological indicators in response to land use and climate change drivers.
- Improve understanding of the effects of climate change and coastal pollution on estuarine and coastal ecology, ecosystem processes, and habitat function.
- Characterize coastal watersheds and estuary ecosystems and quantify ecosystem services to support ecosystem-based management of natural and built communities
- Increase social science research and use of social information to foster coastal stewards that value and protect estuaries.

Currently, there are two reserve system-wide efforts to fund estuarine research. The Graduate Research

Fellowship Program (GRF) supports students to produce high-quality research in the reserves. The fellowship provides graduate students with funding for 1-3 years to conduct their research, as well as an opportunity to assist with the research and monitoring program at a reserve. Projects must address coastal management issues identified as having regional or national significance; relate them to the reserve system research focus areas; and be conducted at least partially within one or more designated reserve sites. Proposals must focus on the following areas: 1) eutrophication, effects of non-point source pollution and/or nutrient dynamics; 2) habitat conservation and/or restoration; 3) biodiversity and/or the effects of invasive species; 4) mechanisms for sustaining resources within estuarine ecosystems; or 5) economic, sociological, and/or anthropological research applicable to estuarine ecosystem management.

Students work with the research coordinator or manager at the host reserve to develop a plan to participate in the reserve's research and/or monitoring program. Students are asked to provide up to 15 hours per week of research and/or monitoring assistance to the reserve; this training may take place throughout the school year or may be concentrated during a specific season.

Secondly, research is funded through the NERRS Science Collaborative (NSC), a partnership between NOAA and the University of New Hampshire (UNH). The Reserve System Science Collaborative is a program that focuses on integrating science into the management of coastal natural resources. Currently administered through the University of New Hampshire, the program integrates and applies the principles of collaborative research, information and technology transfer, graduate education, and adaptive management with the goal of developing and applying science-based tools to detect, prevent, and reverse the impacts of coastal pollution and habitat degradation in a time of climate change. The program is designed to enhance the reserve system's ability to support decisions related to coastal resources through collaborative approaches that engages the people who produce science and technology with those who need it. In so doing, the Science Collaborative seeks to make the process of linking science to coastal management decisions, practices, and policies more efficient, timely, and effective.

System-Wide Monitoring Program

It is the policy of the Wells National Estuarine Research Reserve to implement the System-Wide Monitoring Program (SWMP), guided by the NERR System-wide Monitoring Program Plan 2011.

SWMP provides standardized data on national estuarine environmental trends while allowing the flexibility to assess coastal management issues of regional or local concern. The principal mission of the monitoring program is to develop quantitative measurements of short-term variability and long-term changes in the integrity and biodiversity of representative estuarine ecosystems and coastal watersheds for the purposes of contributing to effective coastal zone management. The program is designed to enhance the value and vision of the reserves as a system of national references sites. The program focuses on three different ecosystem characteristics.

1. **Abiotic Variables:** The monitoring program currently measures pH, conductivity, salinity, temperature, dissolved oxygen, turbidity, water level and atmospheric conditions. In addition, the program collects monthly nutrient and chlorophyll a samples and monthly diel samples at one SWMP data logger station. Each reserve uses a set of automated instruments and weather stations to collect these data for submission to a centralized data management office.
2. **Biotic Variables:** The reserve system is focusing on monitoring biodiversity, habitat and population characteristics by monitoring organisms and habitats as funds are available.
3. **Watershed and Land Use Classifications:** This component attempts to identify changes in coastal ecological conditions with the goal of tracking and evaluating changes in coastal habitats and watershed land use/cover. The main objective of this element is to examine the links between watershed land use activities and coastal habitat quality.

These data are compiled electronically at a central data management "hub", the Centralized Data Management Office (CDMO) at the Belle W. Baruch Institute for Marine Biology and Coastal Research of the University of South Carolina. They provide additional quality control for data and metadata and they compile and disseminate the data and summary statistics via the Web (<http://cdmo.baruch.sc.edu>) where researchers, coastal managers and educators readily access the information. The metadata meets the standards of the Federal Geographical Data Committee.

Education Plan

The reserve system provides a vehicle to increase understanding and awareness of estuarine systems and improve decision-making among key audiences to promote stewardship of the nation's coastal resources. Education and interpretation in the reserves incorporates a range of programs and methodologies that are systematically tailored to key audiences around priority coastal resource issues and incorporate science-based content. Reserve staff members work with local communities and regional groups to address coastal resource management issues, such as non-point source pollution, habitat restoration and invasive species. Through integrated research and education programs, the reserves help communities develop strategies to deal successfully with these coastal resource issues.

Formal and non-formal education and training programs in the NERRS target K-12 students, teachers, university and college students and faculty, as well as coastal decision-maker audiences such as environmental groups, professionals involved in coastal resource management, municipal and county zoning boards, planners, elected officials, landscapers, eco-tour operators and professional associations.

K-12 and professional development programs for teachers include the use of established coastal and estuarine science curricula aligned with state and national science education standards and frequently involves both on-site and in-school follow-up activity. Reserve education activities are guided by national plans that identify goals, priorities, and implementation strategies for these programs. Education and training programs, interpretive exhibits and community outreach programs integrate elements of NERRS science, research and monitoring activities and ensure a systematic, multi-faceted, and locally focused approach to fostering stewardship.

Reserve System Education Goals

The National Estuarine Research Reserve System's mission includes an emphasis on education, interpretation, and outreach. Education at each reserve designed to fulfill the reserve system goals as defined in the regulations (15 C.F.R Part 921(b)). Education goals include:

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;

- Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

Reserve System Education Objectives

Education-related objectives in the Reserve System Strategic Plan 2011-2016 include:

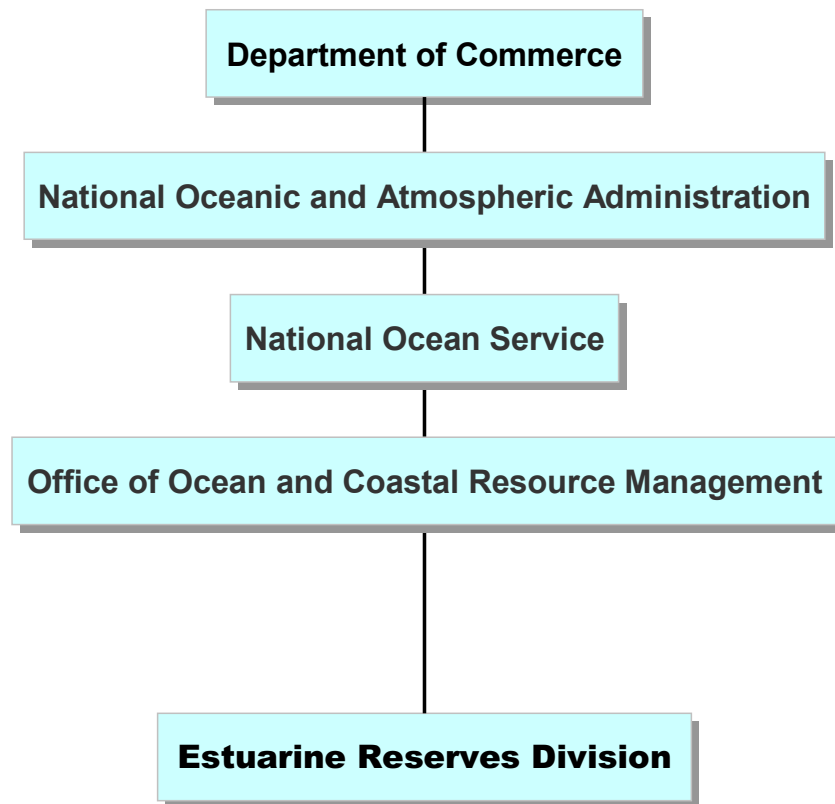
- Enhance the capacity and skills of teachers and students to understand and use NERRS data and information for inquiry-based learning.
- Increase knowledge of estuaries and promote active stewardship among public audiences through the development and delivery of tools and programs addressing climate change, habitat protection, and water quality.

Coastal Training Program

The Coastal Training Program (CTP) provides up-to-date scientific information and skill-building opportunities to coastal decision-makers who are responsible for making decisions that affect coastal resources. Through this program, National Estuarine Research Reserves can ensure that coastal decision-makers have the knowledge and tools they need to address critical resource management issues of concern to local communities.

Coastal Training Programs offered by reserves relate to coastal habitat conservation and restoration, biodiversity, water quality and sustainable resource management and integrate reserve-based research, monitoring and stewardship activities. Programs target a range of audiences, such as land-use planners, elected officials, regulators, land developers, community groups, environmental non-profits, business and applied scientific groups. These training programs provide opportunities for professionals to network across disciplines, and develop new collaborative relationships to solve complex environmental problems. Additionally, the CTP provides a critical feedback loop to ensure that professional audiences inform local and regional science and research agendas. Programs are developed in a variety of formats ranging from seminars, hands-on skill training, participatory workshops, lectures, and technology demonstrations. Participants benefit from opportunities to share experiences and network in a multidisciplinary setting, often with a reserve-based field activity.

Partnerships are important to the success of the program. Reserves work closely with State Coastal



Programs, Sea Grant College extension and education staff, and a host of local partners in determining key coastal resource issues to address, as well as the identification of target audiences. Partnerships with local agencies and organizations are critical in the exchange and sharing of expertise and resources to deliver relevant and accessible training programs that meet the needs of specific groups.

The Coastal Training Program requires a systematic program development process, involving periodic review of the reserve niche in the training provider market, audience assessments, development of a three to five year program strategy, a marketing plan and the establishment of an advisory group for guidance, program review and perspective in program development. The Coastal Training Program implements a performance monitoring system, wherein staff report data in operations progress reports according to a suite of performance indicators related to increases in participant understanding, applications of learning and enhanced networking with peers and experts to assess programs.

Reserve System Coastal Training Goals

The National Estuarine Research Reserve System Coastal Training program is designed to fulfill the

reserve system goals as defined in the regulations (15 C.F.R Part 921.1(b)). Coastal training goals include:

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
- Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

Reserve System Coastal Training Program Objectives

Coastal Training-related objectives in the Reserve System Strategic Plan 2011-2016 include:

- Increase understanding of estuaries and promote active stewardship among public audiences through the development and delivery of tools and programs addressing climate change, habitat protection and water quality.
- Improve the capacity and skills of coastal decision-makers to use and apply science-based information in decisions that affect estuaries and coastal watersheds

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Wells NERR Setting

Physical Setting—Overview

Geography

The Wells National Estuarine Research Reserve is located in the Town of Wells in southern York County, Maine. It encompasses 1,854 acres of uplands and wetlands, plus 386 acres of submerged lands. It is in the geographic heart of the Gulf of Maine watershed, an area that extends from Cape Cod, Massachusetts to Cape Sable, Nova Scotia, Canada. The watershed land base is 69,115 square miles; its water surface is 33,054 square miles. The Gulf of Maine comprises a diversity of interconnected coastal habitats, all playing an important role in the function of this ecosystem.

The Reserve incorporates estuaries found at the mouths of the Webhannet River, Little River (Figure III.3) and Ogunquit River. These river systems arise in the sandy glacial outwash plain of southern Maine and empty into the Wells embayment, a sandy basin extending about 10 miles along the coast from the Ogunquit River to the Kennebunk River. Wells embayment mixes freely with the Gulf of Maine, a semi-enclosed sea bounded to the south and east by underwater banks and to the north and west by Massachusetts, New Hampshire, Maine, New Brunswick and Nova Scotia (Figure III.2). The Gulf is one of the world's most biologically productive environments.

With its low relief and extensive marshes, the Wells Reserve typifies the southern portion of the Acadian biogeographic region. This region extends along the northeast Atlantic coast from the southern tip of Newfoundland to Cape Cod and is characterized by a well developed algal flora and boreal biota. The shoreline is heavily indented and frequently rocky. The sea has a large tidal range and is strongly influenced by the Labrador Current.

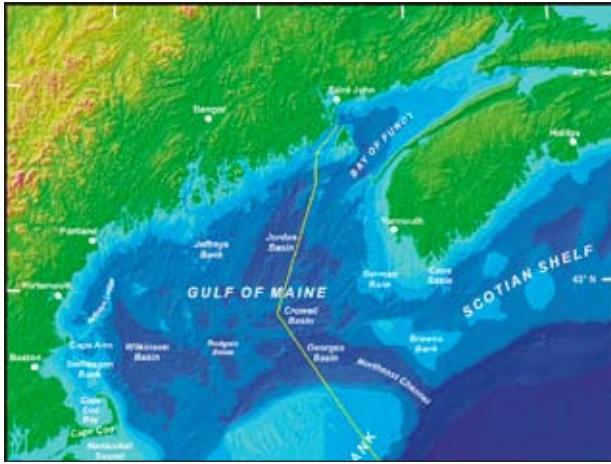
The Reserve is located in the Gulf of Maine Coastal Lowland Subsection—one of 19 eco-regions in Maine. Called Bailey's Ecoregions, and developed by the U.S. Forest Service, The Nature Conservancy and the Maine Natural Areas Program, these ecoregions are grouped according to physiography, climate, geology, soils and vegetation. The Gulf of Maine Coastal Lowland Subsection is a 20-plus mile-wide band that extends from the Piscataqua River (which divides Maine and New Hampshire) to Casco Bay. This region is characterized by a relatively smooth coastline of large headlands, broad bays and sandy beaches. The terrain is relatively flat, with elevations rarely rising above 200 feet—Mount Agamenticus (which reaches an elevation of 691 feet and is the highest point in the region) being one of the exceptions.

Geology

The southern Maine landscape has been shaped primarily by glaciation. During the last Ice Age, the Laurentide ice sheet covered the region, pressing on



A view over the Little River estuary, Laudholm and Drakes Island beaches, and the Wells Reserve's Laudholm campus toward the Webhannet River estuary, Wells Harbor, and a distant Mount Agamenticus.



The Gulf of Maine stretches between Cape Cod and southwestern Nova Scotia, as shown in this map produced by the Gulf of Maine Council on the Marine Environment.

the earth's crust and causing land to subside. As glaciers melted about 14,000 years ago, the land began to rebound and the sea level rose. Coastal basins, embayments and watercourses have been formed over geologic time through interactions between sea level and glacial movement. Meteorologic, hydrologic and oceanographic processes have contributed by scouring, eroding and transporting substrates into today's coastal configuration.

Surficial geologic deposits at the Wells Reserve are strongly influenced by this geologic history. The Reserve has four deposit types: Swamp and Tidal Marsh, composed of peat, silt, clay and sand; Glacial-Marine, composed of sand underlain by silt and clay; Beach and Dune, composed of sand, gravel, and fine sediment, such as silt and clay; and Glacial Till, composed of sand, silt, clay, and gravel. Swamp and Tidal Marsh is the most common deposit type at the Reserve.

Soil formations in the Reserve tend to have gentle slopes, rapid permeability and slow surface runoff. Water tables are at or near the surface throughout most of the Reserve. Along the immediate coast, soils are generally deep sands (where beaches occur) or shallow sandy loams that are well to excessively drained, according the "Biophysical Regions of Maine" report.

Hydrology

The Webhannet River watershed has a drainage area of 8,964 acres (14 square miles), entirely within the Town of Wells. The Webhannet's major tributaries are Depot Brook, Eldridge River and Blacksmith Brook (Figure III.3). Extensive wetlands and salt marshes

near the Webhannet River mouth empty into Wells Harbor, which flows to Wells Bay via a dredged channel between two jetties.

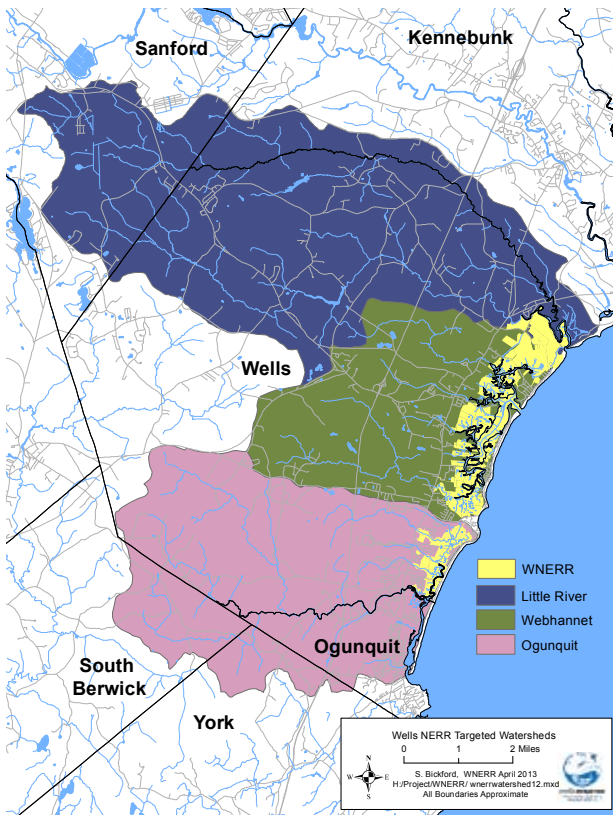
The Little River is formed by the confluence of the Merriland River and Branch Brook. Together, the three waterways have a drainage area of 20,057 acres (31 square miles). The Merriland River has its headwaters in the City of Sanford and crosses the Town of Wells. Branch Brook originates from several springs near the Sanford municipal airport and serves as the border between the towns of Kennebunk and Wells. The Kennebunk-Kennebunkport-Wells Water District draws public water from Branch Brook, reducing its flow to the Little River. The Little River estuary flows to Wells Bay via a salt marsh protected by an unarmored double-spit barrier beach.

The Ogunquit River watershed covers an area of approximately 13,300 acres (or 24 square miles) and is located in the towns of Wells, York, Ogunquit and South Berwick. Green Brook is a major tributary, with Tatnic Brook and several smaller tributaries converging with the main stem of the river. The expansive salt marshes of the Moody Division of Rachel Carson National Wildlife Refuge are located behind a two-mile-long barrier beach and dune systems. The Ogunquit River empties into the Gulf of Maine in the Town of Ogunquit.

The Gulf of Maine monthly mean wave height is greatest from November to March and is lowest in July and August. Annual mean wave height is almost 20 inches. Semi-diurnal tides have a range of 8.5 to 9.8 feet in the Wells embayment.

Climate

The climate of south coastal Maine is the mildest in the State of Maine. As a rule, south coastal Maine has very pleasant summers and falls, cold winters with frequent thaws and unpredictable springs. The Reserve's weather station indicates average annual temperatures ranging from 45 to 49°F (7.2 to 9.4°C). Twelve weeks per year show average temperatures below freezing, and the warmest 8 weeks of the year average around 68°F (20°C). Few summer nights are too warm and humid for comfortable sleeping. Autumn has the greatest number of sunny days and the least cloudiness. There appears to be moderate reduction in sunlight in the first few weeks of July, perhaps due to fog as newly warmed inland air meets the still cold air at the ocean's



The three principal (targeted) watersheds of the Wells Reserve include the Little, Webhannet, and Ogunquit rivers.

surface. Winters are quite severe, but begin late and then often extend into the springtime. Heavy seasonal snowfalls, over 100 inches (2,540 mm), occur about every 10 years. True blizzards are very rare. The White Mountains, to the northwest, keep considerable snow from reaching the area and also moderate the temperature. Normal monthly precipitation is remarkably uniform throughout the year. Winds are generally light, with the highest velocities being confined mostly to March and November. Even in these months the occasional northeasterly gales have usually lost much of their severity before reaching the coast of Maine. Temperatures well below zero °F (-17.8°C) are recorded frequently each winter. Cold waves sometimes come in on strong winds, but extremely low temperatures are generally accompanied by light winds. The average freeze-free season is 139 days. Mid-May is the average occurrence of the last freeze in spring; the average first freeze is in late September.

Vegetation and Habitats

The vegetation of Gulf of Maine Coastal Lowland Subsection resembles that of the Atlantic Coastal Plain to the south. Ecosystems that reach their northern extensions here include sandplain grasslands (found

at the Kennebunk Plains Wildlife Management Area, located 6 miles east of the Reserve) and oak-hickory forests (found around Mount Agamenticus). The largest coastal pitch pine communities in Maine occur on the well-drained, nutrient-poor sandy soils in Scarborough, Kennebunk and Wells. Small stands of pitch pine-scrub oak and the state's most extensive salt marshes are located in this region.

Botanical surveys completed at the Wells Reserve in the 1980's identified three major terrestrial habitat types: upland fields and forests, wetlands, and beach and dune.

Upland Fields and Forests

Prior to European settlement, oak-pine forest covered lands now encompassed by the Wells Reserve. Beginning in the mid 17th century, forests were cleared for timber, farming and fuel. As farms were abandoned in the 19th and 20th centuries, fields were largely supplanted by forests through natural succession. The Wells Reserve at Laudholm Farm displays this land-use evolution with four upland habitats: mowed fields, old fields, oak-pine forest and mixed second-growth forest.

Mowed Fields

With the decline of farming and maturation of forests in New England, the Reserve's open fields and grasslands are valuable from a regional landscape perspective. About 90 acres are mowed annually to provide habitat for species requiring grassland, early successional vegetative stages and large areas of open space. Keeping fields mowed also maintains a tie to the agricultural history of Laudholm Farm.

Old Fields

Adjacent to the Reserve's mowed fields, two "old fields" are succeeding to shrubs such as barberry, honeysuckle and bayberry. Apple and hawthorn trees line the field edges and hedge rows. White pine and poplar forests overtaking these old fields contain herbs and grasses associated with old fields.

Oak-Pine Forest

An oak and pine community occurs adjacent to mowed fields on the northern upland portion of the Reserve. Red maple is a major component of most of the oak-pine forest stands. Other tree species occur in the canopy or sub-canopy but do not attain dominance. At most sites, heath shrubs dominate the understory, with blueberries being most abundant.

Mixed Second-growth Forests

These woods have been disturbed through harvesting or some other form of manipulation and lack strong characteristics of a particular forest type.

Wetlands

Four types of major wetlands have been identified on the Wells Reserve: red maple swamp and floodplain, shrub swamp, brackish marsh, and salt marsh.

Salt Marsh. Covering about 1,200 acres, this is the dominant sub-habitat of the Wells Reserve. Salt marshes of the Little River and Webhannet River estuaries have formed behind double barrier spits over the past 3,000 to 4,000 years. The marshes appear flat, but contain intricate drainage channels (natural and man-made) and creeks lined by small scarps or ridges and are dotted with pools and salt marsh pannes. Plant associations are complex.

Red Maple Swamp and Floodplain. These are found along the banks of the Merriland River and Branch Brook, as well as the lowlands between the Wells Reserve campus and adjacent salt marshes. Red maple is the dominant overstory tree, and alder and winter-berry holly are the dominant shrubs. A well-developed herbaceous layer contains various sedges, ferns and wetland herbs.

Shrub Swamp. These are found in the upper reaches of the Little River and in areas where flow is impeded and water lies stagnant. Close to the open salt marsh of the Little River, north of Route 9, is an intermingling of freshwater and saltwater flora.

Brackish Marsh. As one travels up river from the estuaries of the Wells Reserve, marshes continue to occur in the intertidal environments, changing from salt marsh to brackish marsh to tidal freshwater marsh. The largest and most visible brackish marsh at the Reserve occurs on the north side of Drakes Island Road and is called the Drakes Island Marsh. Tidal flow was once restricted to this marsh by a tide gate, which allowed freshwater plants to invade. The gate fell off in the late 1980's and was left un-repaired, which allowed for partial restoration of tidal flow. In 2005, a larger culvert that connects the tides with this marsh and a self-regulating tide-gate were installed. This will increase tidal flow even more, which should result in furthering salt-marsh restoration.

Beach and Dune

Laudholm Beach is among the few undeveloped sand beaches remaining in Maine. It and Crescent Surf Beach form a double-spit barrier beach that protects the Little River estuary. A low, partially vegetated foredune exists near the river mouth. Landward of the foredune are stable backdunes and heavily vegetated washover areas.

Shorelands between Laudholm Beach and the mouth of the Webhannet River are known as Drakes Island Beach. A seawall extends along this beach. Behind it is single family residential development with few undeveloped lots, which continues south from the Webhannet River mouth to Moody Point.

Intertidal

Intertidal habitats include portions of the salt marsh, high energy dynamic beach areas (inlets and tidal deltas) at the mouths of the rivers, and retreating barrier beach areas bordering developed areas. Sediment in these areas reflects diverse geologic history and forces that continue to sort and shape these intertidal habitats. Mud flats, coarse to fine grained sands, cobbles and boulder beaches contribute to the diversity of habitat and associated flora and fauna in each area. Intertidal invertebrates provide an important food source for resident and migrating birds and fish.

Key Species

Flora

Botanical surveys and observations at the Wells Reserve have identified nearly 500 species of vascular plants. Along the coastline, the Reserve has several species of submerged aquatic vegetation (eelgrass and widgeongrass, for example), and several species



The mummichog (*Fundulus heteroclitus*), also known as the killifish or salt marsh mud minnow, is common in the Reserve's salt marshes.



Dusty Miller (*Senecio cineraria*) presses against driftwood on Laudholm Beach.

of dune vegetation (beach grass and beach pea, for example). Salt marsh is the dominant habitat type at the Reserve, and these expansive habitats include an abundance of smooth cordgrass, salt marsh hay, black rush, and glasswort. Rare plant species occur in the uplands of the Wells Reserve, including slender blue flag iris and sassafras. Both are at the northern limit of their ranges. Two varieties of eastern Joe-Pye weed occur on the Reserve. In the uplands, non-native shrubs are pervasive, particularly Japanese barberry.

Invertebrate Fauna

The Webhannet and Little River estuaries are important breeding areas for intertidal and subtidal invertebrates.

The marine and estuarine invertebrates are the most diverse group of organisms at the Reserve, and include 14 phyla. Representatives of some of the phylogenetic orders of invertebrates at the Reserve include Mollusca, Nematoda, Protozoa, and Arthropoda. They and other phyla are found in salt marshes, mudflats, sandy substrates, and in the water column. Invertebrates common in the mudflats include the soft-shell clam, the clam worm, the blood worm, and the common periwinkle. Common species of molluscs found in sandy substrates include blue mussels, surf clams, razor clams, and jingle clams. Common invertebrates that occur in the salt marsh include the ribbed mussel, green crab, grass shrimp, sand shrimp, and a range of gastropods and amphipods.

Vertebrate Fauna

The Wells Reserve's various habitats support diverse animal communities. Vertebrate communities include resident and migrant species of fish, amphibian, reptile, bird, and mammal.

Fifty-five fish species from 30 families have been documented at the Wells Reserve. They were found

between 1989 and 2001 during surveys of the Little River, Webhannet River, Merriland River, Branch Brook and Wells embayment. The most common were the American eel, alewife, common mummichog, Atlantic silverside and three stickleback species (fourspine, threespine and ninespine). Four reptile species, seven amphibian species, more than 265 bird species and at least 32 mammal species have been documented at the Wells Reserve.

Detailed information on the setting and species of the Wells Reserve can be found in the *Site Profile of the Wells National Estuarine Research Reserve*, published in 2007. This document has chapters on geomorphology, hydrogeography, climate and weather, habitats, flora and fauna, and other information relating to the 2,250-acre site. The Site Profile also has charts containing the common names and scientific names of all known flora and fauna species at the Reserve.

Cultural History and Community Setting

History

The southern coast of Maine was occupied by Native Americans for thousands of years before European settlement in the 1640's. Although no formal archaeological surveys have been completed at the Wells Reserve site, the Abenaki tribe probably used the lands and waters of this area as they had in other parts of New England. The Native Americans of the region were nomadic, traveling to various places in search of the abundance of plants and animals that existed seasonally on the coastal plain of Maine. Unlike sites farther east on the coast, there are no prominent shell middens in the Reserve

The early European settlers found this rich diversity of plants and animals when they arrived in south coastal Maine in the early 17th century. Anglo-American colonial sites dating from the early 1600's may lie within or close to the Reserve, particularly in the upland forests adjacent to the Little River estuary and on the upper reaches of the Webhannet River.

The site of the Reserve campus was first recorded as being settled in 1642. Thereafter, for the next 350 years, it was occupied by only four families: the Boades, the Symonds, the Clarks and the Lords. The site and its residents played prominent roles in the history of Wells.



The iconic Laudholm farmhouse, now used for visitors and offices, has occupied the highest point in Wells for many years.

Henry Boade first appeared in Maine in 1636, in Biddeford. In 1641 he moved to what would become known as the Town of Wells, and chose an upland meadow at the highest point of land on the coast to be the site for his estate, roughly the current location of the visitor center. Mr. Boade was appointed chairman of the Town's first board of selectman and served as town commissioner. William Symonds was a selectman, a frequent member of the annual grand jury and the overseer of wills. The Clark family acquired the farm in 1717; this family retained ownership and farmed the property for 163 years.

Throughout this period, the landscape changed dramatically, from a patchwork of habitats—both wild and those created by the Native Americans—to one that was predominantly agricultural. Fields for crops and livestock replaced forests and shrublands. A regular, predictable pattern was imposed on the landscape.

George Clement Lord I was president of the Boston and Maine Railroad and oversaw significant improvements to the farm. He purchased the property in 1881 from the Clark family; thereafter, he began making improvements to the property. His purchase coincided with the progressive farm era of the late 19th century, when more well-to-do individuals and families purchased New England farms and applied the latest technological advances (both in equipment and buildings) to farming.

The mid to late 19th century was also a period of the industrialization of cities and abandonment of farms. Families and individuals left the rural regions of New England to move to cities for jobs in factories. During this period, the forest began to reclaim the New England landscape.

George Clement Lord II began managing the farm in 1914. He also served as a town selectman, a state representative and state senator, and served on the



Effie Rogers Lord (Mrs. Charles E. Lord) with their son George C. Lord II on the porch of the Laudholm farmhouse about 1891. George would later manage the farm.

Maine Governor's Council. He was also active in many farming organizations and was president of the York County Breeder's Association. (The name Laudholm Farm was established early in the 20th century.) The end of the Lords' farming operation came in 1952 when the Laudholm Guernsey dairy cow herd was dispersed at auction.

In 1978 the people of Wells and the neighboring communities banded together to save Laudholm Farm. They created Laudholm Trust to prevent the property from being developed. Laudholm Trust, in partnership with NOAA, successfully purchased and protected in 1986 the 240 acres of the Laudholm property, which included the historic buildings. Since that time, the Reserve and its partners have protected additional significant lands and buildings that have been incorporated into the Reserve, including the Diane Lord property and the Alheim property.

The acquisition by the Trust and NOAA added to the conservation holdings of other organizations. Throughout the 1960's and 1970's, over 1,000 acres of adjacent marsh and coastline were purchased by the federal government for the Rachel Carson National Wildlife Refuge. In 1967, the State of Maine acquired about 147 acres from the Lord family to be managed for conservation and recreation by the Maine Department of Agriculture, Conservation and Forestry (ACF). All of the ACF land and about 1,100 acres of Rachel Carson land that adjoins the Little River and Webhannet River estuaries were included in the Reserve boundary when it was designated in 1984.

The Laudholm Farm complex was entered upon the National Register of Historic Places on October 20, 1983, based upon its local significance. Many of the buildings have been renovated and adapted to serve the core program functions of the NERR.

More information on the history of the Reserve is found in *Laudholm: The History of a Celebrated Saltwater Farm*, by Joyce Butler.

Community Growth and Land Use

The Wells Reserve is located in York County, one of Maine's fastest-growing regions. Significant population growth and second home development continue to alter the social and ecological landscapes of Wells, Ogunquit, Kennebunk, and most other coastal towns in southern York and adjacent Cumberland Counties. Rural landscapes are assuming a suburban character. Large homes with intense landscaping schemes are replacing smaller homes along waterways. Condominium development introduced dense housing complexes in what were formerly blocks of forest.

Population Growth

According to the US Census Bureau, York County's population grew from 186,742 to 197,131 from 2000 to 2010, an increase of 5.6% and above the 4.2% average for the State of Maine. The Reserve's host community, the Town of Wells, added 189 people during the past decade, a growth rate of 2%. As in recent decades, York County continued to be one of the fastest growing regions in the state for new year-round and seasonal residents. While growth rates leveled off at the end of the last decade, York County is projected to continue to grow and add population over the next decade at a rate higher than the statewide average, as it is close to the Boston metropolitan area and the growing suburban communities of southern New Hampshire.

Considered rural four decades ago, the towns in south coastal Maine have evolved into commuter communities, with many residents living in Wells, Kennebunk, Ogunquit, and other nearby towns but traveling to Greater Boston, southern New Hampshire, and Portland for work. The two major employment industries in this part of Maine include defense and tourism, followed by other service and manufacturing industries. Tourism has a significant influence on land use changes, as Wells and nearby communities have become popular places for second home development.



The seven-mile trail system meanders through woodlands, shrublands, and fields, and skirts the salt marshes of two estuaries.

Land-Use Planning

Over the past decade, Wells, Ogunquit, and Kennebunk have continued to update their comprehensive plans, have adopted ordinances to protect natural resources, and have supported the conservation of land. Wells and York have routinely set aside municipal funds for significant conservation projects. In addition, regional land trusts (Great Works Regional Land Trust, the York Land Trust, Kittery Land Trust, and the Kennebunkport Conservation Trust), as well as statewide conservation groups, have protected land in the area, with an emphasis on parcels adjacent to rivers, streams and biologically diverse areas.

Marine-Related Activities

Wells Harbor, at the Webhannet River mouth, has a boat launch and about 200 moorings for commercial fishing and recreational boats. The harbor and its navigation channel were dredged in 2000, with sand from the dredge deposited on Drakes Island Beach.

Recreational fishing and clamming are popular human uses of the Reserve's estuaries. Marine areas adjacent to the Reserve have become popular for summer whale-watching cruises and naturalist cruises focusing on near shore marine life.

Tourism and Travel

Over 70% of Maine's 9.5 million summer visitors focus their visits in coastal areas. Local chambers of commerce strongly promote tourism seasons that run from mid-May to mid-October. The Towns of Wells, Ogunquit, Kennebunk, and Kennebunkport are popular tourist destinations, with many hotels and restaurants filling to capacity in the summer months between late June and early September.

Water Quality

The Reserve's three river systems have good water quality, based upon State of Maine water quality classifications. These waters receive no major point-source discharges, but non-point sources are sometimes

significant. Fecal coliform levels can spike after rain events and snow melt, resulting in closure of shellfish beds.

Impacts Affecting the Reserve

The overarching ecological issue facing the Reserve and south coastal Maine relates to drastic alteration of the region's rural wooded landscape through intense residential and commercial development. Among the threats to watershed health are:

- Loss of forested buffers along stream and estuarine shorelands. (Maine defines shoreland as 250-ft terrestrial borders along the edges of surface water features, such as streams, lakes, rivers and estuaries.)
- Conversion of shoreland to intensively managed lawn or turf (homes, golf courses, etc.), or asphalt (roads, drives, parking lots).
- Excessive stormwater runoff and associated lack of groundwater recharge. In southern Maine, all freshwater runoff drains to the sea.
- Changes in the landscape and landforms due to climate-induced sea-level rise, and erosion of riparian lands due to increased rain from large storm events.
- Increasing demands on limited freshwater for drinking, lawn and turf management and waste treatment.
- Increased contamination of coastal food webs through non-point-source pollution associated with urban and suburban development and atmospheric transport from transportation, industry and energy facilities "down wind".
- Hydrological modifications associated with dams, roads, causeways, tide gates, dikes and drained wetlands.



The effects of storm surge are likely to increase as global climate change causes sea level to rise.

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Strategic Plan 2013–2018

The Wells National Estuarine Research Reserve developed and adopted a revised strategic plan in 2012 in conjunction with the development of this Management Plan. Below are the Vision, Mission, five core goals, three supporting goals, and strategic objectives of the Reserve's 2013–2018 Management Plan. All the strategic objectives and their strategies are incorporated into each relevant chapter.






Vision

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

Mission

To protect and restore coastal ecosystems of the Gulf of Maine through integrated research, stewardship, environmental learning, and community partnerships.

Core Goals

-  Goal I: People appreciate and understand natural environments, make informed decisions, and take responsible actions to sustain coastal communities and ecosystems.
-  Goal II: Reserve science promotes better understanding of coastal ecosystems, and the results of research are conveyed to decision-makers to meet coastal management needs.
-  Goal III: Coastal communities have enhanced capacity to protect, manage, and restore coastal habitats.
-  Goal IV: People understand the effects of climate change on natural and human communities and have the knowledge and tools needed to make informed decisions and adapt to environmental change.
-  Goal V: The Wells Reserve is a model site and resource for exemplary coastal stewardship that fosters an understanding of the ecological connections among land, water, and people.

Supporting Goals

Goal I: The Wells Reserve encourages a collaborative and collegial environment, and values and recognizes personal contributions of staff and volunteers that enrich both the individual and the organization.


Goal II: The organization has a strong financial foundation that builds capacity and enriches programs.


Goal III: People in coastal communities know, and are inspired to remember, the Reserve's role in advancing coastal stewardship through science, education, and conservation.

Strategic Objectives


For each objective, the colored Roman numerals to the left illustrate its most direct contribution to one or more of our Core Goals. Our Supporting Goals are foundational and therefore support all objectives.


Interpretive Education


 Objective 1: Provide high-quality, field-based science education programs that promote stewardship of the Gulf of Maine watershed and coastal environments through understanding and appreciation of ecosystems.

 Objective 2: Optimize educational use of the site and increase public awareness of its ecological and cultural significance.

Coastal Training Program

 Objective 1: Each year 90% of participants in training indicate intent to apply natural and social science-based information in coastal decision-making

 Objective 2: By 2018 CTP supports three collaborative efforts within the State to sustain ecosystem services and community resilience in a changing climate.

 Objective 3: Each year 80% of trainings, workshops, and technical assistance are designed to address partner and stakeholder needs identified through needs assessments, evaluations, and in consultation with the CTP Advisory Committee.

Research and Monitoring

Objective 1: Investigate coastal food webs and habitats, their underlying physical and biological processes, and their response to natural and climate-driven changes and human activities.

Objective 2: Provide opportunities and support for visiting investigators, staff, and interns to conduct independent or collaborative research at the Reserve and in the Gulf of Maine region.

Objective 3: Promote the development and implementation of regionally coordinated ecological monitoring of coastal habitats, and continue to maintain and expand the System Wide Monitoring Program.

Resource Management and Stewardship

Objective 1: Manage habitats within the Reserve to sustain biodiversity and ecosystem functions while providing opportunities for research, education, and recreation.

Objective 2: Encourage a watershed approach to land use planning to enhance the quality of water resources in coastal regions of the Gulf of Maine.

Objective 3: Provide assistance and expertise to communities and organizations in the conservation, restoration, and stewardship of coastal habitats.

Administration

Objective: Provide the administrative structure needed to fulfill the Reserve's mission and conform to federal and state law and agency agreements.

Boundary and Acquisition

Objective: Conserve lands to protect the natural resources within the Reserve's boundary and targeted watersheds, ensure a stable environment for research and education, and provide for public enjoyment.

Facilities and Construction

Objective 1: Maintain safe and comfortable facilities for staff and partners to accomplish program objectives, and provide visitors with opportunities to learn about coastal ecosystems, the historic buildings, and the landscape history of the site.

Objective 2: Reduce carbon emissions and resource consumption through conservation measures and the use of renewable energy.

Public Access

Objective: Provide access for scientific research, environmental education, outdoor recreation, and public events while ensuring the protection of the Reserve's natural resources and its historic buildings and grounds.

Volunteers

Objective: Attract, nurture, and retain a volunteer work force with a diversity of interests and talents who augment all aspects of our programs.

Communications

Make people aware of Wells Reserve activities, motivate them to support our programs, and inspire them to take actions that benefit coastal environments.

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Accomplishments

2007–2012

Facilities and Land Acquisition

- Created a new, attractive information kiosk at the access point to the Reserve from the parking lot. Kiosk contains illustrated directional map of Reserve campus, description of the Wells Reserve and Laudholm Trust and their mission, history of Laudholm Farm, and bulletin board with current events and activities.
- Constructed and outfitted the Walk-In Environmental Research Chamber in the Coastal Ecology Center, which allows for year-round ecological experiments to occur.
- Renovated and restored the old garden shed on the Alheim Commons campus and converted it into a year-round office and meeting space. Renamed it “The Studio.”
- Purchased the Diane Lord farmhouse with attached barn and 2½ acres of land that adjoins the Wells Reserve — Phase 2 of this acquisition. The farmhouse and barn are part of a life tenancy agreement with the seller. Once the life tenancy terminates, the buildings will be used for education, to be called the Mattina Proctor Education Center.
- Protected the seven historic buildings of Reserve’s two Life Estates. Made significant exterior repairs to the Nathaniel Lord Life Estate, such as install-



A new welcome kiosk was constructed in spring 2009.

ing new roof systems on all buildings, replacing clapboards, repairing sills and foundations, repairing copulas and other features, and painting all buildings. Installed a new roof system on the Diane Lord Life Estate

- Developed new interpretive exhibits, totaling 1,250 square feet, on the first floor of the Visitor Center with the theme of landscape change in New England.
- Developed and mounted seven new building interpretive signs that inform visitors of the past use of the buildings — the farmhouse, water tower, icehouse, horse barn, cow barn, creamery, and milking parlor.
- Developed and designed six new interpretive trail signs for the Yankee Woodlot Trail, Muskie Trail, Pilger Trail, overlooks, and Barrier Beach Road. Sign themes include salt marsh restoration, landscape change, vernal pools, shrublands, field inhabitants, and coastal habitats.
- Installed lighting in the parking lot, greatly improving safety of visitors and staff.
- Built a new 75-foot-long boardwalk along the Muskie Trail, allowing better access to this popular trail even during the wet season of early to mid-Spring.
- Successfully secured a competitive NOAA Coastal and Estuarine Land Conservation Program grant with the Town of Wells and acquired in two separate transactions a 105-acre parcel and a 61-acre parcel in the Merriland River watershed. Acquisitions are part of the Merriland River Corridor Project that aims to protect lands from the headwaters to the estuaries of the Reserve.

Interpretive Education

- Developed and offered Teachers on the Estuary (TOTE) field-based teacher workshops for three years, immersing middle and high school teachers in estuary and watershed education for four summer days at the Reserve and one follow-up day in the fall. Teachers implement stewardship projects and estuary lessons with students upon their return to school in the fall.
- Helped to spread the word about the New England Reserves’ TOTE workshops by presenting at national conferences, including the North American Association for Environmental Education (NAAEE) annual conference and the National Association for Interpretation (NAI) national workshop.
- Implemented a new public kayaking program, acquiring kayaks, paddles, and personal floatation

devices through a partial donation from a Maine-based business.

- Acquired over 40 pairs of new children and adult-sized snowshoes due to a donation from a local business and funding from multiple foundations, thus expanding our winter program offerings.
- Developed, secured funding and initiated a new program called Wild Friends in Wild Places, a school program for grades K-2 delivered in partnership with Center for Wildlife (wildlife rehabilitation center) educators and live animal ambassadors.
- Coordinated two new annual education events, International Migratory Bird Day and Winter Wildlife Day, and developed education activity components for the existing special events: Punkinfiddle: A National Estuaries Day Celebration, the Laudholm Craft Festival, and Eco Day.
- Developed Microscopic Marvels, a new school program for grades 6-12 that enables students to conduct water quality tests and collect plankton at the marsh, and then view plankton under microscopes in the Teaching Lab.
- Enhanced early childhood programming and exhibits to include story hours throughout the year and a Puppet and Story Book Nook in the Coastal Ecology Center.
- Created several new education kits, including a Tree Trunk for grades K-5, a Tree Trunk for grades 6-12, and an Estuaries Kit.
- Completed an interpretive education market analysis and needs assessment for southern Maine for the K-12 Estuarine Education Program, or KEEP.
- Hosted and partnered with a variety of education groups and initiatives for a week at a time, including: the NOAA Environmental Literacy Grant-funded "Earth as a System is Essential" for middle school science teachers; Camp Card adolescent campers with Asperger's syndrome; Maine Humanities Council summer campers delving into the life of Rachel Carson; and University of Southern Maine environmental studies graduate students.
- Served on the NERR System Climate Change Team that developed an implementation plan for all 28 reserves to address the multi-faceted and complex issue of climate change along the nation's coasts.
- Designed and produced six new informational brochures: Wells Reserve brochure, Trail Map, School Field Trips, Research, Stewardship, and Environmental Monitoring.
- Created three new Discovery booklets and backpacks: Water Wonders, Habitat Hike, and Time Travels. Coordinated the installation of correspond-



The Reserve celebrated the opening of its new Changing Landscapes exhibits with a ribbon cutting (summer 2011).

ing Discovery Program posts along the trails and treasure boxes on campus buildings, developed new evaluations for program participants, and facilitated a Discovery Program training for Visitor Center volunteers.

- Diversified methods of evaluating education programs, using pre and post visit student wildlife quizzes for Wild Friends in Wild Places, pre and post visit teacher tests for Teachers on the Estuary workshops, and updated evaluation forms for school field trip programs and the Discovery Program.
- Revamped the Docent Room through the construction and installation of new shelves, repainting from floor to ceiling, the acquisition and display of animal mounts, skulls, and nests. Greatly improved the Forest Learning Shelter displays with posters, animal mounts, and display board.
- Installed four Picture Posts at the Reserve to measure landscape and seasonal change through digital photography, leading to a greater understanding of how landscapes change over long and short periods of time, and installed seven bat houses in multiple fields to enhance bat habitat and provide a link with the Wild Friends in Wild Places school field trip's stewardship message.

Research and Monitoring

- Established collaboration with NOAA's Estuarine Eutrophication Assessment Program (NOS/NCCOS: Suzanne Bricker) on two regional reports and contribute to 1 national report.
- Established collaboration with NOAA's NCCOS Beaufort Laboratory on assessment of mercury methylation and transfer in estuarine food webs (David Evans)

- Collaborated with Maine Department of Environmental Protection to establish nutrient status of priority Southcoast Maine estuaries. Engaged DEPs interest in nitrogen status of Saco River estuary, and EPA region 1 interest in wastewater treatment facility nutrient inputs to Gulf of Maine nearshore waters.
- Collaborated with the University of New England to assess ecological state of Saco River estuary (which drains one of the largest watersheds in Northern New England) including: shoreland land use, fringing marsh plant communities, fringing marsh soils, and marsh-associated fish communities.
- Collaborated with NOAA Restoration Center to evaluate restoration success and identify success indicators for 17 paired reference and restoration sites in Oregon, North Carolina, Virginia, Rhode Island and Maine.
- Established long-term larval fish monitoring program at Webhannet Harbor SWMP station.
- Collaborated with USEPA Region 1 on RV Bold Cruse to survey larval fish occurrence in nearshore waters of central Gulf of Maine estuaries to assess connectivity of fish communities from estuaries to 3 miles offshore.
- Collaborated with Maine Department of Environmental Protection and USEPA Office of Water to collect data for first National Wetlands Condition Assessment.
- Established relationship with NOAA NCCOS Internship Program (student interns from Smith, Mt. Holyoke, Hampshire, Amherst, UMass, Vassar, Clark and Washington College).
- Continued relationship with Maine Conservation Corps Americorps Environmental Educator Program to support Southcoast Maine watershed field assessment of ecological state.
- Formally mentored 11 Ph.D. and M.S. graduate advisees, and 2 undergraduate honors advisees, and informally mentor 3 Graduate Research Fellows. Two students receive Ph.D. and 4 students receive M.S. degrees during this period.
- Established role as source of information for Southcoast Maine fish passage restoration sites, and providers of pre- and post restoration monitoring and evaluation.
- Collaborated with Great Works Regional Land Trust on dam removal and fish passage restoration of Shorey's Brook (providing only tributary fish passage in Maine to the Salmon Falls River) by providing pre- and post- fish community, smelt spawning and habitat monitoring.



Researchers surveyed nekton populations in a number of rivers and streams, collecting data for long-term community comparisons.

- Participated in and helped organize national and regional workshops and committees regarding estuarine habitat restoration, especially for fish.
- Represented Northeastern NERRS on Northeast Regional Association of Coastal Ocean Observing Systems (NERACOOS) Strategic Planning and Implementation Team to establish SWMP as part of observing system.
- Participated in Estuarine Reserves Division Strategic Planning Committee to produce current Strategic Plan.
- Collaborated with Research and Stewardship sectors to initiate ERD Sentinel Site Initiative through Strategic Committee proposal process.
- Produced 16 project reports, 21 peer-reviewed publications, 17 meeting abstracts, 5 manuscripts pending review, 4 MS theses, 2 Ph.D. dissertations, 1 GRF MS thesis, 1 honors undergraduate thesis, 1 highest honors undergraduate thesis, and 13 invited presentations. Note that we do not regularly track documents produced by visiting investigators with whom we do not collaborate, so they are not included in this tally.
- Produced or contributed to 51 research proposals since 2009 (did not track number prior to this date).
- Assessed the movements and habitat use within Maine salt marshes by the American eel, and the species response to salt marshes restricted by tidal flow.
- With Maine Rivers and the Kennebunk Conservation Commission successfully launched the Kennebunk and Mousam Rivers Alliance, a group focused on assessing, monitoring and improving water quality; restoring and protecting habitats for fish and wildlife; and educating the public about the natural and cultural resources of the river.

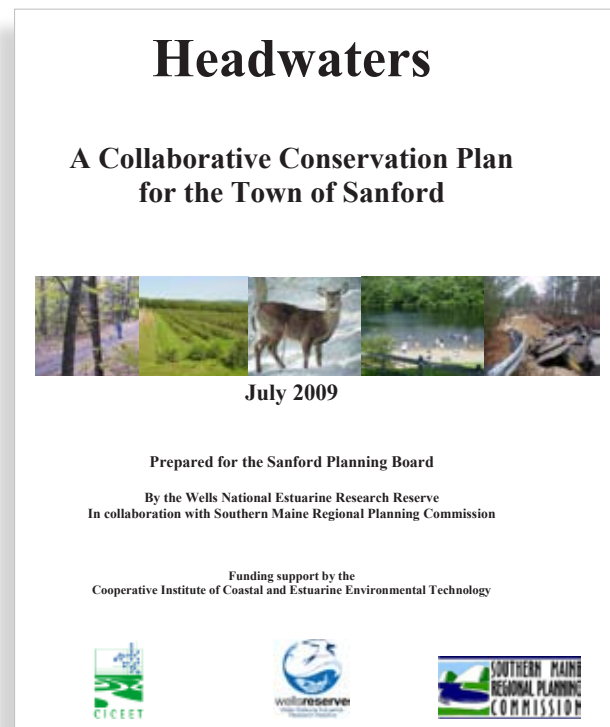
- Created digital maps and restoration site inventory of fringing marsh habitat in Casco Bay; monitored the responses of vegetation and hydrology to restoration activities in the Pemaquid River watershed; and collected and analyzed water samples in 7 rivers in southern Maine as part of Maine DEP's effort to assess coastal water quality.

Coastal Training Program

- Integrated and involved each sector in coastal training and technical assistance activities to foster the use of science in coastal management, conservation, and restoration. The impact of the team approach of CTP at the Wells NERR was reflected in the range, scope, and diversity of CTP activities presented in over 150 events to almost 6,000 people during the five years from 2007 to 2011.
- Implemented an innovative approach to reaching decision-makers through a project called Collaborative Learning and Community-Based Ecosystem Management. The project resulted in the publication of a guide of the same name, and the methods and strategies have become a national training pilot tested across the NERRS in 2012 in partnership with the NERRS Science Collaborative.
- Received a grant from the Cooperative Institute of Coastal and Estuarine Environmental Technology to support Coastal Training Program efforts in land use decision-making and ecosystem-based management (EBM). With its project partners (EBM Tools Network and the Town of Sanford), the Wells NERR developed "Headwaters – A Collaborative Conservation Plan for Sanford," and developed and delivered a series of regional trainings to build EBM technology and practice skills. CTP used the collaborative approach in Sanford to develop this plan.
- Working in collaboration with the Piscataqua Region Estuaries Partnership (PREP) the CTP staff facilitated the development of the Salmon Falls Watershed Collaborative providing training design, meeting facilitation, project management, and action planning. This robust and effective partnership was awarded the United States Water Prize by Clean Water America Alliance in 2012.
- Working in partnership with southern Maine water districts, the Maine Drinking Water Program, the Mitchell Center at the University of Maine, the Rachel Carson National Wildlife Refuge and US EPA the Wells NERR CTP offered workshops, field trips and technical assistance connecting these partner groups with municipalities, watershed groups and land trusts. Shared priorities for clean water, land conservation and use of best management prac-

tices fuel these collaborative efforts. CTP events are designed to foster dialogue and bridge cultural and organizational differences to foster mutually beneficial solutions for source water protection.

- In partnership with the University of New England Center for Sustainable Communities, CTP is part of the Maine Sustainability Solutions Initiative project to develop Ecosystem Indicators for the Saco Estuary. CTP staff contribute to workshop development and stakeholder engagement. The Collaborative Learning approach developed is adapted for this project and has been incorporated into undergraduate courses and internships connecting the CTP and students in the Environmental Studies Department at UNE. Project is funded through NSF's EPSCoR.
- Wells NERR CTP developed an interdisciplinary and multi-faceted project designed to integrate ecological science, economics, and communications research to improve the impact of NERRS science. Called Sustaining Coastal Landscapes and Community Benefits, goals include improving management and protection of ecosystem services associated with riparian buffers, and a communications analysis focusing on the ways people understand ecosystem services in order to design messages, translate science and evaluate policy.



The Coastal Training Program worked with Sanford officials and residents to create a conservation plan that was adopted as policy in 2009. *Headwaters* was made an amendment to the town's comprehensive plan.

- In partnership with the Piscataqua Region Estuaries Partnership (PREP) and 3 other Maine organizations developed The Land Conservation Plan for Maine's Piscataqua Region Watershed, a scientifically based blueprint for the protection of wildlife habitat and water quality in the 10 communities in this southern-most area of Maine.
- Assisted the Maine State Planning Office in developing an annual beach health report template for municipalities and state parks using Maine Healthy Beaches Program monitoring data and other information.

Resource Management and Stewardship

- With Rachel Carson National Wildlife Refuge and the Natural Resource Conservation Service developed and began implementing a long-range plan to maintain, enhance, and expand early successional upland habitat for the New England Cottontail and other species that prefer this type of habitat. Received a 13-year NRCS grant to help us accomplish the Plan's goals.
- With Maine Department of Inland Fisheries and Wildlife successfully completed a decade of a now on-going deer management plan on the Reserve, reducing deer numbers and helping to revitalize

non-native plants and shrubs, allowing them to flourish once again.

- Developed a forest management plan through a Project Canopy Grant to manage the forests of the Wells Reserve, including one objective to revitalize the Yankee Woodlot Demonstration Forest project. Also received 12 mature trees from that grant program to use in a visual enhancement project on the entrance to the Wells Reserve.
- Partnered with the Maine Chapter of the American Chestnut Foundation to use the Wells Reserve as an education site for establishing a blight-resistant population of American Chestnuts in southern Maine.
- Collected voucher specimens of Odonates (dragonflies and damselflies) and Lepidoptera (butterflies) for Maine Department of Inland Fisheries and Wildlife statewide surveys and incorporate this program into the Junior Researchers educational program.
- Continued to be an integral partner in the 10-member Mount Agamenticus to the Sea Conservation Initiative, a landscape-scale project protecting high quality lands in southern-most Maine. Since 2007 helped conserve an additional 23 properties totaling 1,349 acres, bringing a total of 12,898 acres of open space in the 48,000-acre focus area.
- With Great Works Regional Land Trust, implemented highest priority tasks outlined in a the Great Works River Nonpoint Source Pollution Watershed Management Plan (2007); project involved outreach on vegetative buffers, invasive species education, developing a plan for installing best management practices, updating water quality data, and improving access to information.
- Assisted Woods Hole Research Center in the publication and distribution of "Losing Open Space in Southern Maine," a four-color educational poster and brochure documenting and illustrating landscape and other environmental changes in Maine since 1950, with projections of future changes by 2030 under current land use patterns and policies.



The Gulf of Maine Council on the Marine Environment honored the Wells Reserve with its 2009 Visionary Award (winter 2010).

Public Information

- Established graphic standards in conjunction with Laudholm Trust to more closely align the two organizations in the public eye. Reintroduced the partnership with "Wells Reserve at Laudholm" as the primary public-facing identity.
- Published a new brochure describing the programs, purpose, and history of the Reserve and its relationship with Laudholm Trust.

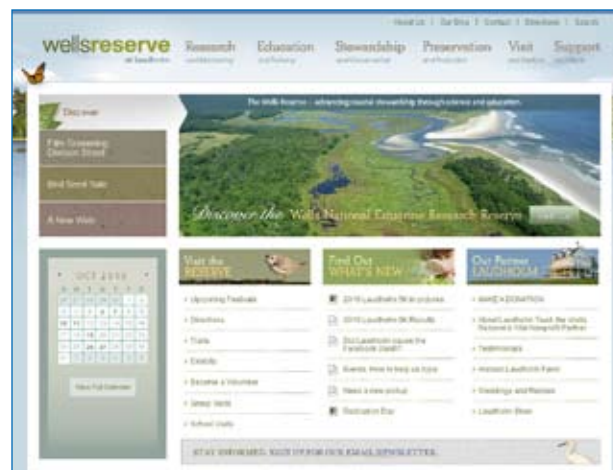
- Redesigned the trail map, newsletter, and existing brochures. Created new brochures focused on key programs.
- Moved to FSC-certified paper whenever practical for print products, with key vehicles using 100 percent post-consumer recycled content free of process chlorine.
- Published *Coastal Fish of Southern Maine & New Hampshire* (ISBN 978-0-9769770-1-8), a 72-page softbound book describing life history, range, and status of 43 species found in our region's estuaries and including sections on fish conservation, effects of water quality on fish, and fish research methods.
- Redesigned website at wellsreserve.org, merging it with laudholm.org to create a unified online presence for our partner organizations. Inserted analytics tool for tracking use patterns.

Volunteer Programs

- Increased and retained an active volunteer force of more than 450 people who contributed in excess of 16,000 hours of their time annually (including regular weekly volunteers and those who participate in special one-time events).
- Increased the number of young volunteers who come to the Reserve to fulfill community service requirements as part of their academic programs or as a court ordered alternative for first time offenders.
- Increased the number of special needs adult volunteers through cooperation with area social service organizations.
- Annually hosted up to 6 international visitors in a 3-week work camp through the Vermont-based Volunteers for Peace.
- Applied for and hosted an annual fall AmeriCorps NCCC team (National Civilian Community Corps) who live and work on major stewardship projects at the Reserve for 4 to 8 weeks. Coordinated work schedules for the team to help with additional projects for partner conservation organizations in southern Maine during their time with the Reserve.
- Collaborated with staff docent coordinator who has expanded the Volunteer Naturalist (docent) training for Exploring Estuaries and added training for Wild Friends in Wild Places, and Microscopic Drifters.

Formal Partnerships

- Established an MOU with the Center for Wildlife, thus formally creating a partnership that led to collaborations on programs which resulted in greater attendance and new audiences.



A completely redesigned website was launched in March 2010 at wellsreserve.org.

- Established an MOU with the York County Audubon Society to formalize our partnership, clarify roles, and increase program collaboration.
- Established an MOU with the Environmental Studies Department at the University of New England to formalize our partnership and create and deliver programs that further our complementary missions.
- Established a formal Lease Agreement with the University of Maine Cooperative Extension to enable a regional Extension Supervisor to have an office at the Studio on the Alheim Commons campus.
- Renewed an Agreement with the University of Maine Sea Grant College Program to provide office space for a Sea Grant Extension Associate at the Wells NERR and to collaborate on projects, and to continue to share a position (4/5 time with Reserve, 1/5 time with Sea Grant).
- Continued to build on the partnership among the State NOAA Programs in Maine — Sea Grant, Coastal Program, and Wells NERR. Developed a fact sheet on how our programs collaborate and add value to each other's programs and projects.
- Established with 30 other science, conservation, and resource management institutions an MOU that formalized the Atlantic Coastal Fish Habitat Partnership, an effort to accelerate the conservation, restoration, and enhancement of habitat for native coastal and estuarine-dependent fish species.

Annual Accomplishments and Activities

Each year for the past six years — from 2007 through 2012 — Wells Reserve staff members accomplished the following:

- Conducted and reported on 6 to 12 research projects that focused on coastal fish populations and food webs, coastal habitat values for fish, shellfish, and birds; interactions between native and invasive marine species, coastal habitat response to sea level rise, salt marsh degradation and restoration; the ecological integrity of coastal watersheds; and coastal management issues.
- Partnered with 50 scientific, educational, and natural resource organizations on projects and programs that advance the understanding and protection of coasts and estuaries.
- Provided peer/panel reviews for proposals, manuscripts, agency documents, as well as letters of support for proposals, and letters of recommendation for graduate program and job applicants.
- Reached 9,500 children and adults with school, summer camp, public presentation, professional training, and continuing education programs.
- Trained and provided technical assistance to 4,000 people who make key decisions about the management and protection of the Maine coast— from elected officials and municipal committee members to natural resource managers and regulators.



The Wells Reserve was recognized by Maine Audubon and the Maine Department of Inland Fisheries and Wildlife for its efforts to protect piping plovers on Laudholm Beach (fall 2011).

- Maintained functional research and teach laboratories, lab and field equipment, and stocks of necessary supplies.
- Managed and protected sensitive habitats and threatened wildlife species on its protected land.
- Remained open every day to provide a treasured retreat for over 40,000 visitors who come to walk our trails and enjoy wildlife and outstanding coastal views, and to take part in events.
- Engaged over 400 volunteers who provide 15,000 hours in areas of research, education, natural resource stewardship, facilities, administration, and fundraising.
- Produced and distributed 50 Geographic Information System (GIS) maps to organizations and agencies to help them make informed decisions.
- Provided policy, planning, acquisition, and technical assistance to 20 land trusts and conservation groups in southern Maine in their efforts to conserve land.
- Monitored changes in weather, water quality, wildlife, marine invasive species, plants, and beaches as part of statewide and nationwide efforts, on short and long-term time scales.
- Served on many regional and national scientific, conservation, and education committees engaged in science-based assessments and studies, educational initiatives, and policy-making and planning to protect and restore our coastal resources.
- Mentored and/or formally advised 5 to 10 masters and doctoral candidates at academic institutions in New England.
- Provided hands-on, field-based learning experiences for 10 to 15 undergraduate and graduate students (our future scientists, educators, and resource managers) through our internship programs.
- Maintained seven miles of trails for public enjoyment and education and carried out over 250 individual maintenance projects to keep the historic buildings and grounds in excellent condition.

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Administrative Plan

Introduction

The Wells National Estuarine Research Reserve administrative plan outlines the organizational relationships and human resources needed to fulfill the Reserve's mission. The Wells Reserve management framework enables coordination and cooperation among entities involved with Reserve programs and activities, ensures consultative decision-making, provides for compliance with applicable regulations, and integrates the Reserve's major program areas .

Program areas administered by the Wells Reserve include research and monitoring, education and training, resource management and stewardship, facilities and administration, and visitor and volunteer services.

Objective and Strategies

Objective

Provide the administrative structure needed to fulfill the Reserve's mission and conform to federal and state law and agency agreements.

Strategies

- Maintain an administrative structure that provides an effective and efficient process to formulate and implement policies and programs.
- Provide adequate staffing and funding to accomplish the full range of responsibilities of a NERR.
- Provide an administrative structure that encourages the integration of education, research and stewardship programs.
- Design and support workplace policies and programs that result in committed people fulfilling their professional potential as they accomplish their work with pride and enjoyment.
- Build relationships and strengthen collaborations with existing partners, and establish partnerships with additional organizations to further the goals of the Reserve.
- Strengthen and maintain communication and collaboration between the boards of the RMA and Laudholm Trust.
- Review and evaluate all programs and the strategic plan annually, making adjustments as needed.
- Maintain and strengthen the partnership with volunteers and advisory committees to fulfill the Reserve's mission and conduct its programs.

- Ensure long-term financial stability for carrying out Reserve research, education, and stewardship programs.
- Support efficient, long-term management of estuarine and coastal ecosystems through cooperative relationships with the Maine Department of Conservation, the U.S. Fish and Wildlife Service, the Town of Wells, the Maine State Planning Office, Laudholm Trust, and other partners.
- Implement administrative and financial procedures and programs to ensure efficient management of Reserve personnel and funds.

Administrative Structure: Reserve Management Authority

The Wells Reserve is a partnership between the National Oceanic and Atmospheric Administration and the State of Maine. Administrative oversight is vested in the Reserve Management Authority (RMA), an independent state agency established in 1991 by the Maine Legislature to support and promote the interests of the Wells Reserve (see Appendix A). As specified in the establishing legislative act:

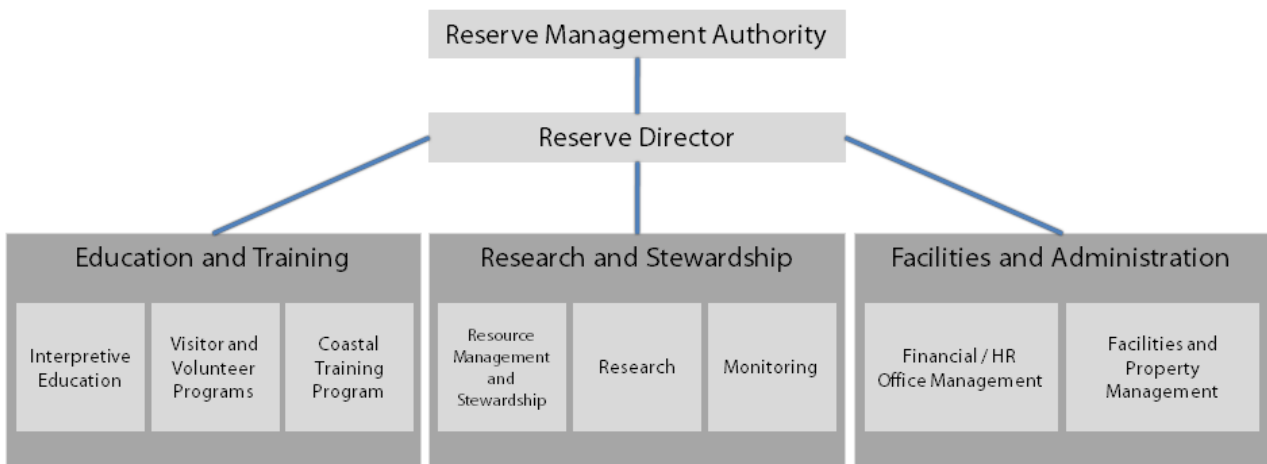
The authority shall manage and sustain the coastal lands and other resources within the reserve, further coordination and cooperation among state agencies, the Town of Wells, the United States Fish and Wildlife Service, and the Laudholm Trust, develop and implement programs for estuarine research and education, and provide public access and opportunities for public enjoyment compatible with the protection of the reserve's natural resources.

Representation on the Reserve Management Authority

The RMA is composed of representatives having a property, management, program, or financial interest in the Wells Reserve. RMA members represent the Maine Department of Conservation, the U.S. Fish and Wildlife Service, the Town of Wells, Laudholm Trust, the Maine Coastal Program, and the National Oceanic and Atmospheric Administration. A Governor-appointed scientist with an established reputation in the field of marine or estuarine research also serves on the RMA.

Maine Department of Agriculture, Conservation, and Forestry

The Maine Department of Agriculture, Conservation, and Forestry (formerly the Department of



Conservation) holds title to 469 acres within the Wells Reserve. Of these, 147 acres are beach, salt marsh, and upland just south of the Little River and about 322 acres are submerged tidal lands (lands below the mean low-water mark, including beaches and other shoreline areas and tidal rivers upstream to the farthest natural reaches of the tides). The Commissioner, or the Commissioner’s designee, serves on the RMA.

U.S. Department of the Interior, Fish and Wildlife Service

The U.S. Fish and Wildlife Service owns and manages the Rachel Carson National Wildlife Refuge, 1,425 acres of which are within the Wells Reserve. The Region 5 Director of U.S. Fish and Wildlife Service, or the Regional Director’s designee, serves on the RMA.

Town of Wells

The Town of Wells owns 258 acres of uplands and wetlands in the Wells Reserve. The Wells Board of Selectmen designates a representative, traditionally a Selectman, to serve on the RMA.

Laudholm Trust

Laudholm Trust, a 501(c)(3) nonprofit organization, provides most of the local match for Wells Reserve operations and capital needs. The Trust uses member contributions, corporate donations, and foundation grants to support the Reserve. The Laudholm Trust Board of Directors designates a representative, traditionally the Trust President, to chair the RMA.

Maine Coastal Program

The Director of the Maine Coastal Program serves on the RMA as an ex officio, non-voting member.

U.S. Department of Commerce, NOAA

The NOAA National Ocean Service, Office of Ocean and Coastal Resource Management (OCRM), Estuarine Reserves Division, administers the National Estuarine Research Reserve System. The Director of the OCRM, or the Director’s designee, serves on the RMA as an ex officio, non-voting member.

Interagency Memoranda of Understanding

The Wells Reserve Management Authority (RMA) has entered several MOUs with various partners to guide site administration. A complete copy of each MOU is in Appendix A. They include:

- The RMA and the National Oceanic and Atmospheric Administration signed an MOU in 2006 describing the purposes of the Wells Reserve and the state and federal agency roles in its management.
- The RMA and the U.S. Fish and Wildlife Service signed an MOU in 2006 describing rights, responsibilities, and obligations of each entity within the Wells Reserve.
- The RMA and the Department of Agriculture, Conservation, and Forestry (called the Maine Department of Conservation when the MOU was signed in 2006) have an MOU describing rights and responsibilities regarding submerged lands within the Wells Reserve.
- The RMA and the Department of Agriculture, Conservation, and Forestry (called the Maine Department of Conservation when the MOU was signed in 2006) have an MOU describing rights and responsibilities regarding 200 acres of uplands within the Wells Reserve.
- The RMA and the Town of Wells signed an MOU in 2006 that establishes a framework for coordination

and collaboration between the Wells Reserve and the Town.

- The Wells Reserve and Laudholm Trust signed an MOU in 2012 that explains and outlines the roles and responsibilities of each organization and the details of their collaboration and partnership.

Other Partner Roles and Responsibilities

In addition to the organizations that are represented on the RMA, Wells Reserve collaborates with a wide range of local, state, and federal partners on the development and implementation of research, education, and stewardship programs. Here is an overview of some key partners and a brief description of their collaborations with the Wells Reserve.

- The Maine Department of Inland Fisheries and Wildlife preserves, protects, and enhances inland fish and wildlife resources. A representative from this agency serves on the Stewardship Advisory Committee.
- The Maine Department of Marine Resources conserves and develops marine and estuarine resources. A representative from this agency serves on the Stewardship Advisory Committee.
- The Maine Department of Environmental Protection protects and restores natural resources and enforces the state's environmental laws. A representative from this agency serves on the Stewardship Advisory Committee.
- The Natural Resources Conservation Service (U.S. Department of Agriculture) helps people conserve, maintain, and improve the nation's natural resources and environment. A representative from this agency serves on the Stewardship Advisory Committee.
- The University of Maine System: The State university system includes two public universities that have active coastal and estuarine research and education programs – the University of Southern Maine (USM) and the University of Maine (UMaine). Currently, a scientist from the UMaine serves on the Reserve Management Authority governing board, and representatives from USM serve on the Education Advisory Committee. Faculty at USM and UMaine also collaborate with Wells Reserve researchers on projects.
- The University of New England (UNE) is an independent, coeducational university with numerous degree programs, including those with an emphasis on Environmental Studies and Marine Science. A representative from UNE serves on the Research Advisory Committee. Faculty at UNE collaborate with Wells Reserve researchers and educators.

- The Gulf of Maine Council on the Marine Environment is a U.S.-Canadian partnership of government and non-government organizations working to maintain and enhance environmental quality in the Gulf of Maine. The council facilitates habitat restoration, research, and education projects at the Wells Reserve.
- The Casco Bay Estuary Partnership (CBEP) is an EPA-designated National Estuary Program that works to protect the health and integrity of Casco Bay. The CBEP collaborates with the Wells Reserve on research, education, and outreach projects.
- The Piscataqua Region Estuary Partnership (PREP) is a designated National Estuary Partnership that seeks to protect the health of the estuaries of New Hampshire and southern-most Maine. The Reserve collaborates with PREP on projects of shared interest. The Reserve Director serves on PREP's Management Committee.
- The Southern Maine Regional Planning Commission is a council of governments that coordinates efforts for economic development and resource management. A representative from this agency serves on the Coastal Training Program Advisory Committee.



The Wells Reserve collaborates with the neighboring Piscataqua Region Estuaries Partnership.

- The York County Chapter of Maine Audubon fosters understanding, appreciation, and conservation of the natural world. The society collaborates broadly with the Wells Reserve, including research, monitoring, and education projects.
- Numerous land trusts and conservation commissions collaborate with the Wells Reserve on land conservation, education, and stewardship projects in watersheds of coastal zone communities.
- University of Maine Cooperative Extension: Laudholm Trust and the Reserve have a cooperative agreement with University of Maine Cooperative Extension (York County) Master Gardner Program. The organizations collaborate on public education and outreach programs of mutual interest.

NOAA's Roles and Responsibilities

The NOAA Estuarine Reserves Division (ERD) establishes standards for designating and operating reserves, provides support for reserve operations and capital (land and buildings) projects. ERD undertakes projects that benefit the reserve system, and integrates information from individual reserves to support decision-making at the national level. As required by Federal regulation, 15 C.F.R. sec. 921.40, the ERD periodically evaluates NERR operations for compliance with federal requirements and with the individual Reserve's federally-approved management plan.

The NERRS is a federal/state partnership. Management of the Reserve is the state partner responsibility, but NOAA cooperates and assists the states and reviews the progress of programs through written semi-annual and reports submitted by the Reserve. Pursuant to Section 312 of the Coastal Zone Management Act, NOAA conducts thorough, site-based performance evaluations every three to four years, ensuring the Reserve is complying with NERR System goals and its approved management plan. If deficiencies are found in the operation of a reserve, NOAA will work with the Reserve to correct them. If the correction does not occur in a reasonable time period, NOAA may withdraw the Reserve designation.

ERD staff, in particular the program specialist, communicates regularly with the Reserve staff. This communication strengthens the partnership between the Reserve and ERD; it familiarizes ERD with Reserve program accomplishments and challenges, and solidifies the concept that the individual Reserve is part of a national system.

Laudholm Trust Partnership

Laudholm Trust is one of the founding organizations of the Wells Reserve and continues to be the primary partner in raising the funds needed to meet the non-federal match for NOAA operations and capital grants. Laudholm Trust/Wells Reserve is a private/public partnership, which is unique in the National Estuarine Research Reserve System. In addition to grants for operations, the Trust provided key financial support for the construction of the Maine Coastal Ecology Center and the Alheim Commons dormitory, the acquisition of conservation lands within the Reserve's boundaries, and improvements to the Reserve's historic buildings. Members of the Trust's Board of Directors also serve on the Reserve's many advisory committees, providing expertise and input on a range of issues.



To ensure communication and collaboration, two to three Executive Committee members of the Trust routinely attend the quarterly RMA meetings.

The Trust's ability to raise funds and build membership in support of the Reserve's core programs, in addition to helping address priority capital and land acquisition needs, will be essential to the Reserve's ability to accomplish the goals outlined in this Management Plan. A continued close collaboration between the two organizations is essential.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act requires federal agencies to take into consideration the effects an agency's projects may have on historic properties. The State Historic Preservation Office is given an opportunity to review all building construction and land acquisition projects to ensure historic resources are protected. Maine Historic Preservation Commission (MHPC) serves this role in the State of Maine. As a partner with NOAA, the Wells Reserve complies with the provisions of Section 106 on all of its projects, communicating with representatives of MHPC.

Maine Coastal Program and Maine Sea Grant College Program

The Wells Reserve has close ties to two other NOAA programs in Maine — the Maine Coastal Program and the Maine Sea Grant College Program at the University of Maine.

The Maine Coastal Program was instrumental in establishing and designating the Wells Reserve and a close partnership continues. Collaborations include research addressing coastal management, outreach to decision-makers with training and information, statewide interpretive education projects addressing coastal issues, and land acquisition and protection planning through the Coastal and Estuarine Land Conservation Program (CELCP). The Coastal Program Director serves on the Reserve Management Authority and the CTP Advisory Committee.

The Maine Sea Grant Program plays a statewide leadership role in marine research, education, and extension activities that focus on coastal and marine issues. The program promotes the use of marine science research and education in the development, management, and stewardship of marine and coastal resources. Wells



Boardwalk on the Laird-Norton Trail, popular with hikers.

Reserve and Maine Sea Grant collaborate often on projects of mutual interest and the Reserve Director serves on the Maine Sea Grant Policy Advisory Committee. To further strengthen the partnership and to enable Maine Sea Grant to work more effectively in southern Maine, the Reserve provides an office for a Sea Grant Extension Associate at the Wells Reserve. The Associate collaborates with Wells Reserve staff on research and outreach projects and serves on the CTP and Education Advisory Committees.

Reserve Staff Responsibilities

At the Wells Reserve, full-time and part-time staff are responsible for most mission-related planning and implementation. The following summaries represent actual staff responsibilities at the time this management plan was prepared.

The Reserve Director serves as the chief executive of the organization and is responsible for the overall management of the Wells Reserve, including its personnel, buildings and grounds, budgets and finances, contractors, and protected areas. The Reserve Director reports to the RMA.

The Research Director coordinates and directs the Wells Reserve research and monitoring programs and oversees some aspects of the stewardship program. This position is responsible for the administration, management, and development of all facets of research and monitoring, including supervising staff, interns, and contractors.

The Education Director designs and supervises the Wells Reserve education, outreach, and interpretive programs. She plans and evaluates these programs and supervises staff and volunteer educators.

The GIS/Natural Resource Specialist works closely with the Reserve Director on stewardship projects and issues on lands within the Reserve boundary. The position is also responsible for the Geographic Information Systems.

The CTP Coordinator directs all aspects of the Coastal Training Program, and also conducts social science research.

The Stewardship Coordinator is an integrated position at the Wells Reserve, and is involved with aspects of research, SWMP, water quality, watershed conservation, and CTP.

The Finance and Office Manager is responsible for financial management, payroll, benefits and human resource administration, and office management.

The Facilities Manager is responsible for coordinating all aspects of maintenance for Wells Reserve buildings and grounds, including light construction work.

The Visitor Services and Volunteer Coordinator is responsible for the operation of our Visitor Center, exhibit areas, and other public spaces at the Wells Reserve, and is also responsible for the volunteer program.

The Research Associates are responsible for implementing the System Wide Monitoring Program and helping to implement the research program.

The Education and CTP Associates are responsible for the implementation of the Wells Reserve interpretive education programs and CTP.

In-Kind Staff Roles and Responsibilities

One Laudholm Trust employee works part-time accomplishing communications and public relations tasks. The Communications Director consults with the Reserve Director and Education Director and reports to the Trust President.

Volunteer Roles and Responsibilities

Wells Reserve has over 400 volunteers who assist in the following areas.

- Volunteer Naturalists (docents) guide school groups and lead public tours.
- Visitor Center Volunteers greet visitors, respond to their needs, answer the phone, and handle sales in the gift shop.
- Rangers walk the trails on weekends from mid-May through mid-November. They answer questions for visitors, communicate problems via radio, monitor trail conditions, encourage compliance with rules, and monitor wildlife.
- Office Assistants do word processing and database management, special projects, and mailings.
- Maintenance Volunteers help with property upkeep, including painting, repairs, light construction, mowing, snow removal, and odd jobs.
- Parking Booth Volunteers greet visitors as they arrive. They collect and record admission fees and provide information about the Reserve and the events of the day.

- Library Assistants help catalog materials and staff the Coastal Resource Library.
- Research Volunteers participate in ongoing and special projects including water quality monitoring, beach profiling, shoreline surveys, marsh restoration, and beach clean-ups.
- Special events volunteers help with the planning and implementation of Winter Family Fun Day, Earth Day, Punkinfiddle: a National Estuaries Day Celebration, and several Laudholm Trust fundraising events.

Wells Reserve Advisory Committees

Six standing committees advise the Wells National Estuarine Research Reserve on a range of facility and program issues. Committee members represent government agencies, research institutions, academia, community organizations, schools, and Laudholm Trust.

The Education Advisory Committee provides guidance to the Education Coordinator on efforts to educate residents and visitors about coastal ecosystems. The committee's advice addresses on-site programs, exhibits, guided tours, interpretive trails and signs, and community outreach. The committee also recommends educational uses of Reserve facilities (library, teaching lab, historic structures).

The Research Advisory Committee provides guidance to the Research Coordinator on research and monitoring activities in southern Maine coastal watersheds and in salt marshes throughout the Gulf of Maine. The committee also explores links and partnerships between Wells Reserve and the other institutions in New England that conduct marine research.

The Stewardship Advisory Committee provides guidance to the Reserve Director and the Natural Resource Specialist and the Stewardship Coordinator on protecting the natural and cultural resources of Wells Reserve while providing for research, education, recreation, and interpretation. The committee's advice addresses habitat management, control of exotic species, and protection of sensitive, threatened, and endangered species. Committee members also assist with public outreach activities pertaining to natural resource management and protection.

The Building Advisory Committee provides guidance to the Reserve Director and the RMA on buildings and lands of the main campus, housing area, and Life Estate.

The committee's advice addresses the historical integrity, maintenance, and appearance of structures and grounds, site improvements, and construction projects.

The CTP Advisory Committee provides guidance to the Coastal Training Program Coordinator and the Education Coordinator on programs to support coastal decision-makers.

The Library Advisory Committee helps the Education Coordinator and the Coordinator of Volunteer Programs to develop and maintain the Coastal Resource Library. The committee assists with organizing and improving collections, exploiting technology, and staffing the library.

In addition to these standing advisory committees, ad-hoc committees and task forces are formed when the need arises. Recent examples include exhibit development, technology upgrades, and building design and construction.

Wells Reserve Program Integration Strategy

The Wells Reserve integrates its programs through frequent inter-program meetings, shared staff responsibilities, and linkages developed for specific projects. The Reserve Director organizes quarterly Laudholm Trust and Reserve staff gatherings, and a monthly "briefings," where ideas, information, and project updates are exchanged.

The Coastal Training Program (CTP) Coordinator holds regular meetings that exemplify integration of the Wells Reserve core programs. The Stewardship Coordinator, GIS/Natural Resource Specialist, CTP Associate and Research staff join the CTP Coordinator on a team that identifies, implements, and coordinates programs and products for the public and coastal

decision-makers. The CTP team also conveys information from completed research projects to appropriate audiences.

Integration is achieved at the staff level when individuals share duties. For example, the Stewardship Program (administratively located in the Research Department) encompasses on-site natural resource management, GIS, and stewardship activities in the communities in the region. The program plans and implements resource management within the boundaries of the Reserve, but also works on initiatives in communities that involve land acquisition planning and habitat restoration. The program is also integral to the implementation of research projects and in helping with SWMP implementation. Rather than consolidating these diverse responsibilities under a single staff person, they are shared among several individuals whose strengths complement the tasks.

Many Wells Reserve projects require the expertise of staff from different programs. The CTP Coordinator, for example, collaborates with the Research Director on projects that require scientific studies and assessments. The CTP staff routinely partner with the Stewardship Coordinator and the GIS Specialist on workshops and training activities.

Resource Protection

Three Wells Reserve employees play important roles in protecting the Reserve's natural resources through on-going monitoring. These include the Natural Resource Specialist, the Volunteer and Visitor Services Coordinator, and the Facilities Manager, who work closely with agency partners to achieve this. See the Resource Management and Stewardship chapter for more information on this function.



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Facilities and Construction

Introduction

The Wells National Estuarine Research Reserve's facilities have to accommodate a broad range of programs and activities. Current facilities include the following: offices for staff, visiting educators and researchers and partner organizations; laboratories for scientists, teachers, and students; a maintenance and repair shop; storage areas; interpretive exhibit areas; classrooms; a gift shop; a welcome area; a public library; meeting rooms; spaces for public events; an outdoor shelter for education programs; and living spaces for visiting scientists, educators, and natural resource managers.

The Wells Reserve facilities used for these purposes are in two locations: Laudholm Farm, an assemblage of more than a dozen renovated historic buildings and one new building constructed in 2001; and the Alheim Commons property, an adjacent parcel holding three buildings one-half mile from Laudholm Farm campus. The Laudholm campus includes two separate Life



Estates – buildings which the Reserve owns but -- as part of an agreement at the time of acquisition -- the sellers retain life tenancy for themselves. The Reserve will assume full use of these buildings upon the death of the Life Estate tenants.

All totaled, the Wells Reserve has about 33,000 gross square feet of useable building space for the activities noted above. It has about ½ mile of paved roads that provide access to the site; parking for 75 cars at the Laudholm Farm campus and parking for 15 cars for residents at the Alheim Commons campus; and about 5,000 feet of boardwalks along its trails.

The Wells Reserve has excellent facilities that help us accomplish our mission. Over the next five years, the Reserve needs to make its buildings more energy efficient through “green retrofits,” and generate electrical power through renewable sources such as solar and wind. This is of the highest priority for the Reserve.

The second priority will be keeping up with the maintenance and repair needs of its facilities and equipment. A distant third is providing additional facilities that will help further the Reserve's mission, such as including multi-purpose classrooms, a larger meeting room, a seawater lab, and dedicated storage areas for vehicles and maintenance equipment. The third priority is dependent on obtaining additional capital funds and building endowments for building operation and care

This chapter is divided into two sections: Section 1 describes existing facilities and their uses and needs; Section 2 describes needs for energy conservation and renewable energy.

Objectives and Strategies

Objective 1

Provide safe and comfortable buildings for staff and partners to accomplish program objectives, and provide visitors with facilities in which to learn about coastal ecosystems and the landscape history of the site.

Strategies

- Recruit and retain qualified Building Advisory Committee members to provide guidance on building maintenance, construction and energy conservation and generation.
- Maintain and improve existing facilities for research, education, training, and stewardship activities,

and continually evaluate facilities to ensure that program needs are met.

- Continue to evaluate interior and exterior structural needs of all buildings.
- Make facilities available to partner organizations for uses compatible with the Reserve's mission.

Objective 2

Reduce carbon emissions and resource consumption through conservation measures and the use of renewable energy.

Strategies

- Conduct and complete a study/assessment of the energy efficiency of our buildings and equipment and of the best options for renewable energy sources.
- Reduce electrical energy consumption in buildings and equipment through more sustainable operational practices and more efficient use of buildings.
- As appliances, vehicles, and other equipment wear out, purchase replacements with greater energy efficiency.
- Install renewable energy and more energy efficient equipment for heating, cooling, and electrical power as outlined in the study.
- Incorporate sustainable standards into building and equipment maintenance and operations.

Section 1: Existing Facilities — Description and Needs

Laudholm Farm: Main Campus Facilities and Forest Learning Shelter

Since designation, the Laudholm Farm campus facilities have been renovated (or in one case, newly constructed), and have received periodic maintenance and repairs.

Laudholm Farm is listed on the National Register of Historic Places. It played a long and important role in the cultural history of the Town of Wells. Laudholm is not a typical Maine farm. Rather, the buildings reflect the "progressive farm era" of New England, when wealthy individuals or families purchased farms, made substantial infrastructure improvements, and implemented the latest farming technology. Laudholm Farm was farmed until 1977. To help document this rich history, the Wells Reserve published the book *Laudholm: The History of a Celebrated Maine Saltwater Farm* in 2005.

After the Reserve was designated in 1984, the buildings were restored and renovated to adapt them to their new use as a coastal and estuarine research, education, and stewardship institution. Since then, new Maine Coastal Ecology Center was built and opened in 2001 and the Alheim Commons Dormitory was built and opened in 2006. Below is brief information on each building, their condition, and the current and potential future uses.

Main Farmhouse (includes ell and woodshed)

This large, three-story Greek-revival farmhouse is the focal point for the Laudholm campus. It was built in sections between 1720 and the 1890s. With its wrap-around porch and dormered windows, it is an impressive and appealing structure for visitors. This building was renovated in the late 1980s after the Wells Reserve was designated. The exterior restoration was designed to recreate the appearance of the farmhouse during the residence of the George C. Lord family (late 19th to mid 20th century).

The first floor of the main farmhouse houses the office for the Volunteer and Visitor Services Coordinator, a meeting/gathering room for volunteer docents and rangers, a public reception area and gift shop, a storage area, and new interpretive exhibits designed, fabricated, and installed in 2011. The second floor holds offices for the Reserve Director, Finance/Office Manager, and Laudholm Trust staff; a meeting room; a kitchen and dining area; and a utility room. The third floor holds four offices for education and Coastal Training Program staff and a Maine Sea Grant extension associate.

While some repairs and ongoing maintenance are needed, the Visitor Center is well maintained and in good condition. The current uses will continue.

Barn Complex (includes auditorium and library)

This impressive structure was built around 1904. The hay and horse barn (48 feet by 100 feet) and the attached dairy barn (35 feet by 70 feet) are wood-framed, clapboard-sided structures that complement the farmhouse. The interior of the hay barn has horse stalls and tack rooms. The converted dairy barn retains some of its original cow stalls. The barns were fully restored in the late 1980s and early 1990s, with additional work done in succeeding years to accommodate emerging needs. In 2003, the roof was repaired and reshingled, and in 2008 the entire exterior was painted.

The maintenance shop and equipment are located on the ground floor of the Hay and Horse Barn. The first floor of the Hay and Horse Barn is used for events and programs mid-spring through late fall. Some areas are used for storage, and one room houses a seasonal classroom. The restored Dairy Barn houses the Mather Auditorium, which accommodates 75 people for lectures, workshops, and other events. Adjacent to this is a small kitchen facility and the Dorothy Fish Coastal Resource Library. The library opened in spring 2002 with a unique collection of books, periodicals, reprints, and reports. It includes a librarian's office and a computer workstation with internet access for public use.

While some repairs and ongoing maintenance are needed, the barn complex is well maintained and in good condition. Current uses will continue into the future.

Maine Coastal Ecology Center (MCEC)

The 6,000-square-foot MCEC, completed in 2001, is a facility that complements the style of adjacent historic structures. The MCEC holds offices for research and stewardship staff, and interns; a research laboratory; a geographic information system center; an interpretive exhibit area; a break room; and a laboratory specifically designed for teaching. The teaching lab is housed in Laudholm Farm's former milk house (creamery), which was renovated and attached to MCEC during construction. In 2007 a 200-square-foot environmental research chamber adjoining the research laboratory was installed. This climate-controlled room allows for experiments on ecological processes of coastal systems to occur year-round. The MCEC is in excellent condition and needs only ongoing maintenance and repair.

Ice House

This small one-story structure beside the main farmhouse is used for storage. It is in good condition and will need periodic maintenance and repair.

Water Tower

Built around 1904, the water tower was fully restored — with a replica of the original water tank constructed — in the early 1990s. The water tower has no practical value but is of great interest to visitors. It is showing signs of wear from the weather, however. Sections of the horizontal framing need to be replaced due to wood rot, and the entire structure needs to be repainted. The wooden shingles

need to be treated with a coating to protect them against rot caused by snow and rain.

Gazebo/Well House

This small octagonal structure was built in the 1880s. In addition to its decorative and historic value, visitors enjoy the views from its shelter. In 2011 the structure was totally restored and is now in excellent condition.

Forest Learning Shelter

This is a 20-foot by 30-foot building located along the Saw Whet Owl Trail, about ¼ of a mile from the visitor parking area. It is accessible only by walking, and with permission by automobile for people with disabilities. Built in collaboration with the Maine TREE Foundation, the Forest Learning Shelter is used by the Education Program as a classroom, particularly those teaching the public about forest ecology. The Shelter is a three-season facility, ideally suited for use May through October. It is in good condition, and will only need ongoing maintenance and repair.

Laudholm Farm: Reserved Life Estates

Two parcels each containing several buildings within the Reserve are part of two separate Reserved Life Estates. According to an agreement between Wells Reserve and members of the Lord family, the three surviving Lord family members listed in the Life Estate agreements can continue to live in and use the buildings for the remainder of their lives. One year after the death of the last identified heir, control over the facilities transfers to the Wells Reserve.

In 2007 and 2008, structures subject to the Life Estate agreements received significant maintenance and repair. Roofing systems, foundations, sills, clapboards, and other sections of the buildings were either repaired or replaced.

Here is a description of each Life Estate building and their potential adaptation to meet the Reserve's mission once the life tenancies end.

Diane Lord House (circa 1850)

This house on 2½ acres of land was purchased by the Reserve in 2008. It includes a farmhouse with attached barn and one small outbuilding. When the life tenancy ends, the building will be named the Mattina Proctor Environmental Education Center. It will house offices of education staff, and the barn will be renovated and converted into a large classroom. The Diane Lord



The historic Laudholm campus of the Wells Reserve, looking west.

House is in good condition. However, there will be a need for significant capital improvements to adapt it for use as an educational facility when that time arrives.

Manure Shed (circa 1905)

This building was restored after the Wells Reserve was established. Currently, Life Estate tenants allow the Reserve to use this facility as storage. This is the most appropriate use for this building.

Sheep Barn (circa 1890-1900)

The Sheep Barn can fulfill several facility needs of the Reserve. Options include: A 30- to 40-seat classroom and public gathering place. The Sheep Barn could also be used as the future home of the Coastal Resource Library, which is currently in the renovated section of the dairy barn. This would allow Wells Reserve to expand its library, and enable the Reserve to convert the current library space into a staff and/or public meeting room.

Farmer's Cottage and Wood Shed (circa 1830-1850)

The Farmer's Cottage serves as the residence of one of the descendants of the Lord family, who has

partially renovated and winterized the facility. It has the potential to serve as summer accommodations for visiting scientists or as caretaker quarters once the Life Estate term ends.

The wood shed, a barn-like structure adjacent to the farmer's cottage, is in fair condition. It is used for storage by the Life Estate tenants.

Killing House (early 1900s)

This small structure is in good condition and is maintained regularly by a member of the Lord family, who uses it as a summer cottage. It could be used as a summer living space at the end of the Life Estate term, and has the potential to be winterized. This structure would be ideal as housing for a visiting investigator (and his or her spouse) while they work on research, education, or stewardship projects at the Wells Reserve. It could also be used for additional office space.

Chick Brooder Building / Little Residence (circa 1916)

This one-time chicken-rearing facility was renovated in the 1930s and is used as a summer residence by a

member of the Lord family. Like the Killing House, this structure would be ideal as housing for one visiting investigator (and his or her spouse) while he or she works on research, education, or stewardship projects at the Reserve. It could also be used for additional office space.

Bull Barn and Silo (early 1900s)



The largest building on the Life Estate is currently used for storage by the Lord family. The Bull Barn is the most versatile building on the Life Estate. It could meet the facility needs of the research and education programs. Future uses could include the following: 1) An interpretive exhibit hall; 2) a multi-purpose classroom with spaces for 30 to 40 people and an area for specimen study; 3) a new location of the Coastal Resource Library; and 4) a Seawater lab and a chamber for live organism study for research.

Auto Garages (1907/1920s)

Used for storage by the Lord family, the most likely future use of these two buildings is for storage. The Wells Reserve is in need of a place to store its vehicles and maintenance equipment — the garages are perfect for this use.

Brooder House

This shed-like structure is used for storage by the Lord family. The most likely future use is for storage.

Other Buildings

There is one outbuilding on the Life Estate — the Log Cottage — that is owned outright by the Lord family. It will be removed from the property by the Life Tenant's heirs when the Life Estate agreement expires.

Alheim Commons Residential Campus

For two decades the Alheim property served as the Laudholm Trust headquarters. In 2004 the Trust donated the buildings and the land to the Wells Reserve. Since then, the Reserve has used the facilities as a residential campus, with one building serving as office and meeting space.

Alheim Commons Dormitory (2006)



To accommodate the need for housing for partners, the Reserve removed a worn, declining farmhouse with attached barn that stood on this property for over 150 years. The old structure was taken down piece by piece, with plans by the contractor to rebuild it elsewhere. In its place the Reserve built the 4,000-square-foot Alheim Commons, a 20-bed dormitory that opened in 2006. It provides accommodations for scientists, educators, and resource managers collaborating with the Wells Reserve. The building is in good condition, and will only need routine maintenance and repair.

Alheim Commons Studio (circa 1900)

This outbuilding served for many years as a storage facility for Laudholm Trust. In 2007 it was renovated and converted to a one-room, year-round office and meeting space. It is currently used as an office by the University of Maine Cooperative Extension, one of the Reserve's partner organizations.

Ranch-style House (circa 1960s)

This building, which was donated, was moved to the Alheim property in 1998 and renovated to serve as housing for a Reserve post-doctoral research associate. In 2011, the furnace was replaced and a new propane heating system installed. The house is in fair condition; it will continue to need maintenance and repair.

Section 2: Energy Conservation and Renewable Energy

To the greatest extent possible, the Wells Reserve has always followed sustainable and ecological practices in its construction and renovation activities. By remodeling and adapting centuries-old buildings to new uses over the past 25 years, the Reserve has met two of environmentalism's three "Rs" — "reuse" and "recycle" (the third is "reduce"). Since its establishment, the Reserve has constructed two new buildings (a

research center and a 20-bed dormitory). In each case, the facilities were constructed with sustainable practices in mind — from using wood harvested and milled sustainably in Maine, to energy efficient heating systems, to environmentally friendly building materials. As part of standard practice, the Reserve continuously examines ways to recycle materials and reduce its carbon output.

The Wells Reserve is ready to enter a new era in energy consumption and generation – one that it needs to pursue, as it complements our mission and message, reduces carbon emissions, and reduces our operating costs over time. The Reserve plans to “import” less energy and produce more on site, and improve the energy efficiency of our historic buildings on the Laudholm and Alheim Commons campuses.

To start the Reserve will study and assess options for alternative energy generation to meet electrical and heating/cooling needs, and analyze our current building energy efficiency. The Study and Assessment will examine the site’s appropriateness for solar, geothermal and wind energy, and update an energy audit conducted in 2005. The Reserve will prioritize and

recommend suitable options for energy generation, recommend changes to building envelopes to retain energy and improve its post-production conservation, assign an estimated cost to each, determine the environmental benefit (reduction in carbon emissions, for example), and factor in cost-benefits and payback on the investments over time. This will form the basis of a multi-year plan that will guide the Wells Reserve in implementation.

In addition to the practical and environmental benefits, the “green retrofits” of our buildings and alternative energy sources will provide the Reserve with educational opportunities. Along with past and current sustainable building and operational practices, the “greening” of our facilities and operations will provide us with opportunities to educate the public.

As the Laudholm Farm campus is on the National Register of Historic Places, the Reserve follows the U.S. Department of Interior guidelines for historic buildings in its construction and repair practices, and works closely with the Maine Historic Preservation Commission.

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Public Access

Introduction

The Wells National Estuarine Research Reserve offers public access to its grounds and facilities for environmental education, scientific research, and outdoor recreation. It also provides a gathering place for its partners and for select private activities. The Reserve Management Authority has established “Rules for Public Use” (see Appendix D).

Objective and Strategies

Objective

Provide access for scientific research, environmental education, outdoor recreation, and public events while ensuring the protection of the Reserve’s natural resources and its historic buildings and grounds.

Strategies

- Provide a welcoming atmosphere for visitors and volunteers that inspires a desire to learn.
- Maintain a system of trails within the Reserve to safely accommodate low-impact recreation and provide access for scientific and educational programs.
- Expand access for people with disabilities by making more trails ADA-compliant; ensure that Reserve facilities accommodate people with disabilities.
- Provide safe, clean and attractive facilities for public use.
- Monitor public use of the site and continually assess visitor impact on wildlife and habitats.
- Conduct a study to determine the number of people who visit the Reserve annually.



An artist paints the Little River estuary from the Barrier Beach Trail.

- Make trail and facility improvements to ensure that all visitors have an enjoyable and safe stay.
- Update rules as needed to ensure they meet the needs of the site’s natural resources and visitors.
- Expand the visibility of the Reserve and its educational and recreational offerings through communication activities.
- Promote and encourage the appropriate use of the Wells Reserve and its facilities, including the library, auditorium, exhibit areas and the teaching lab.

Audiences, Hours of Operation, and Fees

Over 40,000 people visit the Wells Reserve each year. They come to walk trails, to watch wildlife, to enjoy scenery, to do research, to ski and snowshoe, and to participate in guided activities, programs, and events.

Local residents visit the Reserve regularly. Many other people visit from throughout the northeast and the country. The Reserve is a prime attraction in a region that is extremely popular with tourists from across the United States and internationally.

The Wells Reserve is open every day, totaling about 4,000 hours annually. The Visitor Center and exhibits are open about 1,700 hours per year. To date, the Wells Reserve is within its visitor carrying capacity. Through site inspections, the Stewardship Advisory Committee has determined that the Reserve could accommodate more visitors without negatively impacting natural resources or detracting from the site’s quietness. The following schedule was effective in 2012:

Trail Hours

Every day, 7 am to sunset

Visitor Center Hours

Jan 16 to Memorial Day weekend: Mon-Fri 10-4
Memorial Day weekend to Columbus Day:
Mon-Sat 10-4, Sun 12-4
Columbus Day to Dec 15: Mon-Fri 10-4
Dec 22 to Dec 31: Closed

Fees

Parking/admission fees are in effect Memorial Day weekend through Columbus Day weekend. Fees are \$1 for ages 6 to 16 and \$4 for those over 16. Members of Laudholm Trust enjoy free admission (except for special events) and program discounts. Parking/admission fee levels are reviewed annually.



The Visitor Center is housed within the historic Laudholm farmhouse.

Points of Access to the Reserve

Wells Reserve is readily accessible via major roadways. It is minutes from the Maine Turnpike (Interstate 95), U.S. Route 1, and State Route 9. Maine Department of Transportation location signs are posted on U.S. Route 1 at Laudholm Farm Road and State Route 9 at Skinner Mill Road. By car, the Reserve is about 90 minutes from Boston and 30 minutes from Portland, Maine. The Reserve is less than 10 minutes from the Wells Transportation Station (Amtrak).

The Wells Reserve has three vehicle access points: an access road and parking area off Skinner Mill Road, a service entrance at the end of Laudholm Farm Road, and a limited parking area along Laudholm Farm Road.

The main access road ends in a paved 75-car parking lot within view of the campus. This is the most appropriate and most commonly used public entry to the Reserve. The oval lot includes bus parking and three spaces marked for visitors with disabilities. An attractive and informative kiosk stands along the single path leading from the lot to the campus.

The service entrance extends to a loop road in the center of the campus and to the life estate. The

campus loop includes a 4-car parking area, which is used by disabled visitors and for special purposes.

The parking area along Laudholm Farm Road is on the Alheim property and links to the rest of the Reserve via the Yankee Woodlot Trail. The gravel parking area has room for about 20 cars, which includes parking for those staying in the Reserve's short-term and long-term accommodations.

Permitted Activities — Lands

The Wells Reserve strives to allow appropriate public access consistent with natural resource protection. Low intensity recreational uses are allowed to the extent they do not conflict with the operation of the Reserve for research and education. The Reserve offers ample opportunities for the public to enjoy the site's cultural heritage and diverse habitats while restricting access to sensitive areas.

Public recreation and Reserve programs are concentrated within a 500-acre area surrounding the main campus. The 7-mile foot-trail system, with its interpretive aids, can be accessed from the Laudholm Farm campus and from the Alheim property. Those who wish to leave trails must obtain permission from

the Reserve Director or Education Director. Visiting researchers and educators who are permitted to leave trails are required to minimize their impact in restricted areas.

The Wells Reserve does not have a boat-access facility. However, there is one State-sponsored boat launch facility within the Reserve boundary on the Webhannet River at Wells Harbor. It is owned and operated by the Town of Wells and is open to the public. Visitors to the main campus to the Reserve are welcome to bring car-top, hand-carried crafts (such as kayaks and canoes) and transport them by foot over the Barrier Beach Trail that leads to the public access point on Laudholm Beach. It is about a ½-mile walk from the parking area to the beach access point.

Permitted Activities — Facilities

The Wells Reserve’s historic facilities are desirable for a range of activities. The Reserve permits outside groups to schedule events and activities, providing they do not conflict with the programs of the Reserve and do not negatively impact natural or cultural resources. The Wells Reserve allows partner organizations — those who share the Reserve’s coastal stewardship mission — to use the facilities.

Wildlife Sanctuary Designation

Portions of Wells National Estuarine Research Reserve are designated as a wildlife sanctuary (the “Wells Sanctuary”) by the Maine Department of Inland Fisheries and Wildlife (DIF&W). The Wells Sanctuary includes the Reserve lands owned by the Town of Wells and the Bureau of Public Lands, as well as sections of Rachel Carson National Wildlife Refuge (NWR). The sanctuary designation makes illegal the activities of trapping, recreational hunting, and the taking of wildlife by other means. However, since 2002 the DIF&W and the Reserve have had a special archery hunt with the goal of reducing the deer population on the Reserve and adjacent lands. This “deer reduction program” is not open to the public.

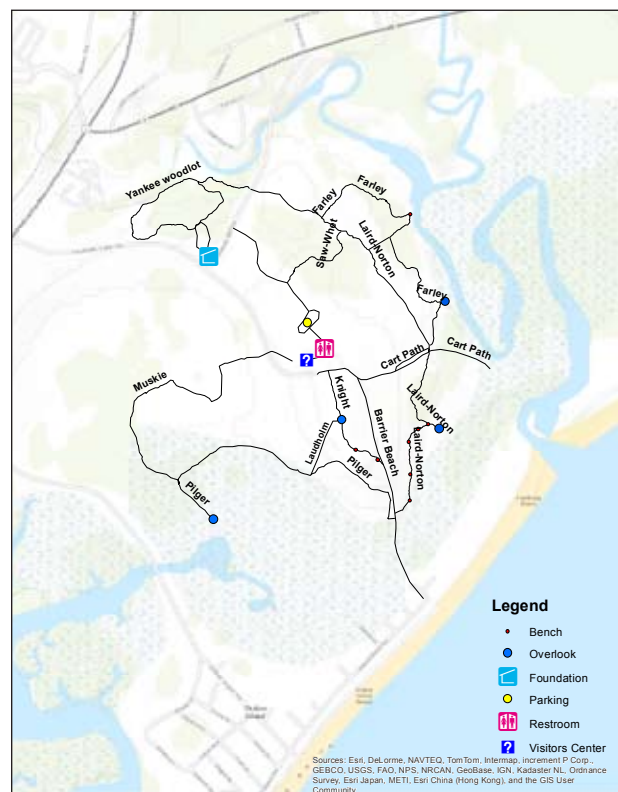
On Wells Reserve lands that are part of the Rachel Carson NWR, federal National Wildlife Refuge regulations apply. Thus, hunting is allowed on parts of the Rachel Carson NWR within the Wells Reserve that are outside the designated Wildlife Sanctuary.

Rules and Regulations

The Reserve Management Authority has adopted rules that govern access to and activities on the Reserve property (Appendix D). Public safety and environmental laws are enforced by State, Federal, or local agencies, as described in the Administrative Plan.

The following summary of key rules is posted on signs at public access points and is reproduced on the trail map:

- Walk only on trails.
- Carry out what you carry in.
- Do not collect plants, animals, shells, or other natural objects.
- We do not allow: pets, smoking, bicycles on trails, camping, fires or feeding wildlife
- Leashed pets are allowed only on the Alheim Commons property.
- Trapping and hunting are not allowed on the Wells Reserve, except as described in the Stewardship Plan. This prohibition is noted on “Wildlife Sanctuary” signs posted on trees along roadways that abut the Wells Reserve property.



Several miles of trails are open around the year for hiking, snowshoeing, and cross-country skiing.

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Interpretive Education

Introduction

The Wells National Estuarine Research Reserve is a regional center for education, training, and outreach on coastal, estuarine, and watershed ecology. Reserve interpretive education programs inform and engage audiences in learning about coastal ecosystems. Audiences include thousands of regional residents and visitors of all ages, including K-12 school groups, families, day campers, and teachers. Education programs translate research into readily available information, increase environmental literacy, and help promote stewardship of the environment. All interpretive education programs link to at least one of the following themes: climate change, water quality, habitats, and land use change.

Objectives and Strategies

Objective 1

Design and deliver field-based science education programs that promote stewardship of the Gulf of Maine watershed and coastal environments through understanding and appreciation of ecosystems.

Strategies

- Use the K-12 Estuarine Education Program (KEEP) 2011 market analysis and needs assessment reports regarding the Reserve's niche in the K-12 and public environmental education community to guide the implementation of future teacher trainings, field trips, kit rentals, and community programming.
- Maintain the existing suite of high quality coastal ecology programs for K-12 students in southern Maine and southeast New Hampshire.
- Expand kit rental offerings to include a broader array of themes, while maintaining the current collection of kit materials.
- Enhance docent training by creating a formalized training handbook, developing an incentives program, and reviewing evaluation methods.
- Support citizen and student monitoring related to landscape change, water quality, salt marsh restoration, invasive species, and endangered species.
- Continue to develop a wide variety of innovative public programs suitable for all age levels.
- Develop programs that incorporate literature, the visual arts, and other artistic media.

- Expand access by increasing handicap accessibility to programs.
- Integrate climate change education into public and K-12 programs to promote climate literacy, specifically through the implementation of an ongoing Climate Stewards evening lecture series and the integration of a climate focus for Teachers on the Estuary workshops.
- Enhance the capacity of Reserve staff to design and execute better evaluations of all education programs.
- Increase the success rate for returned evaluations and develop a system for capturing this evaluation data.
- Develop and expand programs of joint interest to the Reserve's Research, Stewardship, and Education Programs.
- Expand partnerships with like-minded community organizations.
- Enhance the educational content of the website, through blog posts, testimonials, and an increased number of images.
- Develop and support field-based teacher trainings, including Teachers on the Estuary (TOTE) workshops.
- Use the Estuaries 101 curriculum during Teachers on the Estuary workshops, highlighting the climate change extension activities.
- Expand the kayaking program to engage visitors in outdoor-based learning about estuaries.
- Research opportunities to lead community members, including volunteers, on estuary-based experiential education trips throughout the United States and abroad.

Objective 2

Optimize educational use of the site and increase public awareness of its ecological and cultural significance.

Strategies

- Increase the marketing, visibility, and promotion of K-12 field trips, kit rentals, Discovery Program, exhibits, day camps, scholarship opportunities, and teacher trainings.
- Expand, improve, and promote the Coastal Resource Library.
- Develop self-guided educational materials for both the Coastal Ecology Center and the Visitor Center exhibits that promote quality interaction for all age levels.



Students gain valuable experience in the Reserve's dedicated teaching laboratory.

- Maintain the Discovery Program backpack contents.
- Make innovative use of the Forest Learning Shelter, Teaching Laboratory, and other site resources.
- Improve the audio/visual system in the Mather Auditorium, the largest meeting space on campus.
- Foster increased investment in the Reserve from local year-round residents, through volunteer opportunities and program participation.
- Offer culturally rich programming that interprets the historical use of estuaries, the land, and the sea in Wells, the state of Maine, and New England.
- Use current educational philosophies and new technologies, learned in part through staff professional development opportunities.
- Develop all education programs around specific learning objectives that clearly identify the knowledge and/or skills to be covered.
- Integrate an evaluation component when possible.
- Link programming to local, regional, and NERRS-wide coastal and watershed issues, inspiring future stewards.
- Integrate climate-change education into programming whenever possible.
- Involve local and visiting research scientists in educational efforts.
- Ensure cultural, racial, socio-economic, and gender equity in all Reserve education activities.
- Coordinate with regional governmental and non-governmental educational and research institutions, organizations, and programs.

Guiding Principles

The Wells Reserve's Education Program and Education Advisory Committee have developed a set of principles to guide education programs.

- Incorporate hands-on, discovery-based, interactive field and laboratory experiences to further visitors' connection to place.

Thematic Focus

All interpretive education programs focus on one or more of the following themes: climate change, water quality, habitats, and land use change. Of the three primary K-12 field trip options, one has stewardship of wildlife and habitats at its core, the second takes students to the marsh for water quality testing, and the third is centered on estuaries with the concepts of watersheds and water quality highlighted. The Reserve's public programs cover a diverse array of topics, with one of the newest being a climate change evening lecture series. The new kayaking program immerses participants in the estuary habitat, paddling past a SWMP data logger and learning about the effects of land use upstream on the estuary and its water quality. The Reserve's Visitor Center exhibits speak of land use change over time, taking visitors through history and showing the effects of both human and non-human activities on the landscape.

Market Analysis & Needs Assessment

The Reserve's 2011 interpretive education market analysis demonstrated that climate change is addressed by few organizations and is viewed as the top priority among these organizations for more attention. Human impacts and stewardship, habitats and land conservation, and invasive species were also ranked as top priorities. Each of these four topics involves the effects of humans on the environment, which is at the heart of what the Reserve's education program aims to convey to its community. Climate change education with a strong stewardship message is a gap that the Reserve's education program will aim to fill in the coming years, specifically through public programming and teacher workshops.

The 2011 interpretive education needs assessment showed a high percentage of teachers, especially grades 9-12 teachers, interested in a student field trip focused on human impacts and environmental stewardship. Based on these results, the Reserve will investigate a new invasive species service-oriented field trip offering for middle and high school students in the next five years. The Reserve will also continue to seek funding for all grade levels to visit the Reserve free of charge, with program fees and transportation costs covered by grants. Grant-funded climate-focused Teachers on the Estuary workshops will also be a priority, providing teachers with a hands-on field-based

free workshop with the option of graduate credit. A more effective marketing strategy, especially for newer program offerings such as Wild Friends in Wild Places and kit rentals, is an additional recommendation from the needs assessment that the Reserve will incorporate into its five year plan.

Geographic Scope

The geographic coverage of Wells Reserve education programs is southern Maine and southeastern New Hampshire. School programs attract teachers and students from a radius of approximately 60 miles, and public programs reach a much expanded audience through tourism. The Reserve's target local audience lives in York and Cumberland Counties. Within these counties, the towns of Sanford and Biddeford will be focused upon in the next five years for grant funded programming opportunities, due to their high percentage of students receiving free and reduced lunch. The towns of Wells and Kennebunk will be targeted for camp programming, as these towns have sent the most campers to our programs in the past. The Reserve has learned that parents are not keen on driving long distances to drop their children off for a day of camp, so local Wells and Kennebunk families are most likely to take advantage of these programs.

K-12 Education

The Wells Reserve education programs targeting schoolchildren and youths are aligned, to the extent possible, with specific educational standards established by the State of Maine. The Next Generation Science Standards (Fall 2012) express what students should know and be able to do at various checkpoints during their education. The Next Generation Science Standards challenge communities, schools, and teachers to work together in implementing effective instructional strategies to achieve high expectations for all students. In the next five years, the Education Coordinator and Education Advisory Committee will identify The Next Generation Science Standards associated with Wells Reserve educational offerings.

The Wells Reserve faces challenges in delivering its K-12 school field trips, due to diminishing school budgets for site visits. In past years, grant funding was secured to offer free field trips and transportation to targeted school districts for the Wild Friends in Wild Places program. Over the next five years, similar grant

funding will be sought to enable more students to experience field trips at the Reserve. This was one of the recommendations provided in the Reserve's 2011 needs assessment report, and will continue to be an important strategy in future years.

Field-Based School Programs

Wild Friends in Wild Places is a grades K-2 program facilitated for up to 40 students in partnership with Center for Wildlife, a wildlife rehabilitation center in York, Maine. During the first portion of this three-hour program, rehabilitated non-releasable animal ambassadors from the Center for Wildlife are used to teach about native wildlife and their behaviors, characteristics, and life needs. Ambassadors include an opossum, bat, falcon, owl, and turtle. Following the indoor presentation with the ambassadors, students venture outdoors onto the trails of the Reserve to explore the habitats of these same wildlife species, while searching for animal homes and signs. In the winter season, students wear snowshoes on the trails. Following the field trip at the Reserve, teachers are given comprehensive "nature journals" to use with their students back in the classroom. Each journal has activities that relate to the animal ambassadors and habitats that the students experienced during the field trip. As additional follow-up, teachers conduct a stewardship project with their students that relates to wildlife and habitats. The ultimate goal of the program is to enhance the level of environmental stewardship among participating students and teachers.

Exploring Estuaries gives elementary school children the chance to spend a day at the Wells Reserve learning about coastal ecology. This program targets third,



Research scientists frequently commit time to interacting directly with participants in education programs.

fourth, and fifth graders, though it has been adapted to accommodate a much wider range in grade levels. This hands-on program includes a comprehensive Teacher Packet that provides background information and activities for use before and after school field trips. During Exploring Estuaries sessions, up to 60 students are divided into small groups of 12 or fewer. Each group visits several learning stations in four Reserve communities, where docent naturalists lead educational activities. Topics include adaptations, estuary functions, tides, salinity, food webs, watersheds, and beach ecology. By focusing on local habitats and watersheds, Exploring Estuaries helps students to make connections between their every day actions and the health of our waterways and the ocean.

Microscopic Marvels is a plankton and water quality program for grades 6-12 that introduces participants to the variety of plankton occurring in the Gulf of Maine, as well as to estuarine systems and food webs. During this three-hour program, groups of up to 30 students collect, observe, and identify live plankton. They come to understand the importance of plankton to healthy ecosystems, and learn plankton life histories. Participants visit the marsh to conduct water quality tests and collect plankton samples, experiencing the connection between abiotic and biotic factors in the estuary. They then return to the Teaching Laboratory to view plankton with dissection microscopes, learn from Reserve educators, and share their observations. Microscopic Marvels leads to increased awareness of the importance of plankton, greater knowledge of plankton ecology and water quality, and heightened appreciation for the intricate web of life in the estuary and sea.

For self-guided programs, Wells National Estuarine Research Reserve educators work with teachers to meet specific needs. Participants have the option of renting equipment (soil corers, binoculars, refractometers, etc.) and accessing curriculum materials on selected subjects. Self-guided field trip topics have included invasive species, nature journaling, water quality testing, beach exploration, and seasonal monitoring. Some trips explore nature through art or examine cultural history.

The Wells Reserve Discovery Program provides an opportunity for participants to learn about several topics through an interactive trail booklet and associated backpack materials. There are booklets on three different topics: Water Wonders explores the water



School programs are delivered throughout the academic year.

cycle and watersheds; Habitat Hike ventures through the forest, field, and estuary; and Time Travels investigates glaciers, Native American land-use practices, and European colonization. Each participant purchases a Discovery booklet from the Visitor Center gift shop, and the group borrows a backpack kit for use with the activities outlined in the booklet. Each booklet has a mascot associated with it (mummichog, porcupine, and turkey). Along the trails, there are numbered posts with the mascot images affixed. These posts correspond with numbered stops within the booklets. At the end of each participant's trail journey, Discovery mascot pin prizes are distributed by Visitor Center volunteers. These Discovery Program trailside education resources appeal to a wide variety of groups, including schools, scout troops, and families.

Day Camps

Just for Kids camps are half-day, full-day, and full-week nature camps on a variety of topics for children ages 6-9. Kids explore habitats, play games, learn about intriguing science experiments, and create crafts. Recent camps have explored the marsh, tidepools, birds, reptiles and amphibians, life under a log, plankton, fish, wildlife survival, insects, and more.

Junior Researchers camps are full-day and full-week nature camps that incorporate experiential science activities for children ages 9 to 12. Children in this program explore the Reserve's habitats, observe researchers at work, and even assist with researchers' tasks. Through this program, youths obtain a foundation in coastal science and ecological principles.

Just for Kids and Junior Researchers camps are offered during school vacation weeks in February and April, in addition to the school summer break in June, July, and

August. All camps strive to have campers outdoors as much as possible, fully immersed in habitat discovery.

Kit Rentals

The Education Program offers several curriculum kits to teachers for use in their classrooms. The rental period is three weeks and fees vary. Topics currently include Maine wildlife, trees, and estuaries. Each kit has a multitude of activities with corresponding materials. The Safari in a Box kit was developed by the Maine Department of Inland Fisheries & Wildlife, and the Reserve is a rental host site. This kit includes animal track replicas, scat replicas, and furs. Tree Trunks, developed in partnership with Project Learning Tree for grades K-5 and 6-12, provide teachers with tree cross-sections, leaf samples, forestry equipment, field guides, and more. The Estuaries Kit has a myriad of materials that are used to teach elementary students about the water cycle, watersheds, fish migration, NERRS sands, water quality, and other coastal topics. A bird-themed kit is currently being developed and will include activities relating to bird migration, eggs, nesting, beaks, adaptations, and songs.

The Reserve's education kits are resources for teachers to use at school. The kits serve to either extend a group's field trip visit to the Reserve, or provide a lower-cost environmental education alternative that can be administered without paying for the program fees and transportation that field trips require.

Teacher/Educator Training

The Education Program offers teacher trainings on a variety of topics including estuaries and watersheds (e.g. Teachers on the Estuary), and wildlife and habitats (e.g. Project WILD and Project Learning Tree). The Teachers on the Estuary (TOTE) workshops are geared towards middle and high school science teachers. They are research and field-based workshops that improve teachers' and students' understanding of the environment using local examples. These workshops provide resources and experience to support the incorporation of estuary and watershed topics into classroom teaching, while promoting estuary literacy and environmental stewardship. Coastal management issues, such as sea level rise, are explored in TOTE workshops as well.

In addition to teacher trainings and consultations provided as part of K-12 programs, the Wells

Reserve offers occasional workshops for educators seeking continued education. In addition, kit trainings are sometimes provided to local teachers to familiarize them with the kit contents and curriculum. Workshops are often collaborations between the Reserve and its partners.

The Wells Reserve also distributes the educator handbook *What is Ecology? An Introduction to Ecology through Estuaries*, a curriculum developed by Reserve staff. Teachers are referred to this resource, which is now available online at the Reserve's website.

Higher Education (including internships)

The Education Program works with colleges and universities that wish to use the Reserve as a field site for classes. Staff involvement varies with the specific needs and interests of each institution. The Reserve also offers internships and volunteer opportunities for students pursuing degrees in ecology, biology, environmental science, science education, and other similar courses of study.

Docent Naturalist Program

The Wells National Estuarine Research Reserve has an active and vital docent naturalist program through which volunteers are trained to lead programs for school groups, community groups, and the general public. The docent corps is essential to the Education Program throughout the year and adds greatly to its capacity. Please refer to the Field-Based School Programs and Public Programs sections of this Interpretive Education plan for more details.



Volunteer docents participate in training and team-building programs to ensure consistent and positive program delivery.

Docents come to the Reserve with a variety of backgrounds that enrich the volunteer community. They are former classroom teachers, veterinarians, engineers, homemakers, land trust employees, doctors, and interior decorators. In addition to completing trainings and leading groups, many docents attend public programs and travel to broaden their experience and knowledge in natural history.

The Education Program ensures that docents are knowledgeable guides, as docents are required to complete extensive training. This includes an orientation session, skill building sessions (e.g., Great Trip Leading, Uplands and Wetlands of the Wells Reserve), and specific program sessions (e.g., Microscopic Marvels, Secrets of the Salt Marsh). Docents also attend a staff-coordinated field trip to culminate docent training in order to reward docents and enjoy time spent together. Past field trips include visiting the Great Bay NERR Discovery Center, Friends of Casco Bay's volunteer offices, Wells Harbor via boat trips, and Casco Bay with the Maine Island Trail Association for island beach clean-ups.

After they attend training sessions, docents must shadow and co-lead programs with staff or experienced docents before leading tours on their own. After a docent has completed the initial season's training requirements, they are asked to attend a minimum of four additional docent-training sessions per year. Other enrichment opportunities are available monthly through our Lunch 'n Learn series and other educational offerings from the Wells Reserve and its partners (such as evening lectures and trail-based programs). Docents also continue to co-teach after the training phase is completed which improves docent skills through collaboration, provides more leadership for large groups, and builds community amongst the docent corps.

To ensure the quality of the docents and their experiences, several types of evaluation are administered at the Reserve. These include docents evaluating trainings following participation, evaluations by teachers and Reserve educators while leading tours during a school or public program, and acting as an Advisory Committee when necessary for revision and evaluation of programs and materials.

Recognition is paramount to retaining quality volunteers. The Reserve aims to develop meaningful relationships with the docent corps by acknowledging

docents' impressive impact on program delivery and capacity, providing rewards incentives (such as Wells Reserve hats and t-shirts), and saying 'thank you' as often as possible.

Public Programs

A diverse mix of programs is offered to residents, tourists, and community groups throughout the year. These programs may be indoors or outdoors, general or specific, directed or interactive.

Between June and August, the Wells Reserve evening lectures offer monthly presentations by specialists on a variety of topics (e.g., snake conservation, bird banding, nature photography, bats, marine mammals, etc.). Each year, the Reserve offers a new slate of presenters and programs.

The Lunch 'n' Learn series is an informal lunchtime lecture program that occurs September through May. These lectures often highlight Reserve research, natural history topics of local relevance, or staff and volunteer travels. Recent topics have included kelp farming, alewife research, Gulf of Mexico marine mammal research, the New England cottontail, beach profiling, and the NERRS. Participants are encouraged to bring a brown bag lunch to eat while they learn.

Docent-led Interpretive Walks are offered during the summer season. Current walks include: Secrets of the Salt Marsh, Life Between the Tides, History of a Saltwater Farm, and a Nature Walk. They address the history of Laudholm Farm, bird life, signs of wildlife, seasonal topics in natural history, tidal habitats, wildflowers and other Reserve plants, and estuarine



Summertime guided walks cover a variety of topics and are popular with both tourists and residents.

ecology. These tours are led by docent naturalists and appeal to residents and tourists alike.

Group Programs are offered to scouts, Road Scholars, day cares, home school groups, corporations, and other community groups. These may be customized to the particular interests of the participants, but they tend to focus on wildlife conservation, estuary ecology, and beach studies.

Special Programs are two to three-hour programs that families or adults can experience together. These programs often explore specific topics related to plant and animal life cycles, and are typically facilitated outdoors. Previous programs have focused on owls, woodcocks, preschool exploration, kayaking, nature crafts, vernal pools, coastal geology, celestial events, fall foliage, and nocturnal life.

Special Events are offered onsite throughout the year. Winter Wildlife Day is facilitated in partnership with York County Audubon Society and Center for Wildlife during February school vacation week. This free event includes live animal ambassador programs, tracking walks along the trails with a Maine Guide, and wildlife activities and crafts. In May, the Reserve has an International Migratory Bird Day Celebration. This event is also free, and treats visitors to bird banding demonstrations, a live migratory raptor program, bird walk, and hands-on bird activities (bird feeders, bird puppets, and planting seeds that benefit birds). Also in May is EcoDay, an event that spotlights earth-friendly agricultural practices, businesses, sports, and education. There are community vendors, educational activities and crafts, and a beach clean-up at the end of the day. In September, the Reserve holds its annual Punkin'fiddle: National Estuaries Day Celebration. There are estuary activities, lectures, artisans, old fashioned outdoor games, pumpkin decorating, and other fall harvest activities.

For Self-guided Programs, Wells Reserve educators work with community group leaders to coordinate tours that meet specific needs. Self-guided field trip topics have included wading birds, beach exploration, seasonal monitoring, and biological communities. Some trips explore nature through art or examine cultural history. Recent groups have included adults with disabilities, adoption families, Weight Watchers, art groups, traveling college groups in immersion programs, international adult walking tours, and family reunions.

Exhibits

The Wells Reserve's interpretive exhibits open a window on the world of coastal research and landscape change. They draw upon the resources of the site — its land and water, its plant and animal communities, its human history — and demonstrate the importance of stewardship to cultural identity and environmental health.

The two major exhibit areas are the farmhouse (first floor) and the Maine Coastal Ecology Center (MCEC) exhibit wing. Exhibits in the farmhouse, completed in 2011, explore how the landscape of southern Maine's coastal lowlands formed naturally over thousands of years and how that landscape both shapes and is shaped by the people who inhabit it. Visitors move first through the "Wild Landscape" of past glaciers and Wabanaki colonization, to the "Economic Landscape" of European colonization, to the "Domesticated Landscape" of Laudholm Farm, and finally to the current "Protected Landscape" of the Wells Reserve. The exhibits within the MCEC describe current research at the Wells Reserve and throughout the Gulf of Maine, and build an awareness of how that research links to resource management and personal choice. Completed in 2002, these exhibits include a viewing window of the Research Laboratory, Gulf of Maine scientist profiles, the life history of clams, fish collection and study, a coastal puppet and book nook, planktonic life, life in a salt marsh (diorama), the ocean's tides, and watersheds and water quality.

Trail/Site Interpretation

Interpretive signs along trails and on buildings give visitors an opportunity for informal learning about the site and its resources. The Education Program works



Touchable exhibits, such as these replica Wabanaki tools, are featured in the Visitor Center.

with the Laudholm Trust Communications Coordinator to revise existing signs and create new interpretive signage as funding is available. Current signs focus on forest succession, salt marsh communities, vernal pool inhabitants, salt marsh restoration, landscape change, historic building interpretation, and more. There are a total of 26 signs along the trails of the Reserve, as well as abundant tree identification signage.

The Wells Reserve Discovery Program provides an opportunity for families, community groups, and schools to learn about several topics through an interactive trail booklet and associated backpack full of materials. These booklets are discussed in greater detail in the Field-based School Programs section of this Interpretive Education plan.

Information Dissemination

Beyond the onsite program offerings, exhibits, and trailside education, the Reserve's education messages are shared through conference presentations, a newsletter, and social media. The Education Coordinator and Education Associate attend the Maine Environmental Education Association conference each year, and have presented workshop sessions the past two. In addition, efforts are made to attend the New England Environmental Education Association annual conference, New England Ocean Science Collaborative regional meetings, as well as national environmental education conferences when funds allow. Pending grant funding, the Education Coordinator plans to attend state, regional, and national conferences in the next five years to present, specifically regarding TOTE workshops.

Laudholm Trust's Communication Coordinator is the editor of *Watermark*, a newsletter filled with compelling stories about the Reserve's work. Education staff members frequently submit articles for inclusion in this publication. The Communication Coordinator coordinates the Reserve's Facebook and Twitter pages, promoting interpretive education program offerings year-round.

Program Evaluation

The Reserve currently has an evaluation component in place for its school field trips, teacher workshops, and camps. Participants complete a paper evaluation, providing valuable feedback and comments regarding the quality of the program, its leaders, and recommendations for improvement. In the next five years,

onsite public programs, including indoor lectures and outdoor hikes and paddling trips, will also be evaluated. As time allows, logic models will be developed to help guide the Reserve's interpretive education evaluation plan and outcomes.

Educational Usage of Facilities

In addition to higher education groups, the Reserve also hosts community education groups in its facilities. Often, these groups are facilitating their own camps or workshops and want to have the added benefit of being in close proximity to the Reserve's beautiful site. Recent groups have included the Maine Humanities Council for a week-long middle school summer camp about Rachel Carson; Camp Card for a couple of weeks of summer camp for adolescents with Asperger's syndrome; and Earth as a System is Essential for a weeklong teacher training for middle school science teachers. Typically, such groups use the Mather Auditorium, however the Forest Learning Shelter and Teaching Lab are also sought-after options.

Citizen Monitoring

The Wells Reserve has become a model site for Picture Posts, wooden posts that enable environmental monitoring by citizens, students and community organizations through digital photography and satellite imagery. Each post is topped with an octagon. Citizen scientists place their digital cameras against each of the octagon's sides to take pictures of the surrounding landscape. A ninth image is taken up towards the sky. Each series of photographs is uploaded to a central website, where changes between images can be observed over time. In this way, citizens measure landscape and seasonal change. The Reserve has four posts on its site: Two are in a field, a third is on the marsh, and the fourth is at the beach where the river meets the sea. The Reserve plans to involve community groups and schools in this ongoing project, promoting the Picture Posts at conferences and other events.

Coastal Resource Library

The Coastal Resource Library holds an extensive collection of government documents and scientific reprints as well as curricula, field guides, and other

volumes of interest to estuarine science. This library also houses an excellent specialty collection of books and edited volumes on water quality, coastal ecology, aquatic ecology, landscape ecology, conservation biology, and restoration ecology, among other topics. Scientific journals are also available (e.g., *Estuaries*, *Conservation Biology*, and *Restoration Ecology*). The library is staffed by volunteers one morning and one afternoon each week, and is available through appointments anytime during business hours. The library collection of over 3,500 volumes can be searched via the link on the Reserve's website. Interlibrary Loan services enable a larger community to access the collection with great ease.

In 2011, a puppet and story book nook was created for the Maine Coastal Ecology Center exhibit area, extending the library's reach across campus. In addition, many children's books are featured in the new farmhouse exhibits. Each of these exhibit collections incorporates titles from the library. Although the exhibit copies are not available for lending, visitors are directed to the library where duplicate copies can be signed out.

Seasonal preschool story hours for children ages 3-5 and their caregivers are now being conducted by library volunteers. An hour in length, these free programs attract daycares and preschools that have often never before visited the Reserve. Books from the library's collection are featured with a reading, related craft activity, and trail walk.



Story times combined with craft activities and trail walks introduce preschoolers to the essentials of nature knowledge.

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Coastal Training Program

Introduction

The Coastal Training Program (CTP) recognizes that people act to sustain the coastal resources of the Gulf of Maine based upon knowledge of the value of those resources combined with knowledge of the impacts their actions have on what they value. CTP promotes protection, stewardship, and conservation of natural resources and ecosystem services in the Gulf of Maine by supporting collaborative knowledge networks engaged in adaptive management and civic science. CTP informs and engages coastal managers in knowledge creation and exchange. In some cases, CTP functions as a tool of adaptive ecosystem management by facilitating the assessment and evaluation of the outcomes of decisions, actions, and policies. CTP integrates social and natural science-based approaches to achieve outcomes that sustain the coastal ecosystems upon which society depends.

Objectives and Strategies

CTP objectives are accomplished through formal workshops, trainings, and conferences. These events



The Coastal Training Program brings citizens and decision-makers together so they can plan collaboratively for conservation.

are collaboratively planned and implemented with partner groups and CTP advisory committee members, including the following: Southern Maine Regional Planning Commission, Maine Drinking Water Program, Maine Nonpoint Education for Municipal Officials, Maine Sea Grant, Maine Coastal Program, Piscataqua Region Estuary Partnership, and the Great Bay National Estuarine Research Reserve. CTP provides technical assistance to audiences and partners including GIS, Collaborative Learning methodologies, and project planning and management. A suite of less formal but equally effective CTP strategies include membership in on-going working groups and committees that address specific coastal management issues; participation on advisory boards of partner organizations; consultations with CTP audiences; and attendance at municipal meetings to provide expert testimony on coastal management.

Objective 1

Each year 90% of participants in training indicate intent to apply natural and social science-based information in coastal decision-making

Strategies

- Identify and translate emerging research and technology tailored to the needs of coastal decision-makers.
- Increase the application of management-relevant research and monitoring results for environmental decision-makers in support of ecosystem-based management.
- Develop and evaluate innovative communication strategies and delivery methods that translate science effectively and support collaborative environmental decision-making.
- Develop methods to incorporate ecological economics approaches and findings into trainings and technical assistance.
- Provide 8 annual workshops and trainings or 6 technical assistance activities for watershed management, climate adaptation planning, GIS, stakeholder engagement and/or habitat restoration each year.

Objective 2

By 2018 CTP supports three collaborative efforts within the State to sustain ecosystem services and community resilience in a changing climate.



Participants in a Coastal Training Program workshop hear from a local town officer about best practices for managing stormwater.

Strategies

- Identify and engage diverse partners and stakeholders in appropriate and strategic approaches to sustaining ecosystem services and community resilience.
- Facilitate dialogue about the need for and application of scientific research to improve management and policy decisions to sustain ecosystem services and support community resilience.

Objective 3

Each year 80% of trainings, workshops, and technical assistance are designed to address partner and stakeholder needs identified through needs assessments, evaluations, and in consultation with the CTP Advisory Committee.

Strategies

- Assess the science, technology, and information needs in accordance with needs assessments and feedback from conducted programs.
- Respond to those who voice a need for science-based information and technology relevant to coastal stewardship and ecosystem management.
- Evaluate programs to determine how participants apply the information and knowledge they obtain.
- Evaluate research translation and application for contributions to measurable environmental outcomes.
- Facilitate communication of decision-maker needs for science to researchers.

Outcomes

- Diverse stakeholder workgroups created and supported to promote sustainable land use and conservation.
- Improved ability of partners and stakeholder groups to collaboratively facilitate ecosystem service conservation.
- Decision makers increase their knowledge of sustainable land use and conservation practices to maintain community benefits and ecosystem services.
- Training series and technical assistance delivered to meet partner and stakeholder needs.

Coastal Training Program Overview

The Coastal Training Program acknowledges and respects the critical role that local and regional decision-makers, businesses, and citizens play in determining the character and condition of Maine's coastal areas. Decisions about land use, infrastructure development and maintenance, and public health and safety are influenced by regulations, policy, planning documents, scientific findings, and requirements of professional practice.

Developing effective CTP programs requires awareness that underlying the seemingly pragmatic decision-making process is a complex system of human values, attitudes, and motivational forces. CTP is designed to use the collaborative potential of shared values, the pride associated with a diverse system of

professional practice, and commitment to community and place as a resource for coastal management.

Reserve partners and stakeholders identified a need for economic research to integrate with ecological research to inform decisions about tradeoffs that are made in riparian buffer and wetland management in Reserve watersheds and surrounding communities. “Sustaining Coastal Landscapes and Community Benefits” was developed from that need and will test an interdisciplinary approach to non-market valuation of ecosystem services associated with riparian buffers. Funded by the NERRS Science Collaborative, this project engages a diverse group of stakeholders to develop a model and communication tools to support decision-making about riparian land use, conservation, and restoration. Results will influence the future development and adaptation of CTP.

Training Themes

The CTP will use the strategies presented in this management plan to address two training themes that contain six priority topics.

The Wells Reserve CTP is guided by priorities identified in the Wells Reserve’s original market analysis and needs assessment, the 2012 Strategic Plan, and a decade of thorough evaluations of trainings. Additionally, the program has benefited from a series of research projects providing rigorous assessments of the partner and stakeholder audience served by CTP. These evaluations support two overarching training themes for the program: 1) Land and biodiversity conservation; and 2) watershed approaches to pollution prevention and mitigation. Climate change and its associated impacts on biodiversity, sea-level rise, and community resiliency have emerged as a nationally significant issue and is integrated within the training themes primarily through the application of an ecosystem-based management approach.

The two overarching training themes are addressed through the six priority training topics covering the following:

- Strategies for balancing economic growth and development with quality of life values such as rural character, local agriculture, recreation, scenic views, clean water, and wildlife habitat.

- Methods for incorporating scientific information about the cumulative impacts of management and policy into decisions affecting natural resources.
- Ecosystem approaches to conservation and restoration of coastal habitats and biodiversity.
- Methods for incorporating valid economic implications of land conservation and watershed management into decision making.
- Use of science-based Best Management Practices (BMPs) for sustaining water quality and quantity.
- Management strategies and policies that sustain ecosystem services and support community resilience in a changing climate.

CTP is managed internally by the CTP Coordinator and CTP Associate who work collaboratively with the Stewardship Coordinator and GIS/Natural Resource Specialist. This team communicates regularly to collectively manage CTP events and to integrate the research, monitoring, stewardship, and education activities that have objectives relevant to coastal management decision-makers.

Geographic Scope

The Coastal Training Program focuses primarily on communities in southern Maine and coastal New Hampshire. CTP provides more broad-scale technical assistance for the Collaborative Learning approach developed and tested during the first ten years of implementing the program. The Collaborative Learning approach developed at the Wells Reserve uses social science principles and practices to build interdisciplinary, action-oriented teams and facilitates the work of those teams to sustain mutually valued ecosystem services.

During 2012, the CTP Coordinator worked with the NERRS Science Collaborative to develop a national curriculum, “Working Together to Get Things Done,” based on this Collaborative Learning methodology. This training aims to build the capacity of the NERRS to design, conduct, and evaluate collaborative and sustainability science research. The Wells CTP will continue to provide technical assistance to the NERR System for this interdisciplinary approach using lessons learned from Reserve-based projects in the Salmon Falls, Saco, and Little River watersheds.

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Research and Monitoring

Introduction

The Wells NERR Research Program studies and monitors change in Gulf of Maine estuaries, coastal habitats, and adjacent coastal watersheds, and produces science-based information needed to protect, sustain, or restore them. In a typical year, the program directs or assists with more than 20 studies involving dozens of scientists, students, and staff from the Reserve, academic and research institutions, resource management agencies, and environmental and conservation groups.

Reserve scientists participate in research, monitoring, planning, management, and outreach activities locally, regionally and nationally. The program supports field research along Maine's southwest coast from the Kennebec River to the Piscataqua River, including



A research intern takes water quality measurements in a local brook using a handheld datalogger.

nearshore and offshore waters. Within this region, effort is focused on the coastal compartments from Great Bay, N.H., to Casco Bay, Maine, which are characterized by numerous marsh-dominated estuaries and barrier beaches.

The Research Program will continue to focus its efforts on investigations of coastal food webs, the species of interest that depend on them, the habitats that support them, and the human-mediated and natural disturbances that alter them. In addition, we will continue to actively promote the development and implementation of regionally coordinated ecological monitoring of coastal habitats along the gradient of least disturbed, to restored, to most disturbed. This will be accomplished through committee work, meetings, workshops, presentations, and reports. New efforts within the Research Program include the development of programmatic ties with one or more academic institutions.

The Reserve acknowledges climate-driven disturbance is an underlying force that needs to be measured in the natural and altered habitats that we study. The impacts of a changing climate on coastal areas will be expressed across a diverse suite of ecosystem variables (e.g., changes in air, water and soil temperatures; water chemistry; the quantity, timing and intensity of precipitation; the intensity of storm events; and changes in sea level). The Wells Reserve has already initiated many of the Sentinel Site protocols into its monitoring program (e.g., vegetation monitoring, vertical control of water quality stations, sediment elevation tables, etc.) and is committed to establishing and maintaining a NERR System Sentinel Site as described in the Sentinel Sites Guidance for Climate Change Impacts as part of its ongoing System Wide Monitoring Program. We will also work with the CTP program to assess the needs and questions of local communities relative to climate-driven changes in coastal habitats.

Objectives and Strategies

Objective 1

Investigate coastal food webs and habitats, their underlying physical and biological processes, and their response to natural changes and human activities.

Strategies

- Investigate the ecology of estuarine and coastal habitats and food webs along the Gulf of Maine.

- Evaluate the effectiveness of coastal habitat restoration along the Gulf of Maine, and their response to changing patterns of inundation.
- Support investigations regarding salt-marsh fish production and the nekton trophic relay.
- Support investigations regarding the quantity and quality of estuarine and watershed resources.
- Promote the investigation of linkages between estuaries and open water in the Gulf of Maine.
- Promote a landscape ecology approach to the conservation of coastal lands and watersheds.
- Collaborate with other agencies to determine coastal research needs relevant to resource management, and conduct research projects to meet those needs.
- Participate in system-wide scientific work groups addressing how wetlands, estuaries, and nearshore ecosystems respond to land use within coastal watersheds.
- Provide scientific support for education, outreach, and training efforts to manage and protect freshwater and tidal shorelands in watersheds.

Objective 2

Provide visiting investigators and staff with opportunities to conduct independent or collaborative research at the Reserve and in the Gulf of Maine region.

Strategies

- Train and mentor undergraduates, graduate students, post-doctoral associates and citizen volunteers.
- Support visiting researchers by providing access to facilities, field sites, staff and interns.
- Participate in the NOAA Graduate Research Fellowship Program and offer opportunities for graduate research fellows to make contributions in their chosen field of research.
- Cultivate programmatic affiliations with academic institutions, and collaborate with institutions on specific research projects.
- Share information, personnel, equipment and facilities with partners to facilitate research.

Objective 3

Promote the development and implementation of regionally coordinated ecological monitoring of coastal habitats, and continue to maintain and expand the System Wide Monitoring Program (SWMP).

Strategies

- Fully implement and expand SWMP, including bio-monitoring and land-use change analysis.
- Integrate elements of SWMP into the Sentinel Site Initiative, with a focus on changes in marsh elevation and inundation and sea-level rise.
- Collect, maintain and analyze consistent SWMP data for weather, water quality, nutrients, vegetation and land-use change using standardized protocols and technologies.
- Organize, review, document and submit quality-controlled SWMP data to the Central Data Management Office.
- Promote and increase awareness of SWMP data within the Gulf of Maine scientific community.
- Link SWMP and other monitoring efforts with the Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS) and the national Integrated Ocean Observing System.
- Contribute to local, regional and national initiatives involving restoration science and coastal habitat monitoring.

NERR System Research Overview

The National Estuarine Research Reserve System (NERRS) provides a mechanism for addressing scientific and technical aspects of coastal management problems through a comprehensive, interdisciplinary and coordinated approach. Research and monitoring programs, including the development of baseline information, form the basis of this approach. Reserve research and monitoring activities are guided by national plans that identify goals, priorities, and implementation strategies for these programs. This approach — when used in combination with the education, training, and outreach programs — will help ensure the availability of scientific information that has long-term, system-wide consistency and utility for managers and members of the public to use in protecting or improving natural processes in their estuaries.

The NERRS research program was re-evaluated in 1991, 1994 and 1996. Research policy at the Wells NERR is designed to fulfill the NERRS goals as defined in program regulations. These include:

- Address coastal management issues identified as significant through coordinated estuarine research within the System;

- Promote Federal, state, public and private use of one or more reserves within the System when such entities conduct estuarine research; and
- Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

The strategic science goal for the NERR System is that *NERRS scientific investigations improve understanding and inform decisions affecting estuaries and coastal watersheds*. Objectives include: 1) expanding capacity to monitor change in water resources, habitat, and biological indicators, 2) improve understanding of ecological effects of climate drivers and pollution, 3) quantify ecosystem services of coastal watersheds and estuaries, and 4) use social science research to further stewardship. NOAA Estuarine Reserves Division (ERD) research is designed to provide information of significant value to the development and implementation of resource management policy governing U.S. coastal waters.

ERD has identified five aspects of estuarine ecological change to receive particular emphasis: *anthropogenic influence on estuaries, habitat and ecosystem coastal processes, habitat conservation and species restoration, and management, social science and economics*.

System-wide Research Programs

The NERR System has two major system-wide research programs available to all Reserves.

NERR System Science Collaborative

Research is also funded through the National Estuarine Research Reserve System Science Collaborative, currently a partnership between NOAA and the University of New Hampshire. The Reserve System Science Collaborative is a program that focuses on integrating science into the management of coastal natural resources. The program integrates and applies the principles of collaborative research, information and technology transfer, graduate education, and adaptive management with the goal of developing and applying science-based tools to detect, prevent, and reverse the impacts of coastal pollution and habitat degradation in a time of climate change. The program is designed to enhance the Reserve System's ability to support decisions related to coastal resources through collaborative approaches that engages the people who produce science and technology with those

who need it. In so doing, the Science Collaborative seeks to make the process of linking science to coastal management decisions, practices, and policies more efficient, timely, and effective and share best practices and examples for how this can be done.

Graduate Research Fellowships

Graduate Research Fellowships: In 1997, the NOAA/ Estuarine Reserves Division began funding a competitive graduate research fellowship program in the NERRS. The NERRS Graduate Research Fellowship Program (GRF) is intended to produce high-quality research in the reserves focused on improving coastal zone management while providing graduate students with hands-on experience in reserve research and monitoring. This fellowship provides graduate students with funding for 1 to 3 years to conduct their own research projects and training in ecological monitoring. GRF projects must address coastal management issues identified as having regional or national significance, relate them to the NERRS Research Priorities and be conducted at least partially within one or more designated reserve sites.

Students are asked to provide up to 15 hours per week of research assistance to the reserve. A student's individual GRF program is designed with on-site staff and may include on-site monitoring or research. This training may take place throughout the school year or may be concentrated during a specific season.

The Wells NERR will continue to sponsor Graduate Research Fellows to the extent possible. Most fellows have been funded for 3 years, so openings for new fellows at the Reserve may not be available in some years. The Research Coordinator will communicate



Locations of automated data loggers taking water quality measurements for the System-Wide Monitoring Program.

regularly with the fellows, either as an informal project advisor or as a graduate committee member.

System-wide Monitoring Program

The System-wide Monitoring Program (SWMP) provides standardized data on national estuarine environmental trends while allowing the flexibility to assess coastal management issues of regional or local concern and is guided by the SWMP Plan. The principal mission of the monitoring program is to develop quantitative measurements of short-term variability and long-term changes in water quality, biological systems, and land use/ land cover characteristics of estuaries and estuarine ecosystems for the purposes of informing effective coastal zone management. The program is designed to enhance the value and vision of the reserves as a system of national references sites and focuses on three ecosystem characteristics:

1. **Abiotic Characteristics:** Abiotic measurements are supported by standard protocols, parameters, and approaches that describe the physical environment including weather, water quality, hydrological, and sediment related parameters. Data is Federal Geographical Data Committee compliant and available via the Reserve System Centralized Data Management Office.
2. **Biotic Characteristics:** As funds are available, reserves are focusing on monitoring habitats and biodiversity.
3. **Watershed and Land-use Classifications:** The Reserve System is examining the link between watershed land use and coastal habitat quality by tracking and evaluating changes in coastal habitats and watershed land use/cover. This element is guided by the Reserve System Habitat Mapping and Change Plan.

Abiotic Variables

The abiotic factors collected by the NERRS-SWMP include water quality parameters, weather, and hydrological data. Water quality monitoring parameters are collected on a 15 minute interval at four stations located at the head of tide and mouth of both the Webhannet and Little River Estuaries. Those parameters include water temperature, specific conductance, pH, turbidity, dissolved oxygen (both % and mg/l), and water level/depth. Chlorophyll-a, orthophosphates, combined nitrate/nitrite, silicates, and ammonia are collected via monthly grab samples at all four monitoring locations, while one station (Webhanet harbor or welinq) also houses a Diel sampling regime which takes a grab sample every 2 hours and 15 minutes to



The Reserve participates in the Marine Invader Monitoring and Information Collaborative for early detection of problem species.

cover an entire tidal cycle utilizing an ISCO automated water sampler. Our weather monitoring is also done on a 15 minute interval and monitors air temperature, relative humidity, wind speed and direction, barometric pressure, precipitation, and PAR (photosynthetically active radiation). Each Reserve uses YSI 6600 EDS Dataloggers and a Campbell Scientific weather station to collect the data. The data undergo quality control and are then submitted to a centralized data management office for archival and dissemination. Data from one water quality station and our weather station are delivered in “near-realtime” via the GOES satellite system and available on the web at <http://cdmo.baruch.sc.edu>.

Biological Monitoring

This vegetation monitoring program will utilize a Tier I approach and aerial photography to map the distribution of the common salt marsh grasses *Phragmites australis* (an invasive weed usually adjacent to upland border including road beds, dredge spoils, etc.), *Spartina patens* (a dominant species in the high marsh) and *Spartina alterniflora* (a dominant species in the low marsh). The second task will employ Tier II methods to assess the relationship between upland land use, elevation and the abundance of common marsh plants. Both Tier I and Tier II are integral components of the NERR Sentinel Site Initiative.

Land Use and Habitat Change

This component of SWMP is developed and implemented for purposes of identifying changes in coastal ecological condition with the goal of tracking and evaluating the status of estuarine habitat change and watershed land use for all the reserves. The main objective of this element will be to examine the link between watershed land use activities and coastal habitat quality. The basic question to be addressed is: “What is the magnitude and extent of habitat change in estuarine systems and how are these changes linked to watershed land use practices?” The use of the NERRS Habitat Classification Scheme will support monitoring of land use and habitat change.

High resolution mapping will be accomplished through a partnership between the Wells Reserve and NOAA Coastal Services Center, who has contracted out the creation of a land use layer using 2012 National Agriculture Imagery Program (NAIP) imagery. (see Land Use Classification and Change Plan 2013-2017). Completion of the base maps will be accomplished by Fall 2013 and a change analysis will be accomplished in 2023.

Data collected by the NERRS-SWMP are compiled electronically at the Centralized Data Management Office (CDMO) at the Belle W. Baruch Institute for Marine Biology and Coastal Research of the University of South Carolina. CDMO provides additional quality control for data and metadata. NERR-SWMP data are formatted to meet the standards of the Federal Geographical Data Committee. The CDMO then compiles and disseminates all system-wide data and summary statistics over the world-wide web, where

researchers, coastal managers, and educators may readily access the information.

Telemetry, or the delivery of data to remote users in real-time or near real-time, is an important element of SWMP. The NERR system has now implemented a standardized, nationwide program using the Geostationary Operational Environmental Satellites (GOES) system, a critical component of the Integrated Ocean Observing System (IOOS). A Wells Reserve staff member serves as the SWMP Telemetry Support Technician, assisting other techs with basic troubleshooting of their stations before they contact the CDMO. The data are transmitted via satellite at 15-minute intervals, and are used by National Weather Service’s Hydrometeorological Automated Data System, and can be viewed online by anyone. The Reserve will continue to support telemetry and other efforts that integrate with NERACOOS and IOOS. More generally, the Reserve will promote awareness of SWMP data within the Gulf of Maine scientific community. The NERACOOS data distribution web portal provides an active link to Wells NERR telemetered SWMP data, and to the CDMO data retrieval web portal.

Sentinel Site

Building on these foundational elements of SWMP, the Reserve System is developing a network of sentinel sites and the capacity to assess the impact of sea level/lake level changes and inundation on the diverse set of coastal vegetative habitats represented in the system. Reserves are implementing a suite of activities, as described in the 2012 Reserve System Sentinel Site Guidance Document, to assess the relationship between vegetative communities (marsh, mangrove



A research team, having collected nekton from a fyke net, brings the catch back to a measurement station.

and submerged aquatic vegetation) and sea level. Reserves are adding surface elevation tables and monitoring pore water chemistry along vegetation monitoring transects and linking their system-wide monitoring program to a network of specialized spatial infrastructure to allow precise measurement of local sea level and lake level changes and subsequent impacts to key habitats. The Reserve System is working in partnership with NOAA's National Geodetic Survey and the Center for Operational Oceanographic Products and Services to support the development of sentinel sites.

Research Themes

Estuarine Water Quality

Water quality is monitored continuously at several stations with automated instruments as part of the System-Wide Monitoring Program, as well as bimonthly at 15 to 20 stations through the Watershed Evaluation Team (WET) volunteer monitoring program. These data have allowed us to identify several bacterial "hot spots," are used to identify and open areas safe for shellfishing, and have uncovered a relation between tides and low dissolved oxygen levels.

Our water quality work has contributed to the designation of several "Priority Watersheds" in south coastal Maine by the Maine Department of Environmental Protection. Our water quality data has been used to assess estuarine trophic status in the Northeast using the NOAA ASSETS model.

Our partnership with Maine Sea Grant and the University of New Hampshire has identified species-specific sources of bacterial contamination in our coastal watersheds. Nutrient data collected by the Wells Reserve as part of SWMP and in collaboration with the Maine DEP have been used to develop policy relating to regulation of dissolved oxygen and nitrogen in estuaries. Our data and expertise were used in a fact sheet on indicators of estuarine eutrophication in the Gulf of Maine, produced by the Gulf of Maine Council on the Marine Environment's Ecosystem Indicator Partnership.

Salt Marsh Habitats and Communities

Factors that control the dynamics and vigor of salt marsh plant communities and marsh peat formation determine the ability of a salt marsh to persist in the face of sea-level rise. Through a combination of experi-



Reserve researchers use electrofishing to monitor migratory and resident fish in freshwater systems upstream from estuaries.

mental manipulations and long-term monitoring, we are producing data to answer questions concerning the sustainability of natural and restored salt marsh habitats in this region. These studies address land-use impacts, nutrient-plant relations, plant community responses to physical and hydrologic disturbance, and the relative contribution of short-term natural events (e.g., storms) and human activities (e.g., dredging, tidal restriction) on patterns of sediment accretion and erosion.

The Reserve's marshes and beaches are among the best-studied sites nationally with regard to long-term accretion and erosion (over thousands of years). The barrier spits that protect these marshes have also been well studied, especially with respect to alterations due to human activity and sea-level rise. The Saco River and York River estuaries and Casco Bay have also been studied in this regard by the Wells Reserve scientists and collaborators.

Food Web and Habitat Value for Fish, Invertebrates, and Birds

The Reserve combines long-term monitoring with periodic surveys and short-term experiments to

identify species and measure trends and changes in populations of fish, crustaceans, clams, and birds. We have more than 10 years of data on upland birds, wading birds, and shorebirds for assessing population status. Our wading bird data are used as a gross indicator of salt-marsh health.

Our periodic larval, juvenile, and adult fish surveys have produced the best available data for fish utilization of salt-marsh estuaries in the Gulf of Maine, and provided the species list for the only guide to the fishes of south coast Maine estuaries, written and published by Wells NERR.

We are currently focused on the development of nekton indicators of shoreland land-use impacts on estuarine habitat. Our food web studies are quantifying the movement of energy and contaminants from primary producers to nekton. The role of estuarine vegetation structure (emergent plants, macroalgae) in providing habitat and mediating native-invasive species interactions is a unique element of this research theme.



Research scientists involve interns with ongoing experimental work, allowing them to gain knowledge and experience while contributing meaningfully to Reserve investigations.

During the past five years, we have initiated a new focus within this research theme — that of the influence of habitat on the bioaccumulation of methylmercury in marsh/estuarine food webs.

Salt Marsh Degradation and Restoration

Since 1991, the Wells Reserve has been studying the impact of tidal restrictions on salt marsh functions and values, and the response of salt marshes to tidal restoration. Salt-marsh ecosystems in the Gulf of Maine sustained themselves in the face of sea-level rise and other natural disturbances for nearly 5,000 years. Since colonial times large areas of salt marsh have been lost through diking, draining, and filling. Today, the remaining marshes are well protected from outright destruction, but during the past 100 years, and especially since the 1950's, salt marshes have been divided into fragments by roads, causeways, culverts, and tide gates. Tidal flow to most of these fragments is severely restricted, leading to chronic habitat degradation and greatly reduced access for fish and other marine species. Currently, we are studying how adjacent land use change is altering the amount and quality of freshwater flow into Gulf of Maine marshes.

The Wells Reserve evaluates monitoring results from marsh restoration projects throughout the Gulf to assess their performance and to identify data gaps and future monitoring needs. With collaborators from UNH, the Reserve has developed an approach to salt-marsh restoration evaluation, the Restoration Performance Index (RPI), based on data collection from more than 20 restoration-reference site pairs from Rhode Island to Maine. The Reserve completed in 2012 a national study to test the utility of the RPI through an assessment of 27 restoration and reference sites at 5 NERRs — four on the east coast and 1 on the west coast.

Field Research Sites

The Wells Reserve supports studies within a number of south coastal estuaries and watersheds. The research program is currently at capacity with respect to its ability to provide on-site staff support to visiting investigators, and is approaching research capacity of the relatively small field site over which it has research management authority within the Reserve's boundary. The Reserve encourages visiting investigators to consider alternative salt marsh estuaries for their studies, but does not control access to these sites. Researchers



Beach profiling volunteers monitor numerous sites to track erosion and accretion patterns year round.

using sites outside the Reserve boundary collaborate with Reserve staff but must comply with the research protocols of the host location. In the future, to address access to research sites, the Wells Reserve will need to accomplish the following: Negotiate Memorandums of Agreements with both private and agency landowners of salt marshes that will accommodate access for research that minimizes restrictions; acquire additional salt marshes within the Reserve's boundary that will be under state (RMA) control; and increase on-site staff support for visiting investigators through a targeted collaborative funding effort with the Laudholm Trust.

Academic and Institutional Partnerships

The Wells NERR maintains professional relationships with colleagues at the University of New Hampshire, the University of New England, Northeastern University, Boston University, Dartmouth College, Antioch New England Graduate School, Bates College, the University of Maine, and the University of Southern Maine. We have begun to explore formal program partnerships with one or more of these partner institutions. Programs to be considered include: academic-year course offerings by Reserve staff; undergraduate and graduate on-site field research courses; expanded coastal research and training opportunities for students and faculty; semester-long research internships for undergraduates; a Restoration Ecology Institute and Certification Program for academic credit.

Research Program staff work with undergraduate and graduate interns during both the academic year and the summer field season.

Research Program staff also work closely with non-profit groups and citizen volunteers, particularly on watershed, fish passage and estuary water quality monitoring projects.

The Research Director participates on committees for graduate students from the University of New Hampshire, the University of Maine, the University of Southern Maine, and Antioch New England.

Government Partnerships

Research program staff interacts regularly with staff from state and federal agencies and partnerships for the purposes of determining coastal research needs relevant to resource management and providing scientific support for education, outreach and training efforts to manage and protect freshwater and tidal shorelands in watersheds. The Reserve regularly collaborates with the National Marine Fisheries Service Community Restoration Program, the U.S. Environmental Protection Agency (EPA) Casco Bay and Mass Bays Estuary Programs, the U.S. EPA Office of Ecosystem Protection, the U.S. Geological Survey Patuxent Research Center, Maine Sea Grant, the Gulf of Maine Council on the Marine Environment, and Rachel Carson National Wildlife Refuge.

Research staff seeks opportunities to collaborate with the Maine Coastal Program, the Maine Department of Inland Fisheries and Wildlife, the Maine Department of Marine Resources, the Maine Department of Transportation, and the Maine Department of Environmental Protection.

When opportunities permit, the Research Department also cooperates with municipalities. Examples of town-level cooperation include the 2005-06 EPA-funded wetlands management study in the York River, the 2004 studies of watershed sources of microbial contamination in the Reserves estuaries, and the 2010 assessment of the ecological effects of docks and piers in the York River estuary.

Mentoring and Internships

Research program staff works closely with undergraduate and graduate interns during both the academic year and the summer field season. In a given year, program staff works closely with 10 to 20 interns. In general, the students work on Reserve-sponsored research projects. Many students work for credit or to meet a service requirement. Others receive stipends from project funds, the NOAA Five-Colleges Consortium and other NOAA fellowships, or through internships funded by the Laudholm Trust. Program staff works closely with citizen volunteers, particularly on watershed and estuary water quality monitoring projects. The research program benefits enormously from the time, energy, enthusiasm, and interest of these students and volunteers. In return, interns often use their experience at the Wells Reserve as a step toward environment-related employment or graduate study. The benefit to the Reserve continues when interacting with former interns in their professional capacity as members of the regional environmental research and management community.

Information Dissemination

Conferences and Workshops

The Wells Reserve hosts local and regional conferences and workshops as opportunities arise. These efforts

focus on subjects related to monitoring and research relevant to management of coastal habitats in the Gulf of Maine. The Research Program also organizes meetings and workshops on fish passage restoration in south coastal Maine.

Research Program staff participates in numerous committees, meetings, and workshops at local, regional, and national levels. Activities include steering committee memberships, presentations for a range of audiences, development of regional coastal monitoring and research initiatives, oversight and planning of coastal monitoring, management, and habitat protection and restoration programs. Participation in these groups allows the Wells Reserve to contribute science-based information and perspective, and to develop alliances and partnerships with representatives from the other entities working to understand, manage, protect, and restore Gulf of Maine coastal ecosystems.

Researchers report on each of their projects. Findings are presented as oral presentations, posters, abstracts, and full reports and publications. Research Program staff also review research proposals and manuscripts upon request from colleagues, students, peer-reviewed journals and funding agencies.

Site Profile

In January 2007, the Wells NERR published the Site Profile, a 326-page document that details the Reserve's physical and biological resources. The Wells National Estuarine Research Reserve Site Profile includes plant and animal species lists, past research and monitoring projects, and current and future research needs. The Site Profile is a comprehensive reference document; it is targeted at researchers and resource managers carrying out projects in south coastal Maine.

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Resource Management and Stewardship

Introduction

The Wells National Estuarine Research Reserve strives to exemplify wise coastal stewardship through sound natural-resource management within its borders and through its conservation partnerships in southern Maine and around the Gulf of Maine. Along with research and education, stewardship of natural resources is a major component of Reserve programs.

The Reserve encourages individuals and organizations to recognize connections between land-use actions and environmental quality, and to take responsibility for protecting coastal watersheds through personal stewardship, municipal and state planning, land management activities, habitat restoration, and land acquisition.

The diverse habitats encompassed by the Wells Reserve support distinct plant and animal communities requiring specific stewardship approaches. Woodland and fields beaches are in large part resilient to human use, while salt marshes, dunes, beaches, vernal pools, and certain upland habitats are more sensitive to human impacts. Rare native plants and animals require specific management approaches.

Some parts of the Reserve are relatively pristine, while other areas are under ecological stress associated with past land use practices and the spread of invasive species. A large deer population has contributed to the spread of invasive plants and human health issues associated with Lyme disease.

As envisioned in the Coastal Zone Management Act, the role of the Wells Reserve in coastal resource management and stewardship extends beyond Reserve boundaries. To accurately reflect the scope of the Wells Reserve stewardship program, this chapter has two components: the stewardship of natural resources within the Reserve (Site-Based Stewardship); and community-based activities (Community-Based Stewardship) in watershed protection, habitat restoration, and regional land conservation activities.

Objectives and Strategies

Objective 1

Manage habitats within the Reserve to sustain biodiversity and ecosystem functions while providing opportunities for research, education, and recreation.

Strategies

- Use the Reserve as a demonstration site for coastal stewardship and best management practices.
- Maintain and enhance habitats for plant and animal species, particularly those that are threatened, endangered, or of special concern.
- Monitor, control and prevent the spread of non-native plant species that threaten native plants and animals.
- Restore native coastal and upland ecosystems and monitor the success of the restoration activities over time.
- Protect pristine habitats by directing public, staff, and visiting investigators to less sensitive areas.
- Maintain a system of trails and woods roads to safely accommodate staff and visitors.
- Monitor public use of the site and continually assess visitor impacts on natural resources and on the core programs of research and education.
- Conserve priority lands using established evaluation criteria.
- Implement conservation strategies to protect the Reserve's watershed resources.

Objective 2

Encourage a watershed approach to land use to enhance the quality of water resources in coastal regions of the Gulf of Maine.

Strategies

Help support and guide the implementation of existing watershed surveys and management plans.

- Develop surveys and management plans for priority watersheds in southern Maine and support and guide their implementation.
- Disseminate information and provide technical assistance to municipalities, organizations, agencies, and individuals on watershed management issues.
- Support new and growing community-based watershed groups.
- Create and maintain partnerships with organizations and individuals that support watershed approaches to environmental management.

Objective 3

Provide assistance and expertise to communities and organizations in the conservation, restoration, and stewardship of coastal habitats.

Strategies

- Provide networking and training opportunities to help municipalities and organizations increase their effectiveness and capacity to conserve lands.
- Serve as a center providing southern Maine land conservation organizations with GIS, GPS, and other mapping and spatial data support.
- Participate in and contribute to statewide and multi-state planning, conservation, and stewardship efforts that lead to the protection of coastal lands.
- Provide information and technical support to help citizen groups, organizations, and individuals identify and complete coastal habitat restoration projects.
- Coordinate the streamlining and standardization of data from monitoring groups into a central restoration database.
- Synthesize and disseminate information from the restoration database to support regional efforts to manage and conserve coastal habitats.
- Provide support for long-term monitoring of abiotic and biotic elements of restored habitats.

Resource Management

Management Framework

Wells Reserve consists of 2,250 acres. The lands are owned by four distinct entities (acreage data from Wells Reserve): Maine Department of Conservation (147 acres); U.S. Fish and Wildlife Service/Rachel Carson National Wildlife Refuge (1,428 acres); Town of Wells (249 acres); and Reserve Management Authority (RMA) (40 acres). The Wells Reserve also includes 386 acres of submerged lands owned by the Department of Conservation. Submerged lands within the Wells Harbor Federal Navigational Channel are excluded from the Wells Reserve.

Management of state, town, and RMA-owned lands is carried out by the RMA using recommendations made by the Stewardship Advisory Committee. Federal lands are managed by the U.S. Fish and Wildlife Service.



Cutting back Japanese barberry, among the Reserve's most invasive species, to keep a trail clear for walking.

Natural Resource Protection Plan

Reserve administrative processes and State and Federal regulations protect the Reserve's natural resources. Maine's natural resources – including those within the Reserve boundary -- are protected by various laws, including the core laws of the Maine Coastal Program. Appendix E has a list with explanations of the major natural resource laws. These apply to the state, municipal, and federally owned conservation land and water within the Wells Reserve. The U.S. Fish and Wildlife Service monitors and enforces laws on the National Wildlife Refuge land. State natural resource agencies (Departments of Inland Fisheries and Wildlife, Marine Resources, Conservation, and Environmental Protection) enforce laws on state and municipal lands.

The Wells Reserve works closely with State and Federal natural resource agencies in protecting Reserve resources. Staff and trained volunteers routinely monitor activities and use on the Reserve's protected area, and they monitor wildlife and their habitats. They report any violations to the appropriate state enforce-

ment agency, most often the Departments of Inland Fisheries and Wildlife and Environmental Protection. Additionally, each state and federal agency has a representative on the Wells Reserve's Stewardship Advisory Committee. As a result, the agencies remain informed of issues that may affect the Reserve and they are addressed quickly.

The Wells Reserve cooperates with the following agencies in the areas under their purview:

- Maine Department of Inland Fisheries and Wildlife: Inland fish and wildlife populations and anadromous fish.
- U.S. Fish and Wildlife Service: Trust resources include threatened and endangered species, migratory birds, and anadromous fish.
- Maine Department of Environmental Protection: Wetlands and beaches.
- Maine Department of Marine Resources: Marine fisheries, anadromous and catadromous fisheries, and boating in tidal waters.
- National Marine Fisheries Service: Marine mammals and migratory fish.
- Town of Wells: Public safety.

Management Zones

The Wells Reserve has assigned habitats to four management zones: Public and Administrative, Active Management, Conservation, and Protected. These management zones are used to control the types and levels of access and activities at the Reserve. They allow research, education, resource management, and public enjoyment while providing adequate protection to sensitive areas.

An extensive trail system allows visitors visual access to the full range of habitats that make up the Reserve. These trails provide opportunities to view and learn about wildlife and their habitats even when visitors are near or within habitats receiving protection or intensive management.

Public and Administrative Zone

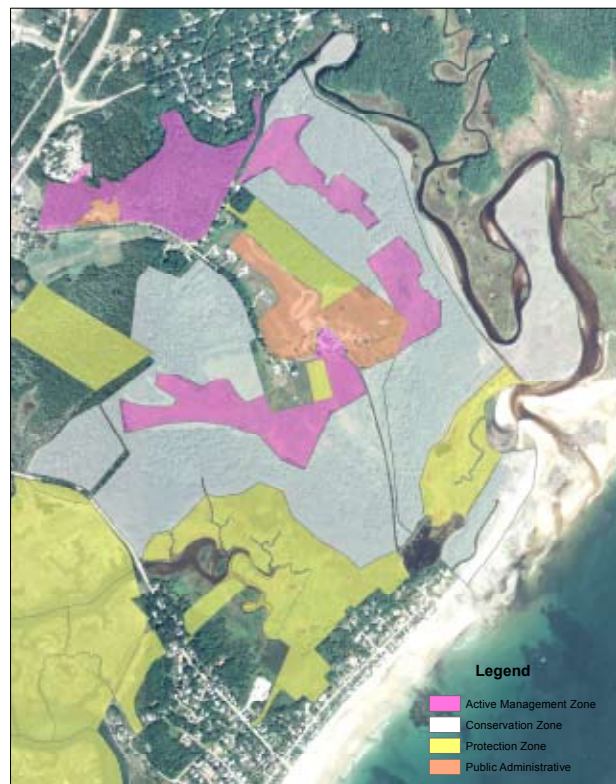
This zone includes a campus of buildings, pathways, parking lots, and other infrastructure to accommodate employees, visiting researchers and educators, and the public. This area is the most intensively used on the Reserve property and supports large and small events and activities. It includes the Visitor Center, barn, auditorium, Maine Coastal Ecology Center, parking area, entrance road, and the landscaped grounds that

immediately surround these facilities. A second area within the public and administrative zone contains the buildings and immediate surroundings of the Alheim Property. Stewardship in the public and administrative zone relates primarily to building upkeep and grounds maintenance. Management activities within the zone include mowing and snow removal.

Active Management Zone

This zone consists of 90 acres of fields and shrublands. These include the grounds surrounding the Visitor Center and six fields that have a long agricultural history. Shrubs along the perimeter of these fields form an edge habitat valuable to wildlife. Stewardship within this zone is guided by the Reserve's open-field management plan (Wells Reserve, 2000). Management activities within the zone include prescribed burns, mowing, brush hogging, and periodic tree cutting. These activities benefit some wildlife species, specifically those dependent on early successional habitats. The Reserve's open-field management plan sets these goals for managing fields and shrublands:

- Maintain the fields for their visual appeal, historical value, and ecological significance.
- Provide habitat for a range of grassland-nesting birds and other wildlife that use open fields for feeding, nesting, roosting, and hunting.



Management Zones of the Wells Reserve. See text for details.

- Control and curtail the spread of non-native species.
- Encourage the growth of native grasses and rare plants that need full sunlight to thrive.
- Maintain and increase the population of New England cottontail rabbits.
- Regenerate desirable shrub species such as alders to provide edge habitats for birds and mammals.
- Provide educational opportunities for the public on topics of natural succession, habitat change, and land-use history.

Conservation Zone

This zone comprises most of the Reserve's forests and shrublands. Stewardship and resource management within this zone is intended to maintain relatively undisturbed, natural habitats. It focuses on minimizing disturbance to plants and wildlife, while ensuring public safety. Management activities within the zone include tree and shrub cutting and trail maintenance.

Protected Zone

This zone includes areas deemed in need of greatest protection because they support sensitive species (state or federal rare, threatened, or endangered species) or sensitive habitats. Sensitive habitats within Wells Reserve include dune systems; beaches for plovers, least terns, red knots, and other birds; salt marshes; freshwater wetlands (including streams, vernal pools, forested wetlands, and wet meadows); and tidal waterways. Stewardship within this zone requires that areas are closed except by permit for specific interpretive education programs, research projects, or stewardship and management activities.

Resource Management Projects

The Wells Reserve has been working on various resource management projects over the past five years that address long-standing issues (deer overpopulation) while others (such as Yankee Woodlot management) emerged recently. Efforts on these and other projects will continue and even expand.

Deer Population Control

Some forested habitats of the Reserve have been severely damaged by white-tailed deer. Deer browsing has restricted regeneration of native woody and herbaceous vegetation and has favored non-native plants, such as Japanese barberry and Japanese honeysuckle (which deer find unpalatable). Restoring forested habitats requires reducing deer population

density and controlling or removing invasive plant species. The Wells Reserve and its Stewardship Advisory Committee, in cooperation with Drakes Island residents, the U.S. Fish and Wildlife Service, the Maine Department of Inland Fisheries and Wildlife (DIF&W), the Town of Wells, and adjacent landowners, instituted a controlled hunt of white-tailed deer in 2002. The limited bow hunt has been successful, but a long-term commitment to the program will be needed to reduce and maintain the deer herd at a size nearer to carrying capacity. The deer population was about 100 per square mile when the deer reduction program began; in 2006 the population estimate was 80 per square mile. The ideal deer density for the southern coastal region of Maine is 15 per square mile, according to DIF&W.

Invasive Plant Control

In 2010, the Wells Reserved conducted a woody and herbaceous invasive plant survey. Several methods of invasive plant management have been implemented over the past five years. These include mechanical removal and herbicide applications to control barberry and honeysuckle, and a controlled hunt to reduce the population of deer, which would allow for the regeneration of native plants. A natural resource management plan will be produced in the next five years that will address management objectives of all of the Wells Reserve habitats, and will concentrate on areas of the property that will benefit the most from invasive plant management.

Early Successional Habitat Management

The New England Cottontail rabbit was listed as an endangered species in Maine and made a candidate species for federal listing in 2007. A significant population of these native rabbits was found on the Wells Reserve. This prompted an effort to increase the availability of native early successional habitat here on the Reserve not only for the New England Cottontail but for a host of other species. In 2008 the Reserve was given a Wildlife Habitat Improvement Program grant from the Natural Resources Conservation Service (NRCS), which included funding for management activities through the 2021.

Open Field Management

The Reserve adopted an open field management plan in 2002 with the goals of halting natural succession and to maintaining open fields. The Reserve uses



In April 2009, a fire crew oversaw a prescribed burn covering about 3 acres of grassland habitat in an effort to maintain open field habitat.

mowing and prescribed burning to protect and improve habitat for grassland nesting birds, including bobolinks and meadowlarks. This habitat type is in decline throughout the northeastern United States. The fields are also important for the monarch butterfly, whose life-cycle depends on milkweed, which is abundant in the Reserve's fields. A range of other species as well relies on this early successional habitat. The open fields afford visitors views of the ocean and southern Maine landscape and are part of the site's agricultural heritage.

Forest Management

In moving toward creating an integrated Natural Resource Plan for the Wells Reserve, a "Forest Habitat Assessment and Management Recommendations" report was produced in 2011. Each forest patch was surveyed and specific management objectives and recommendations were identified. As part of this plan, it was decided to reestablish the Yankee Woodlot Demonstration Forest. In the next five years, activities will be planned to demonstrate to area woodlot owners the processes necessary to manage a forest for specific purposes — from planning to harvesting to long-term management.

Drakes Island Restoration Monitoring

Drakes Island Marsh, a 77-acre tidal marsh at the north end of the Webhannet Marsh system, is bordered on the east and south by a low-lying residential beach neighborhood. For a century or more, it was diked for use as a cow pasture. In 1988, the failure of a clapper valve restored tidal flow through a 36-inch-diameter pipe. Salt marsh vegetation began returning slowly to the area. However, the limited tidal range (about 1 foot versus the 8-plus feet unrestricted range) and increasing freshwater input inhibited the marsh's recovery, impounded tide and floodwaters, and encouraged spread of invasive plants such as cattails and common reed. In 2005, a larger culvert and a self-regulating tide gate were installed. The resulting increase in tidal exchange will, over time, promote marsh vegetation, reduce the predicted spread of invasive freshwater plants, and improve the marsh drainage and habitat for marine species. The improved connectivity between the marsh and the estuary will enhance the flow of water, sediment and organisms in and out of the marsh. In partnership with Rachel Carson National Wildlife Refuge, the Reserve will continue to monitor changes in the marsh. The Reserve will work with the Refuge and partners to manage water levels

to maximize restoration and to improve stormwater management.

Potential Restoration Projects

The Wells Reserve may have an opportunity to work with partners and contribute expertise to restore degraded habitats and prevent their further degradation. Some potential opportunities follow:

Salt Marshes

Science, monitoring, and restoration activities of the Reserve have established it as a partner in salt-marsh restoration around the Gulf of Maine. The research department co-produced regional standards to identify and evaluate tidal wetland restoration projects in the region and monitor Gulf-wide restoration projects. Researchers will continue with these efforts. In partnership with Rachel Carson National Wildlife Refuge, several opportunities for salt-marsh restoration exist within the Reserve. These opportunities will be explored.

Wells Harbor

Wells Harbor was first dredged in 1964 by the Army Corps of Engineers. It was partially dredged in 1974, but sediment continued to fill the harbor's Federal Navigation Channel, so it was dredged again in 2000-2001. In 1998, the Wells Reserve began a multi-year project to monitor the effects of Wells Harbor dredging on salt marshes. Pre- and post-dredge data are being used to assess the effects of dredging on salt marsh accretion and erosion in the context of natural events and processes.

Community-Based Stewardship

The Wells Reserve works with conservation partners in Southern Maine and throughout the Gulf of Maine to accomplish its coastal stewardship mission. For the most part, these activities occur beyond the Reserve boundary. The community-based stewardship involves efforts in watershed protection, land conservation, and habitat restoration.

Watershed Protection

The Wells Reserve works with land trusts, municipalities, government agencies, watershed groups, and other organizations to protect, manage and restore coastal watersheds, and encourage public stewardship of watershed resources. Activities include coordinating watershed surveys and developing management

plans; developing and implementing comprehensive watershed conservation strategies; creating and distributing GIS data and maps on watershed resources; organizing workshops, conferences, and meetings; and participating in watershed events and initiatives throughout the Gulf of Maine. In this program area, the Stewardship Program is well integrated with the Coastal Training Program, providing training, programs, services, and information to decision-makers in southern Maine.

Land Conservation and GIS Center

The Wells Reserve's integrated programs of research, education, and stewardship provide valuable assistance to organizations involved in coastal land protection. Since 1997 the Wells Reserve—as part of its stewardship mission—has worked closely with government agencies, municipalities, and land trusts to identify and conserve important coastal lands in southern Maine.

The Wells Reserve Stewardship Program provides Geographic Information System (GIS), Global Positioning System (GPS), and other spatial products and services to organizations in southern Maine, and in some instances to organizations in other Gulf of Maine states. The program also provides technical assistance in areas such as policy, natural resource information, and conservation plan development. With this information, organizations and individuals make better decisions about the conservation of the coastal landscape, prioritizing which lands to conserve.

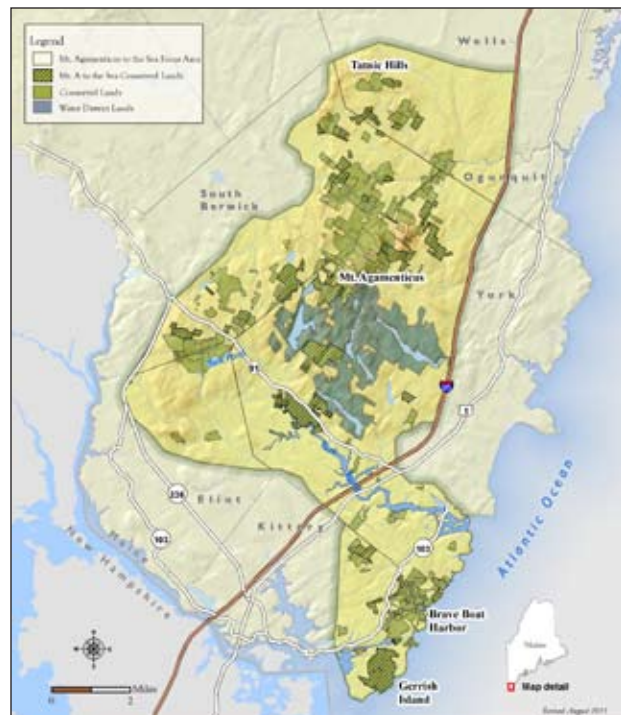
The Stewardship Program helped create, and is an ongoing partner in, the Mt. Agamenticus to the Sea Conservation Initiative (MTA2C), a 10-member coalition of non-profit organizations and governmental agencies working together on landscape-scale conservation. The Coalition focuses on approximately 48,000 acres that encompasses varied and diverse habitats in Maine's six southern-most coastal zone communities. Over the next several years the MTA2C will continue its efforts to conserve this coastal landscape.

The creation of NOAA's Coastal and Estuarine Land Conservation Program (CELCP) provides Wells Reserve and its partners with additional opportunities to protect other high value natural resources in Maine's coastal zone communities. The priority lands include those in the MTA2C focus area, as well as in the lands in the following coastal watersheds and the towns in

which they are located: Spruce Creek and Salmon Falls River (Kittery and Elliot); Josiah River (Ogunquit); the Ogunquit River (Ogunquit and Wells); Webhannet River and Merriland River (Wells); and Branch Brook (Wells and Kennebunk), the Mousam River (Kennebunk); and Kennebunk River (Kennebunk and Kennebunkport).

Habitat Restoration

The Wells Reserve is committed to promoting, supporting and evaluating salt marsh restoration in the coastal zone communities throughout the Gulf of Maine. Stewardship, research, and education efforts are integrated in the pursuit of the Reserve’s habitat restoration mission. The Reserve supports citizen groups in identifying restoration sites and implementing projects. The Wells Reserve fulfills a public need for scientific information that supports coastal habitat restoration efforts. The Reserve works to develop, implement and assess standardized monitoring and evaluation protocols for marsh restoration projects. As the restoration science database grows, the Reserve collaborates with restoration stakeholders throughout the Gulf of Maine to adaptively manage restored sites, document success and advance the practice of salt marsh restoration.



The Reserve is intimately involved with the Mount Agamenticus to the Sea Conservation Initiative, a highly effective collaboration.

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Reserve Boundary and Acquisition Plan

Introduction

With its federal, state, municipal, and non-profit partners, the Wells National Estuarine Research Reserve protects a network of lands that represent a diversity of ecosystems and watersheds in south coastal Maine.

The Reserve protects properties within our boundary that constitute both core and buffer areas. These parcels are important to maintaining the ecological integrity of our estuaries and for allowing us to conduct research and offer education programs. The rivers and streams flowing into the Reserve's estuaries are under continued development pressure. This growth threatens the functions of estuarine ecosystems by fragmenting habitat, damaging wetlands, and degrading water quality upstream of the Reserve.

This chapter describes the priorities and strategies the Reserve uses to acquire properties near or adjoining the Reserve's current protected lands and within its recognized boundary, and to assist partners in acquiring larger contiguous tracts within the targeted watersheds, especially those tracts that border rivers, tributaries, and wetlands whose waters eventually feed the Reserve's estuaries.

As part of its conservation and stewardship mission, the Wells Reserve also works with land-conservation organizations in coastal zone communities of southern Maine to protect key coastal and estuarine lands outside its boundary and targeted watersheds. The Resource Management and Stewardship chapter has information on our conservation partnerships elsewhere in the Reserve's service areas.

Objective and Strategies

Objective

Conserve lands to protect the natural resources within the Reserve's watersheds, ensure a stable environment for research and education, and provide for public enjoyment.

Strategies

- Identify and protect high-priority properties within the Reserve's boundary.

- Work with partners to protect lands within the targeted watersheds (Webhannet, Ogunquit, and Little Rivers)
- Help secure CELCP and Section 315 funds and their matching funds for land conservation projects.
- Increase public awareness of the value of land conservation to ecosystems and communities.
- Make protected property accessible for research, education, and public enjoyment.

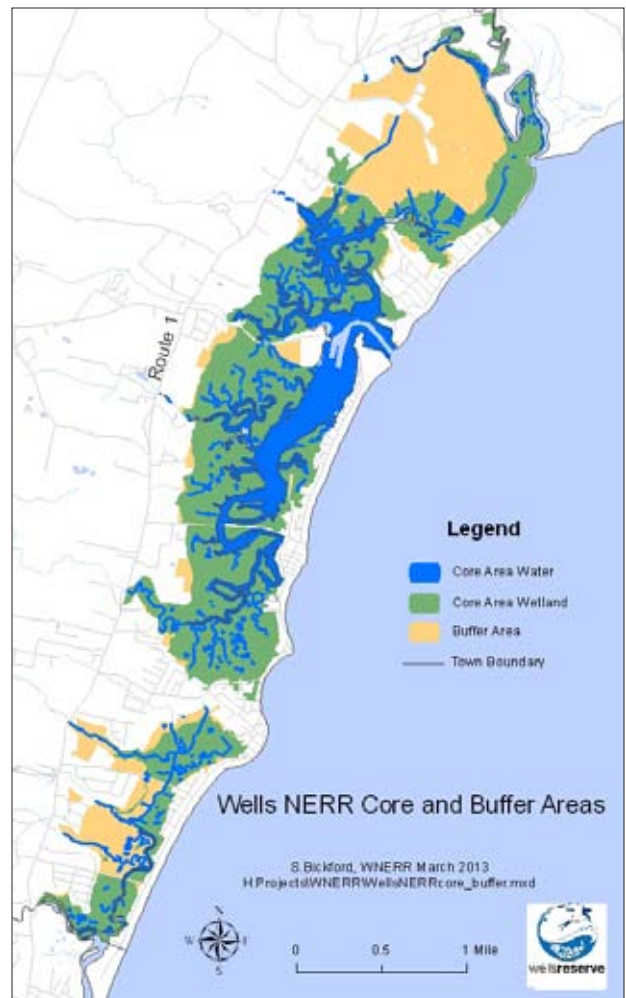
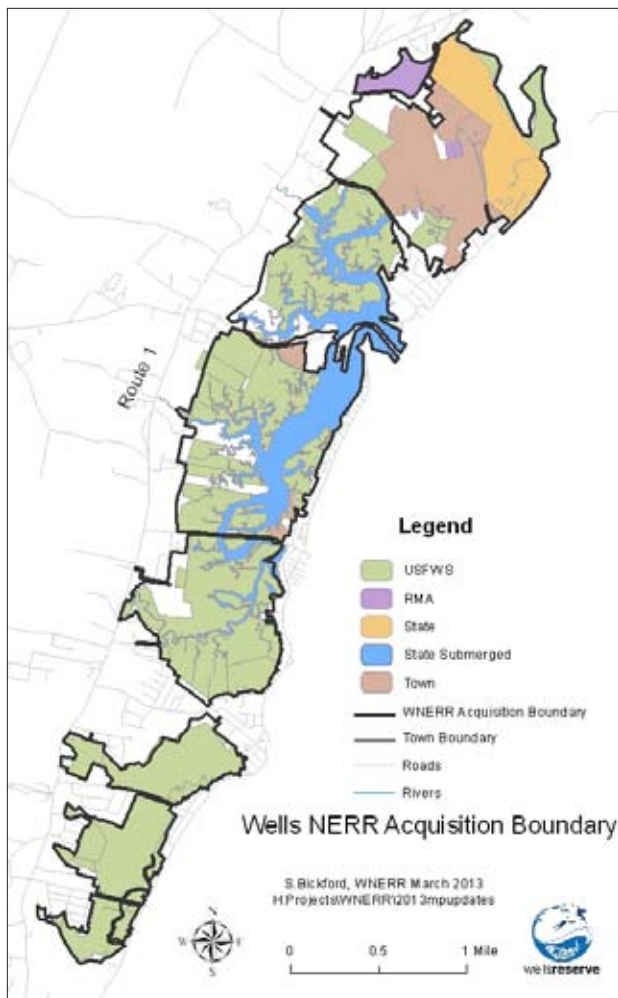
Core and Buffer Areas

The land and water areas within the designated Reserve boundary consist of core and adjacent buffer areas. Core areas include sensitive ecological units essential to the functions of estuaries. These areas are managed to ensure long-term research, monitoring and educational activities. Human activities that occur within core areas could pose a risk to the ecological integrity of these areas, threatening long-term viability to monitor change or conduct scientific studies. For the Wells Reserve, core areas are the main stem of rivers (fresh water and estuarine water sections) and their accompanying submerged lands, wetlands (fresh water and salt water) that abut rivers, and dunes associated with beaches. Access to these areas is limited.

Buffer areas include lands that abut core areas. They are designed to protect the long-term integrity of core areas and provide additional protection to estuarine and riverine-dependent species. These areas are suitable for educational programs, public use, and appropriate active management. Hiking trails, observation platforms, interpretive signs, and other alterations of the land that advance the Reserve's mission are placed in these buffer areas. In addition to delineating core and buffer areas, the Reserve has divided its habitats into four management zones (see Resource Management and Stewardship chapter).

Principal Federal Funding Sources

As a National Estuarine Research Reserve, the Wells Reserve can apply for funds through Section 315 of the Coastal Zone Management Act (NERR Construction and Acquisition Fund). These funds are to be used for the acquisition of properties — both core and buffer — within the approved acquisition boundary of the Reserve. When funds are available, each year the Reserves can apply and compete with other Reserves for funds from the NERR Construction and Acquisition Fund. A 1:1 federal/non-federal match is required.



Two views of the Wells Reserve boundary. On the left, shaded areas show protected lands while unshaded areas within black borders show lands eligible for acquisition using section 315 funds. On the right, protected lands are divided into core and buffer areas (explained in text).

In 2009, the Coastal and Estuarine Land Conservation Program was authorized by the U.S. Congress. CELCP provides the NERR System and the Wells Reserve with opportunities to conserve buffer areas within the approved boundaries and throughout the targeted watersheds that drain into the Reserves' estuaries. In 2009 the Reserve established the Little River, Webhannet River, and the Ogunquit River as the targeted watersheds of the Reserve, making appropriate parcels of land available for CELCP funds through a competitive process. The legislation passed by Congress required that a minimum of 15% of the total amount of CELCP funds authorized in a given federal fiscal year be set-aside for NERR projects. A 1:1 federal/non-federal match is required.

Principal Non-Federal Funding Sources

Non-federal matching funds for 315 funds come from Laudhom Trust and the State of Maine's Land for Maine's Future Program and Maine Outdoor Heritage

Fund, and private foundations. For CELCP projects, funding partners could include the Town of Wells' dedicated Land Bank Fund, Great Works Regional Land Trust, The Nature Conservancy, Maine Coast Heritage Trust, and grant-making foundations.

Background

The Wells National Estuarine Research Reserve was designated in 1984, and officially dedicated in 1986 when all the key properties were acquired and existing State and Federal protected lands were incorporated into the established boundary. The boundary of the Reserve was located entirely within the Town of Wells between the Little River and Eldridge Road. The Reserve boundary followed the shoreline (excluding developed sections) to the east and crossed uplands and salt marsh to the west. The 1,600 acres included property owned by the U.S. Fish and Wildlife Service, the Town of Wells, and the Maine Department of

Conservation. The Reserve has made some changes over the course of 25 years.

In 2003, the Maine Legislature passed, and the Governor signed, Legislative Document 777, which revised and clarified Maine law addressing the location of the Reserve. LD 777 allowed the Wells Reserve to expand its geographic area of acquisition interest into the upper watershed areas of the Little River, Webhannet River, and Ogunquit River within the Town of Wells. With NOAA approval of the previous management plan in 2007, this allowed the Reserve to include in its boundary the Ogunquit River and add 359 acres of salt marsh (a core area) within the Moody Division of Rachel Carson NWR). The Reserve Management Authority and Rachel Carson National Wildlife Refuge/U.S. Fish and Wildlife Service have developed a Memorandum of Understanding to address management within the affected portion of the Refuge's Moody Division (Appendix A-2).

In 2003, Laudholm Trust transferred 35 acres to the Wells Reserve Management Authority. This parcel, known as the Alheim Property, contains the residential campus of the Reserve and natural land with an interpretive nature trail. With the approval of the 2007 Management Plan, this property was incorporated into the Reserve's boundary. In 2005, the Reserve purchased and protected 2.5 acres of fields from Diane Lord. Adjacent to the Reserve's access road, this small parcel (consisting of grasslands) had been the highest priority land acquisition project for the Reserve since it was founded. With the approval of the last Management Plan: 2007-2012, these parcels were incorporated into the Reserve and are part of our protected area ("buffer").

In 2008, Reserve purchased (with NOAA grant and Laudholm Trust funds) an adjoining 2.5-acre parcel with a farmhouse and barn from the same landowner. This will one day be the site of the Reserve's education center. This is the only parcel purchased during the time period of the previous Management Plan (2007-2012) within the Reserve's approved boundary. With the approval of this Management Plan, this parcel is incorporated into the Reserve and is included in the 2,250 acres. This parcel is part of the "buffer area" as described in 15 C.F.R. sec. 921.11.

In 2010, the Reserve and the Town of Wells applied for and were awarded a CELCP grant for the protection of properties that are part of the Merriland River

Corridor Project. In January 2011, 105 acres of land on the Merriland River were permanently protected. In December 2012, the Reserve and the Town protected an additional 61 acres — known as the Highpine Property — as part of the same project with the CELCP grant. These two parcels are within one of the three Reserve targeted watersheds. The Town of Wells holds title to the properties; these parcels are not part of the Reserve's official protected area and outside the recognized boundary, though they support the Reserve's mission and will provide opportunities for education and stewardship programs.

Over the past 15 years, GIS and GPS tools have enabled the Wells Reserve to more accurately define and calculate actual acreage owned. Until the development of this plan, and before the Reserve acquired GIS capability, the Reserve calculated its acreage using boundary surveys and information from its State and Federal partners. When using the more accurate calculation with GIS tools, and including the addition of Lord and Alheim properties and the Moody Division of the Refuge, the total acreage is 2,250. Four organizations hold title to the conservation land within the Wells Reserve. The Department of Conservation's ownership includes submerged lands.

- US Fish and Wildlife Service/Rachel Carson National Wildlife Refuge: 1,428 acres
- State of Maine Department of Conservation: 533 acres
- Town of Wells: 249 acres
- Wells Reserve Management Authority: 40 acres



The York River is under consideration for Wild and Scenic status.

Today, the Wells Reserve focuses its acquisition efforts on the following: 1) the protection of key properties — those that are in the vicinity of and/or adjoin existing protected lands within the Reserve acquisition boundary; and 2) the protection of land outside the recognized boundary in the three targeted watersheds of the Reserve.

Benefits of Protecting Land

The Reserve has long recognized the benefits of protecting land — buffer as well as core areas within the Reserve and in its targeted watershed. Acquisition efforts protect coastal ecosystems, and expand opportunities for research, monitoring, education, and outreach. The following paragraphs specifically address parts of 15 C.F.R. sec. 921.11 that apply to delineating Reserve boundary.

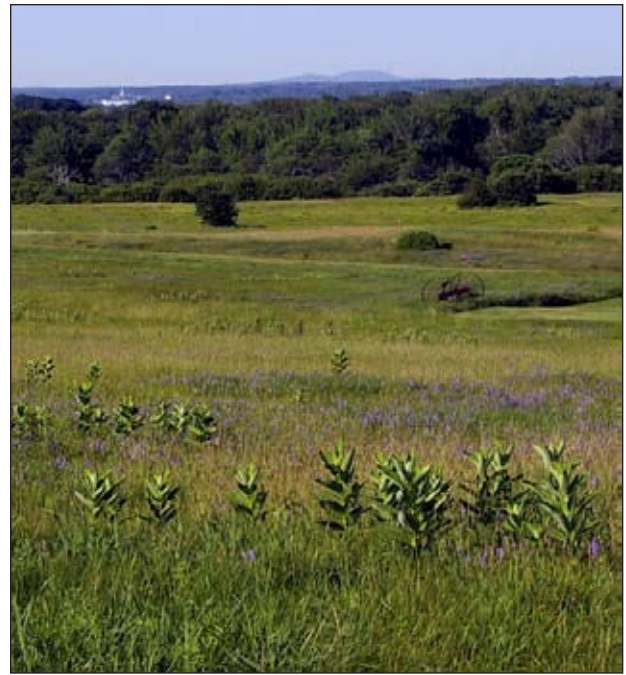
Ecology

Section 921.11(c)(3) requires “...assurances that the Site’s boundaries encompass an adequate portion of key land and water areas of the natural system to approximate an ecological unit to ensure effective conservation.” Our boundary provides these heightened assurances by helping to maintain the integrity of coastal watersheds, and protecting water quality and habitat diversity. The Wells Reserve works with organizations, agencies, and communities to identify and conserve critical resources whose destruction or degradation could diminish the Reserve’s estuarine resources.

Maintain the Integrity of Coastal Watersheds

Coastal land-use patterns in southern Maine are changing from rural forest and farmland to suburban sprawl. Development is fragmenting habitat, affecting wetlands, and degrading water quality and aquatic habitats. These alterations directly and indirectly affect coastal resources and estuarine-dependent species.

Coastal communities, which already have the region’s densest populations, experienced high rates of growth. Vacant oceanfront property no longer exists in Wells. Building lots along the salt marsh edge are rare and expensive. Development pressure now falls on upland acreage, particularly along the banks of coastal rivers and streams. Newly developed areas tend to have large areas of natural vegetation replaced by impervious surfaces, intensively managed lawns, and non-native plant species.



Grassland inholdings within the Reserve boundary were acquired recently, allowing for more effective resource management.

Without conservation efforts, land along the major watercourses flowing through the Wells Reserve will continue to be lost or negatively impacted by development. The Reserve could gradually become a biological island — a protected place surrounded by human development, disconnected from other thriving natural areas with consequent ecosystem imbalances and resource deterioration.

Protecting Water Quality

The economies of southern Maine communities depend heavily on visitors who are attracted to the area’s extensive fine sandy beaches with their clean, swimmable water. Wells and surrounding communities also obtain drinking water from local rivers. Residents and visitors derive work, sustenance, and recreation from local fish and shellfish.

Toxic contaminants that settle onto roads, parking lots, and other impervious surfaces are carried to estuaries in stormwater. Pathogens, nutrients, and toxins from faulty septic systems, pet waste, landscaping, and overtaxed wastewater treatment facilities also diminish water quality.

To a significant extent, the quality of water and aquatic habitats in the tributaries and estuaries of the Reserve depends upon upland forests and wetlands, which filter sediments and pollutants, provide shade, reduce erosion and channelization, and support the food web.

Protecting forested riparian zones is critical for assuring high water quality throughout watersheds.

State and local land-use ordinances do not always prevent the degradation or maintain high water quality over the long term. Conserving riparian and aquatic buffers is the most effective, and lasting, method of protection.

Habitat Protection

The Webhannet River, Little River, and Ogunquit River watersheds support the plant and animal species that use riparian lands exclusively and those that rely on rivers for breeding habitat and travel corridors. Over the years, partner organizations (Rachel Carson NWR, Wells Conservation Commission, Great Works Regional Land Trust, and the Wells/Kennebunk/Kennebunkport Water District) have protected more than 3,500 acres of land in these watersheds. The Reserve intends to continue to work with partners to protect tracts of land within these watersheds that will help with landscape-scale habitat protection.

Education, Outreach, and Training

The Wells Reserve educates the public and coastal decision-makers about estuarine ecosystems and coastal watersheds. Most of the Reserve's education and training programs to date have occurred at the main campus and in the salt marshes, estuarine areas, and uplands adjacent to it. Additional protected property increases opportunities for the Wells Reserve to educate the public, by providing greater access and more diverse habitats.

New interpretive trails in different habitat types expand opportunities for educational programs, while allowing increased access by visitors, school groups, Wells Reserve day-campers, and student researchers. Additional trail offerings would lessen the impact on existing Reserve trails. Water quality and plankton outreach programs aimed at local middle schools, high schools, and adult education classes, would be significantly enhanced by student access to upstream sites.

The Reserve's targeted watershed areas enable the Wells Reserve to offer education, training, and research programs aimed at understanding the effects upstream activities have on estuaries and near-shore waters.

When evaluating parcels for acquisition, the Wells Reserve will use the applied criteria of 15 C.F.R. Section 921.11(c)(6), which references "the site's importance to

education and interpretive efforts, consistent with the need for continued protection of the natural systems."

Research and Monitoring

National Estuarine Research Reserves encompass "... ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical, and biological factors contributing to the diversity of fauna, flora, and natural processes occurring within the estuary." The Reserve's boundary enhances opportunities for the Wells Reserve research and monitoring.

Evaluation Criteria

When assessing parcels for possible acquisition, the following attributes or conditions would be considered favorable:

- Is adjacent to existing protected land or is a large block of unfragmented, undeveloped land.
- Includes riparian land in the targeted watershed areas along the main stems and or major tributaries.
- Connects with other conservation lands.
- Includes riparian land along the main stems of the rivers upstream from the estuaries.
- Contains land in a natural or restorable condition.
- Provides opportunities for environmental education, scientific research, habitat management.
- Is within the proposed Wells Reserve boundary and targeted watersheds
- Contains documented land or water resources of significant ecological value
- Owned by someone interested in conservation options

When assessing parcels for possible acquisition, the following attributes or conditions would be considered unfavorable:

- Expensive for monitoring or stewardship
- Contains known or suspected environmental-hazardous substances
- Likely to be degraded or severely compromised by adjacent land uses
- Inaccessible to staff and visitors for education, research, or stewardship
- Includes buildings or other large structures that cannot be used, subdivided, or sold
- Priced above an appraised fair market value

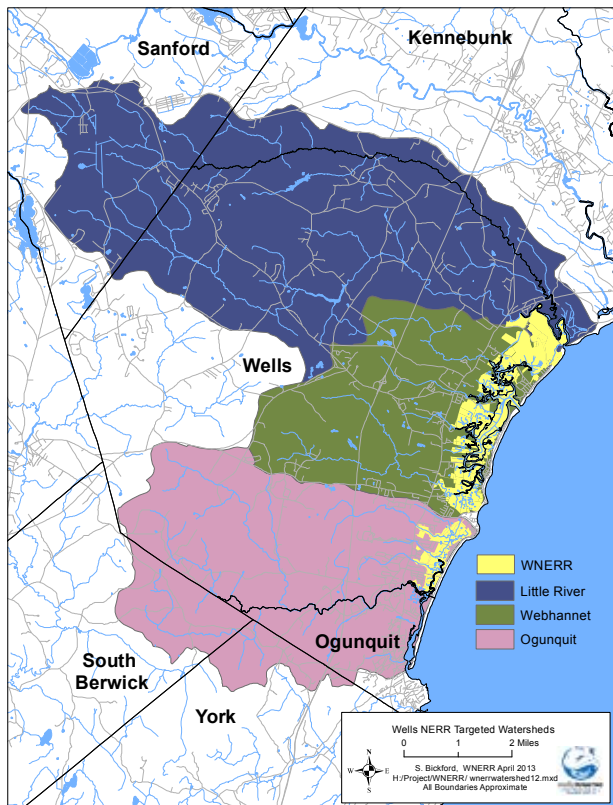
Priorities for Acquisition

Buffer and Core Areas – Section 315 Funds & CELCP Funds

Several parcels of land within our boundary continue to be of high interest to the Reserve, particularly those parcels that are near or adjoin current protected lands. These include both core (salt marshes) and buffer (uplands) areas.

The 27-acre Spiller Property (Buffer): This is located on Laudholm Farm Road. Most of the land abuts conservation land of the Wells Reserve and Rachel Carson NWR. It is a buffer area that consists of a fields, forests, and wetlands. It has habitat for a range of wildlife species. Protection of this parcel would increase the amount of contiguous publicly owned land in the area of the Reserve, and provide for active habitat management activities, and an additional trail, which would link up with our current trail system. This is the highest acquisition priority for the Wells Reserve.

Adjacent Parcels along Rivers and Estuarine Areas (Core and Buffer): While most of the Little River, Webhannet River, and Ogunquit River estuaries, salt marshes, and adjacent uplands are either already protected or developed in areas surrounding the Reserve's



The three targeted watersheds of the Wells Reserve.

current protected area, there still are opportunities for conservation. These lands adjoin or are near conservation land owned by the Town of Wells, the Maine Department of Conservation, or Rachel Carson National Wildlife Refuge. These are relatively small parcels (less than 10 acres) consisting of salt marshes and freshwater marshes, and several upland parcels that help buffer freshwater sections of the Merriland River and salt marshes and estuarine waters of the Webhannet River. The Reserve maintains a list and has GIS maps of these inholding parcels.

Targeted Watersheds and Areas of Conservation Interest – CELCP Funds

The Wells Reserve encompasses one of the largest interconnected back-barrier salt-marsh systems in the state. The waterways that drain into this system are largely in good condition. However, the Webhannet River, the Merriland River and Branch Brook (part of the Little River Watershed), and the Ogunquit River flow through a landscape that is under threat from development. Protecting the rivers that make up the targeted watersheds of the Reserve is crucial for ecosystem viability, thus they are a priority for acquisition. The Reserve and its partners intend to create natural corridors that connect protected coastal areas to upland areas in the headwaters of the rivers.

Focus Area — Little River Watershed (Merriland River and Branch Brook)

The Merriland River and Branch Brook are the major tributaries to the Little River. Currently, over 4,500 acres of the 20,176 acres comprising this watershed have been conserved. For improved resource protection, additional riparian habitats and wildlife corridors should be protected within the Little River watershed.

The land that borders Branch Brook is a high priority. The brook's headwaters are at the Kennebunk Plains and Wells Barrens in Kennebunk and Wells. The Plains and Barrens provide habitat for rare and threatened plants and grassland-nesting birds. More than 90 percent of the global population of the northern blazing star is found there. For over two decades, this rare sandplain grassland has been the focus of land acquisition by The Nature Conservancy, the State of Maine, the Wells Conservation Commission, the Great Works Regional Land Trust, and the Kennebunk/Kennebunkport/Wells Water District. This watershed is also the drinking water supply for three towns.

A second corridor follows the Merriland River. Protection of this river is part of the Merriland River Corridor Project of the Wells Reserve, the Town of Wells Conservation Commission, and Great Works Regional Land Trust. The river's headwaters are located in and near the Fenderson Wildlife Commons, a 500-acre parcel protected by the Wells Conservation Commission. Fenderson Commons is part of a large forested, roadless area supporting diverse community types, including an extremely unusual savanna-like community that features a red maple canopy over sedge meadow ground cover. Fenderson Commons holds an uncommonly rich and varied system of freshwater wetlands, including sphagnum bog, vernal pools, four-season flowing springs, red maple swamps, marshes, and streams. Subsurface water resources may provide a significant source of drinking water, and the Merriland River is a top-rated brook trout fishery. Additions to the Fenderson Wildlife Commons are an acquisition priority for the Wells Reserve and the Town of Wells.

In addition to the Fenderson Commons, the Merriland River watershed includes part of the Great Haith (other sections are in the Webhannet River Watershed noted below), 410-acre conservation area that is one of North America's southernmost raised bogs. This natural area and its surrounding wooded wetlands have been the focus of land acquisition efforts by the Town of Wells for a decade. The 105-acre Tilton property, purchased with the assistance of CELCP funds in 2011, is adjacent to the Haith and a conservation easement held by GWRLT. There is now 645 acres of connected conservation land in this area of town. The Reserve, the Town, and GWRLT will continue to advance the protection goals of the Merriland River Corridor Project in years to come.

Webhannet River Watershed

The headwaters of the Webhannet River flow from a series of extensive wetlands—both open and forested—west of Interstate 95. At this time, much of this land is in a natural condition but very little is permanently protected. The proximity to both U.S. Route 1 and the ocean makes these lands increasingly vulnerable to development. The Wells Conservation Commission and the Wells Reserve have identified lands along the main stem of this river as a priority. The other priority lands within this watershed are those that adjoin the Great Haith.

Ogunquit River Watershed — Tatnic Hills

Land along the Ogunquit River and its headwaters in the Tatnic Hills have long been a priority for conservation organizations. The Tatnic Hills is approximately 10,000 acres encompassing portions of the four towns of Wells, Ogunquit, South Berwick, and York. In addition to the Ogunquit, this area contains headwaters of the Great Works River. Its geological history accounts for the unique bedrock, shallow soils, numerous pocket wetlands, and vernal pools. The density of vernal pools is among the highest in New England. These temporary pools that fill with snow melt and then dry out in summer are critical to the life cycle of many amphibians, turtles — including the state rare Blandings and Spotted, insects, and even a species of shrimp. The significance of the area for its exceptionally high level of biodiversity has been officially recognized by the Great Works Regional Land Trust, Maine Department of Inland Fish and Wildlife, Maine Natural Areas Program, Piscataqua Region Estuaries Partnership, The Nature Conservancy, and the Wells Reserve.

Means of Acquisition

Approaches to Land Protection

When the Wells Reserve determines that a parcel within its acquisition boundary meets evaluation criteria, it will explore various methods to protect the land.

Fee Simple Purchase

The Wells Reserve will purchase the title and all the rights associated with a property. In all but extraordinary circumstances, the purchase price will not exceed Fair Market Value as determined by an appraisal and current market conditions.

Conservation Easement

The Wells Reserve will purchase a conservation easement on the property as long as the conditions of the easement ensure the protection of resources of value to Reserve programs. The purchase price will not exceed Fair Market Value as determined by an appraisal and current market conditions.

Donations

The Reserve will accept donations of land and easements or negotiate their purchase below market value if at all possible. The value of a full or partial donation will be used to match Federal or State land acquisition funds.

Other Methods

The Wells Reserve will consider other appropriate conservation options, such as acquiring land with a Reserved Life Estate or mitigation lands. The Reserve Director and Stewardship Coordinator review all conservation efforts that involve the Reserve, either as principal participant or as a member of a partnership, to determine the impact of public perception. This review will determine whether the goals and objectives of the Reserve are clearly articulated and understood by the public. An information and outreach component will be part of each successful acquisition. If needed the Education Director and CTP Coordinator will provide assistance assessing public perception and designing the information and outreach component of the acquisition.

Holding Title to Acquired Lands

The RMA or one of its partner entity (Town of Wells, Maine Department of Conservation, Maine Department of Inland Fisheries and Wildlife) holds title to property acquired with NOAA (Section 315 or CELCP) and matching funds. Title to properties

purchased by the Reserve's other federal partner, US Fish and Wildlife Service, would be held by that agency, which would have management responsibility. The following statements summarize how the RMA and its other state and municipal partners would manage Reserve lands to which they held title.

- The Reserve Management Authority would manage its lands pursuant to the Wells Reserve management plan and the agreements within. The RMA is one of four State of Maine natural resource agencies that can, by statute, hold title to conservation land.
- The Town of Wells Conservation Lands Ordinance gives management responsibility for conservation lands to the Wells Conservation Commission. The Commission would manage its lands consistent with its ordinances and the grant fund requirements.
- The Maine Department of Conservation and the RMA would sign a memorandum of understanding addressing management of the property.
- The Maine Department of Inland Fisheries and Wildlife and the RMA would sign a Memorandum of Understanding addressing management, research, and education on the property.

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Volunteer Plan

Introduction

The Wells National Estuarine Research Reserve volunteer programs engage a diverse corps of more than 450 people who contribute over 16,000 hours annually to advancing the Reserve's mission. Volunteer programs are directed in close collaboration with Laudholm Trust. The Reserve depends greatly on the expertise and dedication of volunteers. Volunteers have a passion for the Wells Reserve, and take pride in the work they do. In return, the Reserve assists volunteers in gaining life-enhancing experiences, ample opportunities for growth, and enjoyable social contact with other like-minded individuals.

Objective and Strategies

Objective

Attract, nurture, and retain a volunteer work force with a diversity of interests and talents who augment all aspects of our programs.

Strategies

- Recruit and retain a volunteer corps to help accomplish program goals and objectives.
- Create a positive, open, and inclusive environment where all volunteers are encouraged to participate.
- Facilitate opportunities for volunteers to gain knowledge of coastal ecology and other subject areas needed to augment programs and operations.
- Ensure that volunteers are well trained for the tasks they take on and feel valued and appreciated.
- Provide ongoing feedback to volunteers, fostering supportive growth in their positions.

Volunteers

Volunteer Positions

Volunteers fill many roles and accomplish many tasks. They greet visitors, answer phones, teach school groups, lead nature walks, develop educational materials, tend the grounds, improve and patrol trails, run the library, scrape and paint, perform administrative tasks, assist with research projects and enter research data, distribute program information, assist ad hoc committees, monitor environmental conditions, and work with partner organizations on behalf of the Reserve. Volunteers represent a good cross-section of

the year-round and seasonal residents of the Reserve's surrounding communities

Many volunteers serve on the Reserve's advisory committees that meet regularly to guide Reserve staff on research, education, training, and stewardship programs and issues. The Laudholm Nature Crafts Festival is coordinated and run by about 200 volunteers. The other large Reserve and Laudholm Trust event, Punkinfiddle: A National Estuaries Day Celebration, is largely planned and staffed by over 100 volunteers. Volunteers play key roles with International Migratory Bird Day activities, Winter Wildlife Day, Eco Day, and other educational events and community celebrations. In addition, volunteers are involved in projects through collaborations between the Reserve and the Town of Wells, Rachel Carson National Wildlife Refuge, Maine Sea Grant, local schools, businesses, York County Audubon Society, local land trusts, and other partners.

Volunteer Recruitment

The most effective methods of recruiting new volunteers are personal contacts, word of mouth, and engaging visitors in conversation while they are at the Reserve. Formal outreach efforts include presentations to high schools and community groups, United Way, and other organizations, newspaper and magazine articles, the Reserve's website, and listings. Referrals come through the United Way, R.S.V.P. (Retired Senior Volunteer Program), and other organizations. Students frequently approach the Reserve as an avenue for meeting their academic community service requirements. A number of younger volunteers come through court-ordered initiatives. Most often, they are hard-working, eager, and "good-spirited" teens who have made minor infractions with the law. By volunteering with our facilities program they are able to clear their records. Some return voluntarily after their mandated hours are completed.

Major resources for volunteer recruitment are service organizations, such as AmeriCorps and the Vermont-based Volunteers for Peace, an international work camp. Annually, the Reserve applies for and receives a team of eight to twelve volunteers from AmeriCorps NCCC (National Civilian Community Corps) who come for four to eight weeks each fall. The Reserve also recruits six to eight international volunteers for three weeks each summer. These teams of young and



In addition to hundreds of local volunteers, the Reserve often hosts teams of volunteers through the national AmeriCorps program and international Volunteers for Peace camp.

energetic individuals provide concentrated amounts of volunteer time that allow the Reserve to accomplish major stewardship and maintenance projects, as well as assistance with two major events. Other groups come as part of business, school, or camp community service days.

Many current volunteers have been involved since the early days when Laudholm Trust was founded in 1982 to create the Wells Reserve. Newer residents and early retirees find the Wells Reserve / Laudholm community is one that they can integrate into and attach to easily. Volunteering provides opportunities to use and update existing skills and to learn new ones. Volunteers often recruit other volunteers.

Volunteer Training

Staff and experienced volunteers train new volunteers. Volunteers often team up with others until they are comfortable on their own. The most intensive volunteer training is for volunteer naturalists (docents); their education includes at least 25 hours of classroom and field training, with additional opportunities for enrichment. Docent training sessions take place in the

spring, summer, and fall. Education staff and guest speakers (including research staff) provide docents with the knowledge and practice needed to lead watershed-based environmental education programs. Training on new education initiatives that relate to Visitor Center operations are provided for volunteers as needed. For example, the Visitor Center volunteers received separate trainings on the new exhibits and Discovery Program, ensuring that they were familiar with each of these popular educational resources. The Research Program provides thorough training tailored to specific research projects. Water quality, beach profiling, and invasive species monitoring training is extensive enough to give participants the confidence to perform their tasks independently or with a team of fellow volunteers.

Evaluating Volunteers

Volunteers are not usually formally evaluated, but instead receive feedback through training and on-the-job experience. Volunteers often have a knack for knowing whether a job is a good fit. If a particular job

is not a good match for the skills and interests of a volunteer, efforts are made to find a task that is.

Docent Naturalists are provided with more formal feedback than other volunteers. After facilitating a guided school program, docents receive copies of completed teacher evaluations. In addition, Reserve educators are making an increased effort to join docents on their programs each season to evaluate and provide helpful comments and suggestions for improvement.

Rewarding Volunteer Involvement

All volunteers have complimentary access to the Reserve year round. Volunteers are celebrated and honored by the Reserve and Trust staff through a volunteer recognition event in August and a festive holiday party in December. At the volunteer recognition event, awards are given to the highly dedicated volunteers. The most important rewards for volunteers are the constant “thank yous,” notes, and appreciation they receive from Reserve and Trust staff

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Communications

Introduction

The purpose of the communications program is to ensure the Wells Reserve is recognized and rewarded for achievements made in pursuit of its mission. Whether the aim is to raise the profile of research findings, increase attendance for interpretive programs, drive stronger site visitation, enhance the success of local conservation organizations, or help people connect their everyday actions to the health of their environment, our messages will be most effective when crafted and delivered consistently.

Every member of the Wells Reserve staff communicates in some fashion and certain activities of each core program address the objective of the communications program. While the responsibility for focusing on core themes and delivering consistent messages is spread across all staff, communications program implementation hinges on a close collaboration with Laudholm Trust.

Objective and Strategies

Objective

Make people aware of Wells Reserve activities, motivate them to support our programs, and inspire them to take actions that benefit coastal environments.

Strategies

- Reinforce brand recognition among existing audiences and drive new engagement.
- Develop and implement a communication plan that defines audiences, establishes themes and messages, specifies how messages will be delivered, and identifies how impact will be measured.
- Evaluate and adjust the communications plan annually.

Cultivating the Brand

How the Wells Reserve is perceived affects how well it can accomplish its mission. Leaving a positive impression across all audiences will reinforce value and build support.

Challenges and opportunities arise from the Wells Reserve's existence at the deeply loved place long known as Laudholm. While a Wells Reserve brand might ideally connote intellect, the entrenched

Laudholm brand is largely emotional. Managing this dichotomous brand often centers on the communications program, where "Wells Reserve at Laudholm" has become the standard brand name. For those audiences lacking a connection with the historic Laudholm campus—in particular the scientific, the governmental, and the geographically remote—the formal "Wells National Estuarine Research Reserve" is often used. Either name, as well as the simplified "Wells Reserve," should imply expertise, professionalism, and community engagement.

Knowing Our Audience

The communications plan will identify existing audiences across all program areas and allow for capturing new audiences. After 25-plus years of the Reserve, many target audiences are already known, but the degree of their engagement can often be increased. Also, generational and societal changes require continuing adjustments of communication strategies.

Myriad audiences might each require particular approaches for communication. Messages targeting the scientific, educator, conservation, government, visitor, volunteer, and donor communities will sometimes overlap but often differ by necessity. The communications plan will specify how to identify target individuals and groups, manage contact preferences, and guide how each audience will be addressed for maximum impact.

Identify Themes and Corresponding Messages

The communication plan's core themes should reflect the vision and mission of the Wells Reserve and position the organization to achieve its objectives. Once established, they should remain consistent and be repeated so people readily recognize them as uniquely Wells Reserve.

Candidate themes include:

- Water quality, habitat protection, and climate change
- Advancing coastal stewardship through science, education, and conservation
- A community resource leveraging a national network
- A 19th century site supporting a 21st century mission

Our messages may be diverse, but will always reinforce the core themes. Individual messages will promote programs and events, highlight research activities, encourage site use, report newsworthy events, and mark milestones.

Delivering Our Messages

The communications plan will outline multiple methods for delivering messages, building upon strengths of the past while adapting to a fast-changing media environment. Several fundamentals will remain cornerstones of the communications program:

- Build relationships with traditional media outlets at the local and regional level
- Refine electronic communications tools such as the website and email marketing
- Develop a responsive following through social media venues
- Maintain an exemplary print product line
- Present to community and peer groups
- Publish in professional journals and the popular press, produce technical reports, and prepare compelling white papers
- Promote programs off site through advertisements, fliers, street banners, signboards, and displays
- Strengthen internal messaging systems

Measure, Evaluate, and Adapt

Some communication methods will be easily measurable. Newspaper column-inches, website page views, and social media followers, for example, can be directly tied to specific delivery modes. Measures such as program attendance, site visitation, and donations, however, are usually not tied to a specific delivery method, and some desirable outcomes from the communication program would be difficult to measure — enhanced name recognition, improved coastal literacy, increased program effectiveness, or strengthened partnerships, for example. The communication plan will establish appropriate metrics and monitoring techniques for quantifying the program's effectiveness. The plan will also identify when qualitative responses would be appropriately used for assessing program effectiveness.

The communications plan, once established, will be reviewed annually, refined in response to its evaluation, and adapted to emerging trends in communications.

Atlantic Tomcod

Coastal Lowland Status Common, though local claims large ones are caught less often than before in estuarine rivers of our region. Juveniles are occasionally collected during trawl and fyke net surveys.

Life History

Atlantic Tomcod are semianadromous; they do not travel far between salt and fresh water. Spawning occurs in shallow brackish or fresh water over gravelly bottoms and sand. Eggs sink to the bottom in masses. Incubation takes 24 to 30 days at temperatures of 30 to 43°F (4 to 6°C). Young-of-the-year may remain in fresh or slightly brackish water for their first spring and summer, but then drift into estuaries and nearshore waters.

Habitats

Atlantic Tomcod frequently inhabit the mouths of streams or estuaries. Sometimes they are found in salt marshes. Young-of-the-year and small adults are often found in shallow eelgrass beds. Tomcod are resistant to sudden changes in temperature and salinity.

Food Web Position

Food: Mostly copepods as larvae, then small crustaceans, small mollusks, worms, and fish larvae. Also eat their own eggs, larvae, and juveniles.

Predators: Striped Bass and Bluefish.

Fisheries: A good tasting fish, but no longer plentiful enough to support a commercial fishery.

Calendar

Upstream migration: October and November
Spawn: November through February, peaking in January

Downstream migration: February to May; later for young-of-the-year

Northwest Atlantic Range

Southern Labrador to Virginia

Size

Average 3 to 4 in (8 to 10 cm)

Appearance

Atlantic Tomcod closely resemble Atlantic Cod but have rounded tails and small eyes rather than square tails and large eyes. They have a pale lateral line slightly arched over their pectoral fins. Coloring on the back is olive or muddy green, fading to lighter on sides and mottled with dark blotches. The belly is gray or yellow-white.

Further Reading

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Points of Interest

Atlantic Tomcod populations have declined due to loss of access to spawning grounds, overfishing, and exposure to toxins. Because they typically live year-round in estuaries, tomcod are particularly subject to stresses from pollutants.

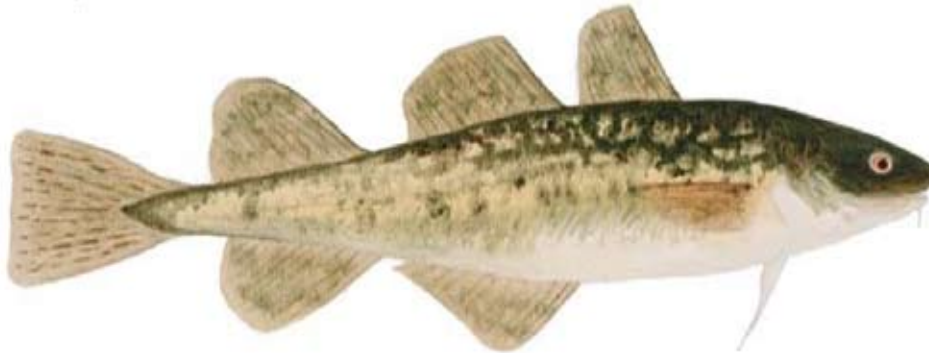
Tomcod produce antifreeze proteins that let them tolerate water temperatures below freezing, leading to their frostfish nickname.

ORDER Gadiformes
FAMILY Gadidae (Codfishes)
SPECIES *Microgadus tomcod*
TSN 154720
AKA Frostfish, Tommy Cod

benthopelagic piscivore

dependence upon estuaries

- adult feeding
- juvenile feeding
- refuge/shelter
- passage



A page from *Coastal Fish of Southern Maine and New Hampshire*, an accessible guide published in 2008 by the Wells Reserve and Laudholm Trust.

APPENDICES

A. Memoranda of Understanding

NOAA AND RMA

USFWS AND RMA

MDPL AND RMA — BEACH AND UPLANDS

MDPL AND RMA — SUBMERGED LANDS

TOWN OF WELLS AND RMA

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B. Conservation Easements

DEED ON LAUDHOLM FARM

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C. State of Maine Legislation

ACT TO ESTABLISH WELLS NERR

ACT TO AMEND THE LAWS REGARDING THE LOCATION OF WELLS NERR

D. Rules for Public Use

E. Natural Resource Laws

F. Federal Regulations

G. Coastal Zone Management Act, section 315

Appendix A-1: NOAA/RMA MOU

**Memorandum of Understanding
Between the
National Oceanic and Atmospheric Administration
and
Wells National Estuarine Research Reserve Management Authority (RMA)**

Detailing the State-Federal Roles in the Wells National Estuarine Research Reserve

This Memorandum of Understanding (MOU) serves to establish the framework for coordination, cooperation and communication regarding the Wells National Estuarine Research Reserve (Wells NERR). This MOU concerns the Office of Ocean and Coastal Resource Management (OCRM), National Ocean Service, National Oceanic and Atmospheric Administration (NOAA) and the Wells NERR Management Authority (RMA).

WHEREAS, NOAA designated the Wells NERR as a National Estuarine Research Reserve (NERR or Reserve) in 1984 pursuant to its authority under Section 315 of the Coastal Zone Management Act of 1972, as amended, (CZMA 16 U.S.C. 1461) and in accordance with implementing regulations at 15 CFR 921.30, for the purpose of creating a natural field laboratory in which to gather information by promoting and conducting scientific studies of the natural and human processes occurring along Maine's coastline to: contribute to the science of estuarine ecosystem processes; enhance the quality of environmental education; and provide the technical information essential to effective coastal zone management to ensure the protection of estuarine ecosystems throughout Maine and the United States; and

WHEREAS, the State of Maine determined that the waters and related coastal habitats of the estuarine ecosystem of the Wells NERR provide opportunities to study the natural estuarine ecosystems as a representative site in the Acadian Region in NOAA's system of biogeographic zoning; and

WHEREAS, the Legislature of the State of Maine created the Reserve Management Authority (RMA) to act on behalf of the State in matters concerning the Wells NERR, the boundaries of which are delineated in the Wells NERR Management Plan (Plan); and

WHEREAS, the Wells NERR has an established program that has been recognized at the state and federal levels for achievement in accomplishing both state and federal goals of natural resource protection through environmental education and outreach, scientific research, environmental monitoring, and on-site resource management practices; and

WHEREAS, the Wells NERR and NOAA have found that the value of the natural and cultural resources of the Wells NERR estuaries to the citizens of Maine and the United States benefit from the management of this site as part of the National Estuarine Research Reserve System (NERRS); and

WHEREAS, the RMA as the responsible agency of the State of Maine for the management of the Wells NERR, and NOAA, as the responsible federal agency for the national administration of the NERRS, acknowledge the value of establishing federal-state cooperation in the long-term management of this Reserve in a manner consistent with the purposes of its designation; and

WHEREAS, the Management Plan for the Wells NERR describes the goals, objectives, plans, administrative structure, and institutional arrangements for this Reserve, including this MOU and others;

NOW, THEREFORE, in consideration of the mutual agreements contained herein, the RMA and NOAA agree, contingent on the availability of funding from the RMA and its partner organizations and the Congress of the United States, respectively, as follows:

ARTICLE 1: STATE-FEDERAL ROLES IN RESERVE MANAGEMENT

A. Wells NERR RMA Responsibilities in Reserve Management

The RMA shall:

be responsible for compliance with federal law and regulations of the NERRS, and goals and objectives of the Reserve's Management Plan;

ensure that the Reserve's Management Plan and annual work plans are consistent with the provisions of the CZMA;

be responsible for the administration and on-site management of the Reserve;

assume the responsibility of managing the Reserve and any ad hoc advisory committees that may be established to address scientific research, environmental education, or on-site management;

ensure protection of the natural and cultural resources of the Reserve, and ensure enforcement of the provisions of state law, including the rules and regulations of the Maine Coastal Program;

annually apply for, budget, and allocate funds received for scientific research and environmental monitoring, environmental education, community outreach, public land acquisition, general program operations, and the construction of the Reserve facilities;

coordinate and conduct active research and monitoring programs at the Reserve with scientists from a variety of institutions to obtain a better understanding of the ecology of the Reserve's ecosystem for application to the improved manageability of the Reserve, similar coastal ecosystems, and the NERRS;

disseminate the information gathered through scientific research to environmental regulators, local school systems, the general public, and any other interested parties;

seek private, local, and state (nonfederal) funding for the facilities and staff required to implement the provisions of the Reserve's Management Plan, such as: field research laboratories; classrooms for environmental education; libraries; administrative offices; interpretive displays; equipment; storage space; and staff to perform the duties related to the management and stewardship of the natural resources and buildings of the Reserve;

maintain liaison with local, regional, state, and federal policy makers, regulators, and the general public;

seek partnerships for the protection of the natural and cultural resources of the Reserve with residents, commerce, industry, adjacent landowners, government agencies at the local, state, and federal levels, and any other appropriate parties;

provide for public recreational uses that are compatible with natural and cultural resource protection;

Respond to NOAA's requests for information and respond to evaluation findings made pursuant to Section 312 of the CZMA.

B. Federal Role in Reserve Operation

OCRM will serve to administer the provisions of Section 315 of the CZMA to ensure that the Reserve operates in accordance with the goals of the NERRS and the Plan. These responsibilities are subject to the availability of appropriated funds. In carrying out its responsibilities, OCRM will:

Review and process applications for financial assistance from the Wells NERR and other eligible entities, consistent with 15 CFR Part 921, for the operation of the Reserve and acquisition, development, management, education, research and monitoring programs for the benefit of the Reserve;

This MOU does not create any obligation on the part of OCRM to award financial assistance.

Make periodic evaluations in accordance with Section 312 of the CZMA to measure the Wells NERR's performance in Plan implementation;

Advise the Wells NERR of existing and emerging national and regional issues; and

Establish an information exchange network cataloging all available research data and educational material developed on each Reserve included within the NERRS.

C. General Provisions

Nothing in this MOU or subsequent financial assistance awards shall obligate any party in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.

Both parties agree to comply with all applicable federal and state laws regulating ethical conduct of public officers and employees.

Each party will comply with all applicable laws, regulations, and executive orders relative to Equal Employment Opportunity.

Upon termination of this MOU or any subsequent financial assistance awards, any equipment purchased for studies initiated in furtherance of this MOU will be returned to the agency of initial purchase.

A free exchange of research and assessment data among agencies is encouraged and is necessary to insure the success of these cooperative studies.

D. Other Provisions

Nothing in this MOU diminishes the independent authority or coordination responsibility of each agency in administering its statutory obligations. Nothing herein is intended to conflict with current agency directives. If the terms of this MOU are inconsistent with existing directives of any agency entering into this MOU, then those portions which are determined to be inconsistent shall be invalid, but the remaining terms not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of this MOU, all necessary changes will be made by either an amendment to this MOU or by entering into a new MOU, whichever is deemed expedient to the interest of all Parties. Should disagreement arise on the interpretation of the provisions of this MOU, or amendments thereto, that cannot be resolved at the operatin

resolved at the operating level, the area(s) of disagreement shall be stated, in writing, by each party and presented to the other parties for consideration.

ARTICLE II: REAL PROPERTY ACQUIRED FOR THE PURPOSE OF THE RESERVE

As well as agreeing to adhere to the rest of the provisions set forth at 15 CFR Part 921, RMA agrees to the conditions set forth at 15 CFR 921.21(e), which specify the legal documentation requirements concerning the use and disposition of real property acquired for Reserve purposes with Federal funds under Section 315 of the CZMA.

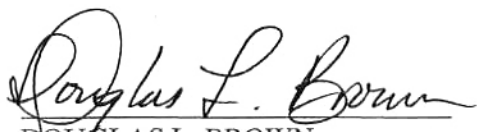
ARTICLE III. PROGRAM EVALUATION

OCRM will schedule periodic evaluations of the Wells NERR's performance in meeting the terms of financial assistance awards, in implementing the Reserve's Management Plan and in meeting the provisions of this MOU. Where findings of deficiency occur, NOAA may initiate action in accordance with the designation withdrawal procedures established by the CZMA and applicable regulations.

ARTICLE IV. EFFECTIVE DATE, REVIEW, AMENDMENT AND TERMINATION

This MOU is effective on the date of execution and replaces the previous MOU with the RMA dated September 10, 1991. The MOU will be reviewed periodically. This MOU may be amended by the mutual consent of the parties. This MOU may be terminated by mutual consent of the Parties, or by NOAA if it withdraws designation of Wells as a NERR, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 CFR Part 923 Subpart L. Should this MOU be terminated, reimbursement of unexpended funds shall be determined on a pro rata basis according to the amount of work done by the Parties at the time of termination.

IN WITNESS THEREOF, the Parties hereto have caused this MOU to be executed.



DOUGLAS L. BROWN
ACTING DIRECTOR
OFFICE OF OCEAN AND COASTAL
RESOURCE MANAGEMENT
NATIONAL OCEAN SERVICE
NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

5-19-06

Date



SUSAN ROUILLARD
CHAIR, WELLS NERR MANAGEMENT AUTHORITY
STATE OF MAINE

5-22-06

Date

Appendix A-2: USFWS/RMA MOU

DCN: 50130-6-K014

**Memorandum of Understanding
Between the
United States Fish and Wildlife Service
and
Wells National Estuarine Research Reserve Management Authority (RMA)**

This agreement amends and supersedes the Memorandum of Understanding entered into on April 2, 1997.

MEMORANDUM OF UNDERSTANDING

This agreement is made and entered on this 26 day of May 2006, by and between the United States Fish and Wildlife Service, hereinafter, "FWS," and the Wells National Estuarine Research Reserve Management Authority, hereinafter, the "Authority," for the purpose of establishing the respective rights, responsibilities and obligations of the FWS, and the Authority regarding property located within the boundaries of the Wells National Estuarine Research Reserve, hereinafter, the "Reserve."

The Wells National Estuarine Research Reserve was designated in 1984 pursuant to Section 315 of the Federal Coastal Zone Management Act of 1972, as amended, to provide for long-term estuarine research, education, interpretation and resource management. The Wells Reserve is located on the coast of southern Maine and faces the Atlantic Ocean. The Reserve encompasses approximately 2000 acres of tidally flushed wetlands, riparian and transitional upland fields and forests within the Little River, Webhannet and Ogunquit watersheds.

WITNESSETH THAT,

WHEREAS, a cooperative effort of the Wells National Estuarine Research Reserve, the Laudholm Trust, the Town of Wells, the Maine Bureau of Parks and Lands, the Maine State Planning Office, and the FWS produced a Wells National Estuarine Research Reserve Management Plan that provides a framework for future management responsibilities by all agencies to accomplish the goals and objectives for research, education, resource management, and facility development; and

WHEREAS, in 1990, the 114th Legislature of the State of Maine established the Wells National Estuarine Research Reserve Management Authority for the purpose of managing lands in the Reserve which were owned or leased by the Authority or for which a special agreement with a cooperating agency had been entered into; and

WHEREAS, in 2003, the 121st Legislature re-established the Reserve boundary (LD 777) to include

land in the Town of Wells between the Little River to the north and the Ogunquit River to the south, with the boundary to the east paralleling the shoreline, excluding the shoreline development, and to the west lands adjacent to coastal wetlands and the drainage basins of their tributary streams; and

WHEREAS the FWS is an agency of the United States Government responsible for the conservation and management of certain nationally significant wildlife resources; and

WHEREAS the parties believe that the purposes of the Reserve are substantially compatible with the purpose of the Refuge; and

WHEREAS, according to the policies and regulations of the National Estuarine Research Reserve System, if management of a proposed national estuarine research reserve will not conflict with FWS use and control of Federally-owned lands, such cooperation and coordination is encouraged to the maximum extent feasible; and

WHEREAS, under 16 U.S.C. § 661 and/or 16 U. S. C. § 668dd(a)(4)(E), the Secretary of the Interior is authorized, in administering National Wildlife Refuge lands, to enter into agreements with public and private agencies; and

WHEREAS the Secretary of the Interior is further authorized under the Fish and Wildlife Act of 1956, 70 Stat. 1119, as amended, 17 U.S.C. 742 et seq., to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources.

NOW, THEREFORE, IT IS MUTUALLY AGREED, as follows:

I. The parties agree that the FWS may manage the land now owned, or to be acquired by, the Authority, the Town, or the Maine Department of Conservation, within the boundaries of the Refuge as an integral part of the Rachel Carson National Wildlife Refuge, and enforce thereon all applicable laws, regulations, and policies on the condition that the management exercised by the FWS over such lands shall be consistent with the goals, policies, and regulations of the National Estuarine Research Reserve System and the Authority. The FWS may continue to manage such lands as described above so long as this agreement remains in effect.

II. To the greatest extent practicable, the FWS will carry out its activities relate to the management of that part of the Refuge included within Reserve boundaries consistent with the goals of the National Estuarine Research Reserve System and the Wells National Estuarine Research Reserve Management Plan. The Authority will, to the extent practicable, manage the Reserve consistent with the Federal authorities under which the Refuge was acquired and is managed by the FWS.

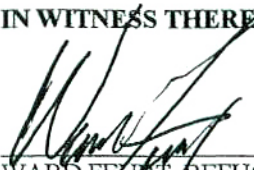
III. Nothing contained in this Agreement shall be construed as binding the FWS to expend, in any one fiscal year, any sum in excess of appropriations made by Congress or administratively allocated for the purpose of this Agreement for the fiscal year, or to involve the FWS in any contract or other obligation for the further expenditure of money in excess of such appropriations or allocations.

IV. The rights and benefits conferred by this Agreement shall be subject to the laws of the United States governing the FWS and to the rules and regulations promulgated under such laws and Section 315 of the Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.), and its implementing regulations.

V. This Agreement becomes effective on the date of signing of the last signature below. The term of this Agreement shall be for five years with terms for renewal. The Agreement may be terminated by any party upon six months written notice to the other parties, except that the Agreement shall be terminated upon the exclusion of all Refuge lands from the Reserve.

VI. The parties agree that the FWS will undertake no actions to block the Webhannet River estuary so long as this Agreement remains in effect. However, the parties further agree that, in the event that the estuary should be closed by natural processes, the FWS reserves the right to restore flowage.

IN WITNESS THEREOF, the Parties hereto have caused this MOU to be executed.



WARD FEURT, REFUGE MANAGER
RACHEL CARSON NWR
US FISH AND WILDLIFE SERVICE
US DEPARTMENT OF INTERIOR



SUSAN ROUILLARD, CHAIR
WELLS NERR MANAGEMENT AUTHORITY
STATE OF MAINE

 May 26 / 2006
Date

 May 26, 2006
Date

Appendix A-3: BPL/RMA MOU (Laudholm Park)

Memorandum of Understanding
Between the
Bureau of Parks and Lands of the Maine Department of Conservation
and
Wells National Estuarine Research Reserve Management Authority (RMA)

This Agreement is made and entered into by and between the Bureau of Parks and Lands of the Maine Department of Conservation, acting by and through its Director, pursuant to 12 M.R.S.A. Chap. 220, Section 1815, (hereinafter called the "Bureau"), and the Wells National Estuarine Research Reserve Management Authority (hereinafter called the "Authority"), an agency of the State of Maine, acting by and through its Chairman.

WITNESSETH that

WHEREAS, the State of Maine owns certain lands in the town of Wells, York County, known as the Laudholm Park Property, (the "Property"), which is currently managed by the Authority as part of the Wells National Estuarine Research Reserve ("Wells NERR"); and

WHEREAS, the Authority desires to manage the Property, which is described in the York County Registry of Deeds in Book 3819, Page 187, and Plan Book 147, Page 34, being 230.5 acres more or less, in a manner consistent with the Wells NERR Management Plan;

WHEREAS, in 1990 the 114th Legislature established the Authority for the purpose of managing lands in the federally designated Wells NERR which are owned or leased by the Authority or for which a special agreement with a cooperating agency had been entered into; and

WHEREAS, the Bureau has determined that the use of the Property as a natural area for the purposes of the education, research, and stewardship programs of the Wells National Estuarine Research Reserve is in the public interest; and

WHEREAS, the Bureau's right to develop additional parking for public use of Laudholm Beach shall be a condition of the continuing inclusion of the Property within the Wells NERR, should the need be determined in the future; and

WHEREAS, the Authority recognizes the Bureau's retained right to provide additional parking for beach access.

NOW THEREFORE, the parties hereto agree to the following terms and conditions:

ARTICLE 1. PREMISES: The Property, which is subject to the terms and conditions of this Agreement, are those premises located in the Town of Wells, County of York.

ARTICLE 2. TERM: This agreement shall commence upon signing by all parties and approval by the Governor and continue in effect from year to year until termination by either the Bureau or the Authority pursuant to Articles 8 and 9.

ARTICLE 3. PERMITTED USES: The Authority shall have the right to use the Property for public purposes in accordance with the Wells NERR Management Plan.

ARTICLE 5. LIENS: The Authority shall be responsible for all tax levies, assessments, license fees and permit fees. The Authority shall keep the Property free and clear from all mechanics liens for work or labor done, services performed, appliances, water supplied, sewerage disposed of, power contributed, used or furnished in or about the Property for or in connection with any operation of the Authority, or any alterations, improvements, repairs, or additions which the Authority may make or permit or cause to be made, or any work in connection by, for, or permitted by the Authority on or about the Property.

ARTICLE 6. ASSIGNMENTS: This Agreement may not be assigned without the prior written consent of the Bureau.

ARTICLE 7. REQUIREMENTS OF LAW: The Authority is responsible for complying with all state and municipal laws and regulations.

ARTICLE 8. DEFAULT: If the Authority fails to perform any of the agreements, terms, covenants, or conditions hereof and such default continues for a period of 30 days after written notice thereof to the Authority by the Bureau, unless otherwise agreed by the parties, said Agreement is terminated and the Authority shall have 30 days to remove all personal property belonging to it. Upon occurrence of an event of default, in the event the Authority does not remove personal property within the 30-day period, the Bureau may reenter the Property and remove all persons and all or any property there from, either by summary proceedings or by any suitable action or proceeding at law, and to repossess and enjoy the Property.

ARTICLE 9. CANCELLATION: The Authority may terminate this agreement with 60 days notice to the Bureau. 60 days after its written notice to the Bureau of its intent to cancel this agreement, the agreement will be deemed terminated and the Authority shall (a) peaceably and quietly surrender and deliver to the Bureau the Property together with the improvements thereon and (b) within 30 days thereafter remove all trade fixtures, equipment, and personal property owned by the Authority and located on the Property with respects to which the Bureau has given the Authority notice to remove, and the Authority shall repair any damage to the Property caused by such removal.

ARTICLE 10. ACCESS TO PREMISES: The Authority shall permit the Bureau and its agents and designees to enter the Property for the purpose of inspection in a manner that does not (except in cases the Bureau deems to be emergencies) unreasonably interfere with the Authority's use thereof at all reasonable hours.

ARTICLE 11. NOTICES: Wherever it is provided in this Agreement that notice, demand, request or other communication shall or may be given to or served upon either of the parties by the other, and whenever either of the parties desire to give or serve upon the other any notice, demand, request or other communication with respect to this Agreement or the Property, each

such notice, demand, request or other communication shall be in writing, prepaid registered mail, and addressed to the Authority or the Bureau at the addresses as follows:

Chair,
Wells National Estuarine Research Management Authority
Wells National Estuarine Research Reserve
342 Laudholm Farm Road
Wells, ME 04090


Director,
Bureau of Parks and Lands
Maine Department of Conservation
22 State House Station
Augusta, ME 04333

ARTICLE 12. SEPARABILITY: The Bureau and the Authority intend and believe that each provision in this Agreement complies with all applicable municipal, county, state and federal laws. However, if any provision or if any portion thereof in this Agreement is found by a court of law to be in violation of any ordinance, statute, law or public policy, and if such court should declare such portion or provisions of this Agreement to be illegal, invalid, unlawful, void or unenforceable as written then it is the intent both of the Bureau and the Authority that the rights, obligations, and interest under the remainder of this Agreement shall continue in full force and effect to the extent reasonably possible.

ARTICLE 13. GOVERNOR'S APPROVAL: Pursuant to 12 MRSA, Chap 220, Section 1815, this agreement shall not be effective unless approved by the Governor.

ARTICLE 14. ENTIRE AGREEMENT: This document contains the entire agreement between the parties and cannot be changed or terminated orally, but only by an instrument in writing executed by the Parties.

For the Bureau of Parks and Lands:



David Soucy, Director
Bureau of Parks and Lands

1/27/06

Date

For the Wells NERR Management Authority:

 2/2/06

Susan Rouillard, Chair

Appendix A-4: BPL/RMA MOU (submerged lands)

Memorandum of Understanding

Between the

Maine Department of Conservation/Bureau of Parks and Lands

and

Wells National Estuarine Research Reserve Management Authority (RMA)

This Agreement is made and entered into by and between the Maine Department of Conservation, Bureau of Parks and Lands (hereinafter the Bureau), and the Wells National Estuarine Research Reserve Management Authority (hereinafter the “Authority”), for the purpose of establishing the respective rights and responsibilities of the Bureau and the Authority regarding the submerged lands located within the boundaries of the Wells National Estuarine Research Reserve (Wells NERR”).

Whereas under 12 M.R.S.A. Chapter 220, Section 1838-1., the Bureau is authorized, with the consent of the receiving agency, Governor and Commissioner of the Maine State Department of Conservation, in managing submerged lands, to enter into agreements with public agencies; and

Whereas under Private and Special Law 108, the Authority is authorized to manage the Wells NERR, and to enter agreements with public agencies; and

NOW THEREFORE, IT IS MUTUALLY AGREED, as follows:

1. The Bureau retains ownership and management authority of all submerged lands as defined by Title 12 M.R.S.A. Sections 1801 and 1862,
2. Publicly-owned submerged lands will remain within the boundaries of the Wells NERR so long as the Authority does not attempt to unreasonably restrict public access ways to, or public trust rights in, on or over submerged lands.
3. The Bureau maintains its authority to issue leases and easements on submerged lands within the Wells NERR in accordance with Title 12 M.R.S.A. Sections 1801 and 1862.
4. In evaluating lease or easement applications for uses on submerged lands within the Wells NERR, the Bureau shall follow the guidelines in the Submerged Lands Rules, Chapter 53 Bureau of Parks and Lands, and the Submerged Lands Act, 12 MRSA Sections 1801 and 1862.
5. This Agreement becomes effective on the date of signing of the last signature below and will continue in effect until terminated. The Agreement may be terminated by any party upon six months written notice to the other parties.

For the Bureau of Parks and Lands:



David Soucy, Director
Bureau of Parks and Lands

1/27/06
Date

For the Wells NERR Management Authority:



Susan Rouillard, Chair

2/2/06
Date

Appendix A-5: Wells/RMA MOU

**Memorandum of Understanding
Between the
Town of Wells
and
Wells National Estuarine Research Reserve Management Authority (RMA)**

This Memorandum of Understanding (MOU) serves to establish the framework for coordination, cooperation and communication between the Wells National Estuarine Research Reserve (Wells NERR) and the Town of Wells.

WHEREAS the Town of Wells and its inhabitants were instrumental in the protection of Laudholm Farm and in the creation of the Wells NERR in the mid-1980s;

WHEREAS the Town of Wells continues to be a key partner in protection of the Wells NERR and in the implementation of its mission as center for coastal science, education, and conservation;

WHEREAS THE Reserve Management Authority (RMA) and the Town of Wells (Town) are respectively the Holder and the Grantor of An Easement Deed dated June 30, 1992, and recorded in the York County Registry of Deeds, Book 6214, Page 54; and

WHEREAS the aforesaid Easement concerns real estate known as Laudholm Farm in Wells, Maine; and

WHEREAS the Property was purchased with funds obtained in part from the National Oceanic and Atmospheric Administration, Laudholm Trust, and the State of Maine;

WHEREAS, the Maine Department of Conservation's Bureau of Parks and Lands ("Bureau") also owns certain lands in the town of Wells, known as the Laudholm Park Property ("Park Property") which is currently managed by the RMA as part of the Wells NERR;

WHEREAS the Bureau has determined that the use of the Park Property as a natural area for the purposes of the education, research, and conservation programs of the Wells NERR is in the public interest, and that the Bureau retains the right to develop additional parking for public use of Park Property should the need be determined in the future;

NOW THEREFORE, the parties hereto agree to the following terms and conditions:

The Town of Wells shall have a representative on the Wells NERR's governing board, the RMA, and helps to establish policies that guide the Wells NERR in its mission as a National Oceanic and Atmospheric Administration-designated National Estuarine Research Reserve;

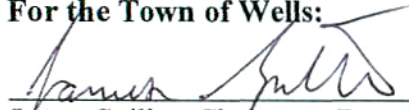
The RMA and the Town recognize that the right for the Bureau to develop additional parking for public access on the Park Property is a condition of the Town granting of the easement to the RMA; and that the provision of additional parking is consistent with the recreational aspects of

the Easement's goals and nothing in the Easement shall be construed against the development of parking to facilitate public access.


Potential Invalidity:

In the event the Easement Deed dated June 30, 1992 and recorded in York County Registry of deeds, Book 6214, Page 54, is determined to be invalid, or in the event said easement by its own provisions or by operation of law terminates, the Town will within ten (10) days of the determination or occurrence convey to RMA or its successor managing entity, title in fee simple to the real estate subject to said easement.

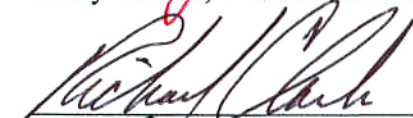
For the Town of Wells:


James Spiller, Chairman, Board of Selectman


Date: 1-17-06


Harry Tomah, Vice Chairman


Date: 1/17/06


Richard Clark, Selectman

Date: 17 JAN 2006

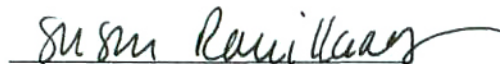

David Mackenzie, Selectman

Date: 1/13/06


Scott Defelice, Selectman

Date: 1/17/06

For the Wells NERR Management Authority:


Susan Rouillard, Chair

Date: 1/31/06

Appendix A-6: Laudholm Trust/Wells NERR MOU

Memorandum of Understanding Between Laudholm Trust and Wells National Estuarine Research Reserve

Whereas the Wells National Estuarine Research Reserve (Wells Reserve) and Laudholm Trust are dedicated to protecting and restoring coastal ecosystems through research, education, and stewardship, and to the preservation of the historic buildings and lands of Laudholm; and

Whereas the Wells Reserve is part of a network of 28 National Estuarine Research Reserves (NERR) that operate according to cooperative agreements and management plans approved by the National Oceanic and Atmospheric Administration (NOAA); and

Whereas the Laudholm Trust is the private, nonprofit organization that spearheaded the effort to create and protect the Wells Reserve and whose continued involvement remains vital to the success of the organization; and

Whereas each NERR is a partnership between NOAA and a coastal state; and that the State partner with NOAA in Maine is the Reserve Management Authority (RMA), an independent state agency created by the Maine Legislature to oversee the affairs of the Wells Reserve; and

Whereas the RMA is a public-private partnership composed of organizations that include Laudholm Trust, NOAA/Estuarine Reserves Division (ex-officio), Maine Department of Agriculture, Conservation, and Forestry, the U.S. Fish and Wildlife Service, the Town of Wells, and the Maine Coastal Program (ex officio), as well as a scientist appointed by the Governor; and

Whereas the Wells Reserve encompasses historic Laudholm Farm and the Alheim Commons and has the responsibility to maintain and operate the buildings, grounds, and the adjacent natural land; and

Whereas the Wells Reserve depends on the financial support of NOAA, private support from Laudholm Trust, and external grant support from other local, state, private, and federal sources; and

Whereas the Laudholm Trust is the primary funding partner of the Wells Reserve, providing the required non-federal match for the Reserve's NOAA financial awards; and

Whereas Laudholm Trust has a primary responsibility to raise funds and build membership in support of the Wells Reserve, and that the capacity of the Reserve to deliver its programs and operate and care for its buildings and land is directly tied to this private support; and

Whereas Laudholm Trust provides in-kind staff and program support for communications and volunteer recognition activities; and

Whereas the Trust President is employed by Laudholm Trust as its chief executive who reports to its Board of Trustees, and who serves as the Chair of the RMA Board of Directors;

Whereas the Wells Reserve Director is employed by the RMA as its chief executive who reports to its six-member Board of Directors;

Now, therefore, both parties have agreed to the following:

The Wells Reserve will provide and maintain office space as outlined in the Lease Agreement dated June 9, 2003, and further provide, as it does to its own staff, the necessary equipment, supplies, utilities, and other overhead support necessary for Laudholm Trust to carry out its routine business and fundraising activities on behalf of the Wells Reserve; and

The Wells Reserve is responsible for the development and management of the core programs required by NOAA and that of other grantors in program areas such as: research and monitoring, education and training, and coastal resource stewardship; and

Laudholm Trust and the Wells Reserve will work together to develop organizational budgets, work plans and strategic plans for their respective organizations that take into account one another's needs and goals; and

Laudholm Trust and the Wells Reserve may apply for grants together or separately to support education and research programs, land acquisition and management efforts, building needs, and operations, consistent with their shared mission and respective management/strategic plans, but agree that in order to avoid competition, conflict of interests, or duplication, to coordinate the application for such funds; and

The Laudholm Trust President, in the role as Chair of the RMA, provides input to the Reserve Director on the direction of Reserve programs and the management of its facilities and natural land, consistent with the NOAA-approved Management Plan; and

The Trust President and Reserve Director seek to actively engage and inform RMA members and Laudholm Trustees of activities and projects, and provide updates at regularly scheduled meetings; and

The operations and staffing of the Visitor Center overseen by the Volunteer and Visitor Services Coordinator is the responsibility of the Wells Reserve; and

The Wells Reserve and Laudholm Trust share volunteer resources and the responsibility of recruiting, encouraging, and cultivating volunteer involvement in the Wells Reserve programs and in Laudholm Trust community support and fundraising activities; and

Laudholm Trust Board of Trustees will have representation on the Reserve's various Program Advisory Committees, as needed; and

Recognizing that successful private fundraising and community support are essential to the future health of the Wells Reserve organization and its programs and facilities, the Wells

Reserve makes the facilities and the grounds of the Reserve, including the Alheim Commons property, available for Laudholm Trust to raise funds through special events, rentals to outside groups, and for various community activities, provided they do not unduly interfere with the core programs and the true intent of the Wells Reserve; and

Promotional signage, marketing, and any communications materials that are intended for the general public for the purposes of encouraging fundraising or membership support shall be developed in concert by the Director of the Wells Reserve and the President of Laudholm Trust; and

All funds given to the Wells Reserve by Laudholm Trust are donations for the sole purpose of meeting the annual operational, programmatic, and capital needs of the Reserve -- and to cover the facility and non-fundraising administrative costs of the Trust -- which will be accounted for as part of annual audits; and

All program fees collected by the education program, office and dorm room rentals, parking fees, donation boxes, and other Wells Reserve earned income are separate and distinct from contributions made by Laudholm Trust; and

Any electronic or hard-copy publication created cooperatively by the Wells Reserve and Laudholm Trust shall bear the imprint of the Wells Reserve, Laudholm Trust, NOAA and other significant contributor and/or partner to the project; and

Laudholm Trust and the Wells Reserve will continually seek ways to cooperate and to advance their shared mission and will remain mindful and respectful of the distinct organizational differences between them.

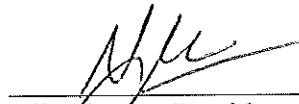
This agreement may be amended by mutual agreement with 60 days notice and must be reviewed every two years.



Paul M. Dest, Director
Wells Reserve

7.23.12

Date



Nik Charov, President
Laudholm Trust

7/23/12

Date

6.7.12

APPENDICES

A. Memoranda of Understanding

NOAA AND RMA

USFWS AND RMA

MDPL AND RMA — BEACH AND UPLANDS

MDPL AND RMA — SUBMERGED LANDS

TOWN OF WELLS AND RMA

LAUDHOLM TRUST AND RMA

B. Conservation Easements

DEED ON LAUDHOLM FARM

DEED AT WELLS HARBOR

C. State of Maine Legislation

ACT TO ESTABLISH WELLS NERR

ACT TO AMEND THE LAWS REGARDING THE LOCATION OF WELLS NERR

D. Rules for Public Use

E. Natural Resource Laws

F. Federal Regulations

G. Coastal Zone Management Act, section 315

Appendix B-1: Laudholm Farm Easement

BK 6214 PG 054

12200

EASEMENT DEED ON
LAUDHOLM FARM IN WELLS MAINE
TO THE WELLS NATIONAL ESTUARINE
RESEARCH RESERVE MANAGEMENT AUTHORITY

THIS INDENTURE, made this 30 day of June, 1992, by and between the Inhabitants of the Town of Wells, a municipal body, corporate and politic, having its town office at Route 109, Wells, County of York and State of Maine (hereinafter referred to as the "Town") and the Wells National Estuarine Research Reserve Management Authority, an agency of the State of Maine (hereinafter referred to as the "RMA"),

WITNESSETH:

WHEREAS, the Town holds title to approximately 213 acres of real property (hereinafter referred to as the "Property") situated in the Town of Wells, County of York and State of Maine, which parcel is described in two deeds, one from Mary W. Kline, Charles E. Lord, and Nathaniel N. Lord, et als. to the Town, dated October 24th, 1984 and recorded at the York County Registry of Deeds at Book 3400, Page 163 on October 24th, 1984, and one from Mary W. Kline, Nathaniel N. Lord and Jonathan E. Lord et als to the Town, dated April 18, 1986, and recorded at the York County Registry of Deeds at Book 3819, Page 173 on April 24, 1986, excepting from the latter deed that property conveyed to the State of Maine by a Quit Claim Deed dated April 24, 1986 and recorded at the York County Registry of Deeds at Book 3819, Page 187 on April 24, 1986, said Property being more particularly described in Exhibit A attached hereto and made a part hereof by reference; and depicted on the plot plan attached hereto as Exhibit B and made a part hereof by reference; and

WHEREAS, said Property was conveyed to the Town to be maintained as a part of the Wells National Estuarine Research Reserve, created in 1984 as part of the Federal National Estuarine Research Reserve System authorized by 15 Code of Federal Regulations (CFR), Part 921; and

WHEREAS, rights of ownership to the Property are limited by 15 CFR Part 921, the Federal regulations governing National Estuarine Research Reserves; and

WHEREAS, the Property was purchased with Federal funds and funds raised by Laudholm Trust, a non profit Maine corporation, for that purpose; and

WHEREAS, a great deal of appreciation is owed to the Town and its citizens for the initial role it has played as Lead Agent in the Establishment of the Wells National Estuarine Research Reserve; and

200

WHEREAS, in 1990, the 114th Legislature of the State of Maine established the Wells National Estuarine Research Reserve Management Authority for the purposes of managing said Property; and

WHEREAS, a primary purpose of the RMA is to expand the knowledge and understanding of estuaries throughout society so that these vital areas will be properly managed as important natural resources; and

WHEREAS, the Property is a tract of wetland and upland having significant value in its present state as a natural area adjacent to the Rachel Carson National Wildlife Refuge and is an integral part of the Wells National Estuarine Research Reserve; and

WHEREAS, the Town and the RMA recognize the unique value of the Property as an important natural habitat in a region which is subject to considerable development pressure and have the common purpose of conserving the natural values of the Property; and

WHEREAS, the Town and the RMA have the desire to make the Property available to the public as consistent with the Wells National Estuarine Research Reserve Management Plan; and

WHEREAS, the Town and the RMA have determined that for the permanent preservation of the Property for research, education, preservation of open space and scenic values and public recreation as consistent with the Wells National Estuarine Research Reserve Management Plan, it is in the public interest to place an Easement upon the Property; and

WHEREAS, this Indenture provides limitations on the use of the Property to preserve in perpetuity the integrity of the coastal ecosystem and the traditional and scenic appearance of the landscape as expressed in the Wells National Estuarine Research Reserve Management Plan; and

WHEREAS, the RMA recognizes that the right to develop, on land owned by the State of Maine, additional parking, up to a total parking capacity of 70 cars, for public access to, and use of, Laudholm Beach is a condition of the granting of this Easement; and

WHEREAS, by a vote of its Legislative Body at a special Town Meeting held on June 30, 1992, the Town was authorized to grant an Easement upon the Property for the purposes set forth herein;

NOW, THEREFORE, in consideration of the facts above recited and the covenants herein contained, the Town does hereby grant to the RMA, its successors and assigns forever and in perpetuity, for the benefit of the general public and the RMA, as an absolute and unconditional gift, an Easement in, to, on, over, under and across the Property as follows:

- A. The right of the RMA to enforce by proceedings at law or in equity the rights, covenants and restrictions hereinafter set forth, including the right, upon a breach of any covenant, condition or restriction set forth in this Easement Deed, to require restoration of the Property to its condition as of the date of this grant, subject to any permitted changes made after the date of this grant; and
- B. The right of the RMA to enter and occupy the Property together with the right to enter and occupy all existing and future structures thereon; and
- C. The right of the public to access the Property in accordance with the Wells National Estuarine Research Reserve Management Plan; and
- D. The right of the RMA to prohibit any taint, corruption or pollution of whatever character to the Property and its associated waters, wetlands and habitats; and
- E. The right of the RMA to conduct a professional survey of the Property or any part thereof to the extent necessary to determine if there is a violation of this Easement, when proof of a boundary is a material issue to this determination; and
- F. The right of the RMA to establish and maintain footpaths provided that they are located and designed in a manner to prevent unreasonable soil erosion; and
- G. The right of the RMA to post interpretive and/or educational signs on the Property and the right to maintain and replace said signs; and
- H. The right of the RMA to manage (including, but not limited to, allowing or conducting research and educational activities and managing access) the Property in accordance with the Wells National Estuarine Research Reserve Management Plan; and
- I. The right of the RMA to build additional structures on, or otherwise improve or alter, the Property in furtherance of the goals expressed in the Wells National Estuarine Research Reserve Management Plan;

and

- J. The sole right of the RMA to enter into, or grant approval of, any contracts, leases, conveyances or other agreements concerning the Property, subject to prior approval by the National Oceanic and Atmospheric Administration; and
- K. The sole right of the RMA to receive any and all income derived from the Property and to administer any and all such income, in accordance with State and Federal Regulations.

In furtherance of the foregoing affirmative rights, the Town, on behalf of itself, its successors and assigns, does hereby impose on the Property the following restrictions and covenants which shall run with and bind the Property in perpetuity:

1. DEED RESTRICTION

The Town and the RMA acknowledge that title to the Property held by the Town is subject to the following condition found in the Town's source deeds:

"Title to the property conveyed by this deed shall vest in the Inhabitants of the Town of Wells subject to the condition that the property shall remain part of the Federally-designated Wells National Estuarine Sanctuary. In the event that the property is no longer included as part of the Sanctuary, or if the sanctuary designation of which it is part is withdrawn, then the National Oceanic and Atmospheric Administration or its successor agency, in conjunction with the State of Maine, may exercise any of the following rights regarding disposition of the property:

- 1. The recipient may be required to transfer title to the Federal Government. In such cases, the recipient shall be entitled to compensation computed by applying the recipient's percentage of participation in the cost of the program or project to the current fair market value of the property; or
- 2. At the discretion of the Federal Government, (a) the recipient may either be directed to sell the property and pay the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the proceeds of the sale (minus actual and reasonable selling and fix-up expenses, if any, from the sales proceeds) or; (b) the

recipient may be permitted to retain title after paying the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project at the current fair market value of the property."

This Easement Deed shall similarly be subject to the above condition and nothing herein shall be interpreted to grant to the RMA any rights which are broader than, or inconsistent with, those rights acquired by the Town through its source deeds.

2. LAND USE

The Property shall be used exclusively for the purposes of research, education, preservation of open space and scenic values and public recreation as consistent with the Wells National Estuarine Research Reserve Management Plan.

3. PERMITTED STRUCTURES

The existing structures on the Property consist of a Visitor's Center in a restored farmhouse, a large barn and other structures incidental to the operation of the Laudholm Farm, and presently utilized as a part of the Wells National Estuarine Research Reserve. The RMA shall have the right at its own expense to maintain, improve, replace, rebuild, restore, rehabilitate and alter any or all of these existing and permitted structures, including septic waste disposal systems and wells, and shall further have the right to construct additional improvements on the Property provided any such alterations or improvements are of high quality, in compliance with all applicable federal, state, and municipal laws and are consistent with the Wells National Estuarine Research Reserve Management Plan.

4. OPERATION OF RESERVE

The RMA shall bear all costs and responsibility of operation, maintenance and upkeep of the Property, and does hereby release, relieve and indemnify the Town, its officers, directors, agents, and employees from all mechanics liens for work or labor done, services performed, appliances, water supplied, sewage disposed of, power contributed, used or furnished in or about the Property for or in connection with any operation of the Wells National Estuarine Research Reserve, or any alterations, improvements, repairs, or additions which the RMA may make or permit or cause to be made, or any work in connection with, by, for or permitted by the RMA on or about the Property.

5. INSURANCE

The RMA agrees to maintain liability and casualty insurance in an amount reasonably calculated to cover all potential risks associated with the management and operation of the Wells National Estuarine Research Reserve and to name the Town as co-insured on any such policies providing such coverage is at no additional cost. The RMA further agrees to provide the Town upon demand with a Certificate of Insurance evidencing compliance herewith.

6. WASTE DISPOSAL AND WATER PROTECTION

Any construction, operation, modification, alteration, or reconstruction of any waste disposal system or method shall be conducted in a manner that will prevent discharge of any waste into salt or fresh waters located on, about or offshore of the Property. It is forbidden to dispose of or store rubbish, offal, garbage, debris, abandoned vehicles or equipment, parts thereof, or other offensive, hazardous or toxic waste material on the Property.

7. BOUNDARY MAINTENANCE

The RMA shall maintain the boundaries of the Property, or in lieu thereof, at Town's request in writing, shall restore any or all boundaries thereof to a condition susceptible of identification by Town when necessary for its monitoring and enforcement purposes. Maintenance or restoration of boundaries may be accomplished by any means consistent with the conservation purposes of this Easement Deed, including, but not limited to, the location of monuments and survey pins and the maintenance of a cleared line of sight along boundaries.

SPECIFIC PROHIBITIONS

Use of the Property in a manner inconsistent with the Wells National Estuarine Research Reserve Management Plan is prohibited. All Parties acknowledge that this Easement Deed is subject to all Federal, State and local land use regulations, ordinances, statutes and acts.

CONSTRUCTION

If uncertainty should arise in the interpretation of this Easement Deed, judgment should be made in favor of conserving the Property in its natural, open and scenic state. Nothing in this Easement Deed shall be construed to permit any activity otherwise prohibited by the valid laws and regulations of any federal,

state or local government or governmental agency having competent jurisdiction over the Property.

10. MONITORING AND ENFORCEMENT RIGHTS

The Parties, their successors and assigns, shall make reasonable efforts from time to time to assure that the condition of the Property is in compliance with all of the covenants and restrictions herein. In connection with such efforts, the Town shall have the right, upon prior notice to the RMA, to enter the Property at reasonable times and in a reasonable manner to make periodic inspections.

In the event that either the Town or the RMA determines, in its best judgment, that an event or circumstance of non-compliance with the terms and conditions herein set forth has occurred or is in existence, that party shall give notice to the other of such event or circumstance of non-compliance and demand corrective action sufficient to abate such event or circumstance of non-compliance and, at its discretion, sufficient to restore the Property to its condition at the time of this grant, subject to permitted changes made subsequently.

If the party to this Easement Deed responsible for such non-compliance fails within a reasonable time to abate or remedy such non-compliance or to continue such remedial action to completion, the complaining party shall be entitled to its remedies at law and in equity. Requirement of notice is waived in matters requiring more immediate action, in which case the complaining party shall be entitled immediately to pursue its remedies at law or in equity, ex parte as necessary. Neither party shall be responsible for any injury to or change in the Property resulting from causes beyond the party's control, such as, but not limited to, fire, flood, storm and earth movement, or from any prudent action taken by that party under emergency conditions to prevent, abate or mitigate significant injury to the Property resulting from such causes. The failure of either party, for any reason whatsoever, to enforce any of the terms, covenants, or other provisions of this Easement Deed shall not constitute a waiver of its right to enforce the same or any other provision hereof.

11. SUBSEQUENT TRANSFEREES

By acceptance of this Easement Deed, the RMA covenants and agrees, as real covenants running with the land in perpetuity, and not as conditions to this Easement or as restraints on alienability (1) that it will hold this Easement in perpetuity for conservation purposes (unless it transfers this Easement in compliance with (2)); (2) that it will not transfer said Easement except to an entity which, as a condition of such transfer, gives

the RMA assurances that it is committed to the conservation purposes of this Easement, and is able to and agrees to enforce the rights granted in this Easement Deed, and if the State entity managing the Wells National Estuarine Research Reserve should change, the RMA shall transfer this Easement to that entity.

12. GRANT IN PERPETUITY

The Easement herein granted and any amendment or assignment hereof shall be recorded at the York County Registry of Deeds and shall be a burden upon and shall run with the Property in perpetuity and shall bind the Town, its successors and assigns forever. A copy of the restrictions contained in this Easement Deed and incorporation by reference of this Indenture shall be included in any subsequent deed or legal instrument by which the Town conveys any interest (including a leasehold) in the Property.

13. AMENDMENT

The Town and the RMA recognize that circumstances could arise which would justify modification of certain of the restrictions contained in this Easement Deed. To this end, the Town and the RMA shall have the right to agree to amendments to this Easement Deed, provided that such amendment furthers or is not inconsistent with the purposes of this Easement Deed. Such amendment shall become effective upon recording at the York County Registry of Deeds. Notwithstanding any other provision of this instrument, the parties, their successors and assigns, may, by agreement, and by agreement only, terminate this Easement. Any such agreement to terminate, to be effective, must be recorded in the York County Registry of Deeds.

14. MISCELLANEOUS

- A. It is agreed that, notwithstanding any other provision in this Easement Deed or in any other document relating to the roles and obligations of all parties with respect to the Property, the RMA is hereby designated as Lead Agent.
- B. The Town's title to the Property is held for the benefit of the people of the Town of Wells and the general public. It is held subject to, and with the benefit of, the rights and responsibilities given the RMA by, including but without limitation of the generality of the foregoing, this Easement, the Memorandum of Understanding of even date to be recorded at the York County Registry of Deeds, and State of

Maine P.L. 1990, Chapter 108.

- C. The term "Town" wherever used herein, and any pronouns used in place thereof, shall mean and include, unless repugnant to the context, the above-named Town, its representatives, successors, assigns and all persons hereafter claiming by, under or through said Town, whether or not such persons signed this Easement Deed or had an interest in the Property on the execution date of this Easement Deed. Notwithstanding the foregoing, any such person's obligations under this Easement Deed shall cease if and when said person shall cease to have any present, partial, contingent, collateral or future interest in the Property by reason of a bona fide transfer. The term "RMA" whenever used herein, and any pronouns used in place thereof, shall mean and include, unless repugnant to the context, the above-named "RMA" and its representatives, successors and assigns.
- D. Wherever the Wells National Estuarine Research Reserve Management Plan is referenced in this Easement Deed, the reference shall be to the Plan as it may be amended from time to time and as approved by the National Oceanic and Atmospheric Administration, unless otherwise indicated by specific reference to the Plan, dated May, 1991.
- E. Wherever it is provided in the Easement Deed that notice, demand, request or other communication shall or may be given to or served upon either of the parties by

the other, and whenever either of the parties desire to give or serve upon the other any notice, demand, request or other communication with respect to this Easement Deed or the Property, such notice, demand, request or other communication shall be in writing, prepaid registered mail, and addressed to the Town or the RMA at the following address:

Wells National Estuarine
 Research Reserve Management Authority
 R.R. #1, Box 806
 Wells, Maine 04090-

Town of Wells
 P.O. Box 398
 Wells, Maine 04090

40A

F. This document contains the entire agreement between the parties and cannot be changed or terminated orally, but only by an instrument in writing executed by the parties, their successors or assigns.

TO HAVE AND TO HOLD the said Easement Deed unto the said RMA and its successors and assigns, forever.

IN WITNESS WHEREOF The Inhabitants of the Town of Wells, hereby grants the foregoing Easement Deed by causing this instrument to be signed and sealed in its corporate name by its undersigned selectmen, duly authorized, this 7 day of July, 1992.

THE INHABITANTS OF THE TOWN OF WELLS

[Signature]
Witness

By: [Signature]
Thomas Oliver, Chairman

[Signature]
Witness

By: [Signature]
George Finch

[Signature]
Witness

By: [Signature]
Robert Foley

[Signature]
Witness

By: [Signature]
Kenneth Creed, III

[Signature]
Witness

By: [Signature]
Harry B. Margeson, Jr.

ITS SELECTMEN, DULY AUTHORIZED

RMA ACCEPTANCE

The above and foregoing Easement Deed was authorized to be accepted by the Wells National Estuarine Research Reserve Management Authority, and it does hereby accept the foregoing Easement Deed by and through Walter K. Weather, its Chairman duly authorized, and has caused this instrument to be signed this 7 day of August, 1992.

WELLS NATIONAL ESTUARINE RESEARCH
RESERVE MANAGEMENT AUTHORITY

By: Morton K. Walker
ITS CHAIRMAN, DULY AUTHORIZED

NOTARIZATIONS

Town

STATE OF MAINE
COUNTY OF YORK, SS.

July 7, 1992

Personally appeared the above named Thomas Oliver, George Finch, Robert Foley, Kenneth Creed, III, and Harry B. Margeson, Jr., and acknowledged the foregoing instrument to be their free act and deed and the free act and deed of said municipal corporation.

Before me,

Christian L. Bonner

Christian L. Bonner
~~Notary Public/Attorney-at-Law~~

RMA

STATE OF MAINE
COUNTY OF YORK, SS.

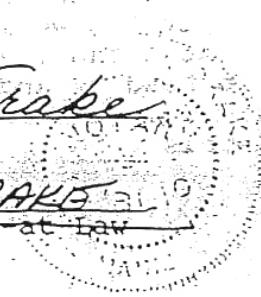
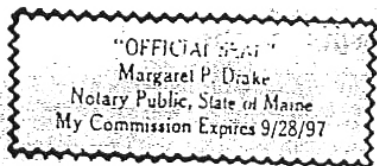
^{MKB}
August 7, 1992

Personally appeared Morton K. Walker, the Chairman of the above-named Holder, Wells National Estuarine Research Reserve Management Authority, and acknowledged the foregoing instrument to be his free act and deed in his said capacity and the free act and deed of said state instrumentality.

Before me,

Margaret P. Drake

MARGARET P. DRAKE
~~Notary Public/Attorney-at-Law~~



Appendix B-2: Wells Harbor Easement

BOOK 3819 PAGE 192

13720

CONSERVATION EASEMENT

FROM THE TOWN OF WELLS TO THE STATE OF MAINE,

DEPARTMENT OF CONSERVATION

THIS INDENTURE made this 22nd day of April, 1986
by and between the Town of Wells, a municipal body, corporate and politic,
having its town office at Routes # 1 and #109, Wells, York County,
Maine, hereinafter referred to as the Grantor, and the STATE OF MAINE,
Department of Conservation, hereinafter referred to as the Holder,

W I T N E S S E T H:

WHEREAS, by Act of the State of Maine Legislature, Title 33, Maine Revised Statutes, 1964, as amended, Section 476 et. seq., the Uniform Conservation Act, conservation easements were recognized and defined; and

WHEREAS, the Grantor holds title to certain real property (hereinafter called the "Protected Property") which is described in Exhibit A, attached hereto and incorporated herein by reference, and indicated on a map, attached hereto as Exhibit B and made a part hereof by reference; and

WHEREAS, the Protected Property is a tract of wetland and upland containing 22.8 Acres more or less, having significant value in its present state as a natural area, adjacent to the Rachael Carson National Wildlife Refuge and is an integral part of the Wells National Estuarine Sanctuary, managed in part by the Holder for preservation as a natural habitat for research and education purposes and for the scenic enjoyment to the general public; and

WHEREAS, residential or commercial development of the Protected Property would have a deleterious effect upon the Wells National Estuarine Sanctuary and the nearby Rachael Carson National Wildlife Preserve; and

WHEREAS, a primary purpose of the Holder is to preserve land areas for the recreational, educational and aesthetic enjoyment of the general public; and

WHEREAS, the Grantor and the Holder recognize the unique value of the Protected Property as an important natural habitat in a region which is subject to considerable development pressure and have the common purpose of conserving the natural values of the Protected Property; and

WHEREAS, Grantor and Holder have determined that for the permanent preservation of public recreational and educational opportunities and preservation of the open space and scenic values of the Wells National Estuarine Sactuary it is in the public interest to place a Conservation Easement over the Protected Property; and

WHEREAS, Grantor at a Town Meeting held on March 8, 1986, by vote of its Legislative Body, was authorized to grant a Conservation Easement effecting the Protected Property for the purposes set forth herein;

NOW THEREFORE, the Grantor and Holder, for and in consideration of the facts above recited and of the covenants herein contained, hereby agree as follows:

Section 1. Grant of Conservation Easement. As an absolute and unconditional gift, Grantor does hereby grant to the Holder, its successors and assigns, forever and in perpetuity for the benefit of the general public and the Holder, a Conservation Easement in, to, on, over, under and across the Protected Property consisting of the following:

(A) The right of the Holder and the general public to view the Protected Property from the town road indicated on Exhibit B; (hereinafter referred to as the Town Road), in its present substantially natural, and scenic condition;

*Plan for Laudholm Trust by Dow & Coulombe, Inc. dated April 15, 1986, to be recorded with this conservation easement

(B) The right of Holder and the general public to enter and to travel by foot across the Protected Property for quiet recreational enjoyment; such right shall not include entrance by and operation of motorized vehicles on the Protected Property by the Holder or the general public except on the Town Road;

(C) The right of the Holder and its successors and assigns to place barriers on the Protected Property to prevent motorized vehicular access by the general public subject to the approval of the Grantee;

(D) The right of the Holder and its successors and assigns to construct and maintain foot trails subject to the approval of the Grantee;

(E) The right of the Holder and its successors and assigns to enter and inspect the Protected Property at any time and in any manner which does not unreasonably threaten its use as a natural habitat; and

(F) The right of the Holder and its successors and assigns to enforce by proceedings at law or in equity the covenants hereinafter set forth.

(G) To manage the protected property in accordance with the management plan for the Wells National Estuarine Sanctuary and the National Estuarine Sanctuary Program regulations at 15 CER 921.

Section 2. Covenants. In furtherance of the foregoing affirmative rights, the Grantor makes the following covenants on behalf of itself, its successors and assigns, which covenants shall run with and bind the Protected Property in perpetuity:

(A) The Protected Property shall be used for conservation and recreational purposes only, except for other purposes specifically allowed in this Conservation Easement. No commercial, residential, industrial, quarrying or mining activities shall be permitted on the Protected Property.

(B) At present there are no structures of any kind on the Protected Property. No structures of any kind, temporary or permanent, shall be located on the Protected Property, except there is retained in the Grantor, its successors and assigns, the following rights:

1. The right to post small signs on the Protected Property that prohibit unauthorized use or regulate and guide permitted use.

2. The right to post non-commercial signs on the Town Road of the Protected Property.

3. The right to post interpretive/educational signs on the Protected Property legible at a distance no greater than twenty feet, and
4. The right to maintain and replace said signs.

(C) No alteration shall be made to the surface of the Protected Property other than that caused by the forces of nature, unless such alteration is approved in advance and in writing by the Holder, its successors and assigns, provided however, there is retained in the Grantor, its successors and assigns the following rights:

1. The right to excavate and fill, in connection with the installation, maintenance, improvement, alteration or replacement of the Town Road and the underlying water, sewerage and other underground utility services, provided such activity is performed in conformance with all local, state and federal laws and regulations governing such activity and done in a manner that will prevent discharge of any waste into salt or fresh water located about the Protected Property that will at all adversely affect the purity of said waters, and further provided that the land and vegetation be thereafter restored, as nearly as possible, to its prior undisturbed state.

2. The right to construct foot trails subject to the prior approval in writing of the Holder, and to maintain such authorized foot trails.

(D) Without limiting the generality of the foregoing, billboards, trailers, mobile homes, prominent antennae for telecommunications and radar, and use of the Protected Property as an aircraft landing site, the last except in an emergency, are specifically prohibited on the Protected Property.

(E) No motorized vehicles of any sort, including without limitation, automobiles, trucks, off-road vehicles, snowmobiles and recreational vehicles, shall be permitted on the Protected Property, except on the Town Road generally and except elsewhere on the Protected Property in the case of emergency, for fire control or prevention or as necessary for the establishment, excavation, installation, repair, replacement or improvement of the Town Road, underlying utilities, and footpaths, and in connection with the inspection and monitoring activities of the Holder.

(F) The cutting of standing timber shall not be permitted on the Protected Property, provided however, there is retained in the Grantor, its successors and assigns, the following rights:

1. The right to gather, use or remove dead wood which might cause an unsafe condition or hazard to authorized users of the Protected Property.

Section 3. Protection of Easement Terms. If uncertainty should arise in the interpretation of this Conservation Easement, judgment should be made in favor of conserving the Protected Property in its natural and scenic state.

Section 4. Savings Clause. If any part of this instrument shall be decreed to be invalid by any court of competent jurisdiction, such decree shall not be interpreted so as to invalidate the remainder of this instrument.

Section 5. Reservation of Rights for Grantor. Except as expressly limited herein, Grantor reserves for itself and its successors and assigns, all rights as owner of the Protected Property, including the right to use the Protected Property for all purposes not inconsistent with this grant.

Section 6. Compliance with Easement. The Holder may make reasonable efforts from time to time to assure compliance by Grantor with all of the covenants and restrictions herein. In connection with such efforts, Holder may make periodic inspection of all or any portion of the Protected Property, and for such inspection and enforcement purposes the Holder shall have the right of unlimited access to all of the Protected Property. In the event that Holder becomes aware of any event or circumstance of non-compliance with the terms and conditions herein set forth, Holder shall give notice to Grantor of such event or circumstance or non-compliance via certified mail, return receipt requested, and demand corrective action sufficient to abate such event or circumstance of non-compliance and restore

the Protected Property to its previous condition. Failure by the Grantor to cause discontinuance, abatement or such other corrective action as may be demanded by Holder within thirty (30) days after receipt of notice shall entitle Holder to bring an action in a court of competent jurisdiction to enforce the terms of this Conservation Easement.

Section 7. Binding Effect. The covenants agreed to and the terms, conditions, restrictions and purposes imposed with this Conservation Easement shall not only be binding upon Grantor but also its assigns and all other successors to its interests and shall continue as a servitude running in perpetuity with the Protected Property. The Grantor, its assigns and successors, agree that the terms, conditions, restrictions, and purposes of this grant will be inserted in any subsequent conveyance of any interest in said property..

Section 8. Subsequent Transferees. By acceptance of this Conservation Easement, Holder, its successors and assigns, covenants and agrees, as real covenants running with the land in perpetuity, not as conditions to this Conservation Easement or as restraints on alienability, (1) that it will hold this Conservation Easement in perpetuity; (2) that it will not transfer said Conservation Easement except to a successor state agency or its equivalent able to enforce the rights granted in this Conservation Easement, and (3) that it is familiar with the generally existing conditions on the Protected Property, will document the conditions on and monitor the Protected Property at periodic intervals reasonably often hereafter and will make good faith efforts to enforce the provisions hereof. Wherever the term "Holder" appears in this Conservation Easement, including the foregoing covenants, it shall also refer, as appropriate, to any transferee, assignee, or successor in interest to the Holder of this Conservation Easement.

Dodu & Coulombe, Inc.
ENGINEERS AND SURVEYORS
SINCE 1864
LAND USE & PLANNING CONSULTANTS
85 Park Street
Saco, Maine 04072
(207) 284-4521

BCD-3519 PAGE 199

EXHIBIT A

April 16, 1986

PROPOSED DESCRIPTION FOR A CONSERVATION EASEMENT

Town of Wells to the State of Maine

A certain lot or parcel of land situated in the Town of Wells, County of York and State of Maine, bounded and described as follows:

Beginning at a standard United States Fish and Wildlife Service concrete monument found set in the ground on the southerly side of the Lower Landing Road on the easterly edge of a New England Telephone and Telegraph Company easement and shown as corner number one on a plan titled "United States Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Rachel Carson National Wildlife Refuge, Lower Wells Division, Town of Wells, Tract (8,a)" dated September 26, 1972; thence easterly approximately parallel with said Lower Landing roadway and by said land of the Rachel Carson National Wildlife Refuge, 333 feet, more or less, to an iron pipe found driven into the ground and shown as corner number two on said plan; thence continuing by said Rachel Carson National Wildlife Refuge the following three (3) courses and distances, South 27°-14'-45" East (South 27°-12' East per said plan), 477.34 feet to corner number 3 as shown on said plan; thence South 69°-12'-45" East (South 69°-11' East per said plan), 227.88 feet to an iron pipe found driven into the ground at corner 4 as shown on said plan; thence South 68°-57'-15" East (South 68°-52' East per said plan) 349.65 feet to an iron pipe found driven into the ground at corner 5 as shown on said plan and remaining land of this grantor; thence North 10°-18'-30" East, by said remaining land of this grantor, 1125.96 feet to an iron rod driven into the ground near the top of a bank at the edge of a tidal marsh; thence continuing North 10°-18'-30" East, by said remaining land of this grantor, to the center of Depot Brook (also known as Doctor's Creek); thence generally westerly, southerly and westerly by said centerline of Depot Brook to said easterly edge of a New England Telephone and Telegraph Company Easement; thence South 22°-West, by said New England Telephone and Telegraph Company Easement and land of the Rachel Carson National Wildlife Refuge, 400 feet, more or less to the point of beginning. Containing about 12.9 acres of upland.

----- subject to a certain undefined right-of-way and utility easement known as Lower Landing Road.

See accompanying report.

The above courses are based on the South 79°-07' East bearing shown on said plan.

Continued

(Page 1 of 4)

BOOK 3819 PAGE 200

Dow & Coulombe, Inc.
ENGINEERS AND SURVEYORS
SINCE 1864
LAND USE & PLANNING CONSULTANTS
85 Park Street
Saco, Maine 04072

(207) 284-4521

Page -2 of 4 - Exhibit A
April 16, 1986
Town of Wells

Being a portion of land described in a deed to the Inhabitants of the Town of Wells dated March 30, 1962 and recorded in York County Registry of Deeds in Book 1470, Page 259.

Reference is made to a "Plan Showing a Survey of a Proposed Division Line Made for Landholm Trust" dated April 15, 1986 made by Dow & Coulombe, Inc.

Bofin & Coulombe, Inc.
ENGINEERS AND SURVEYORS
SINCE 1864
LAND USE & PLANNING CONSULTANTS
85 Park Street
Saco, Maine 04072
(207) 284-4521

BOOK 3819 PAGE 201

April 16, 1986

Exhibit A (page 3 of 4)

Mr. Mort Mather
Laudholm Trust
Wells, Maine

RE: Surveyor's Report

Dear Mr. Mather:

Per our agreement we have surveyed and marked a proposed division line located near Wells Harbor and the Lower Landing Road. Please find enclosed several copies and the original plan showing the results of the survey, a proposed legal description for the portion to be conveyed, and a bill for our services to date.

It is the policy of our company to bring to the attention of our client any condition we encounter during the course of the survey which could affect title or use of the subject parcel. The status and location of the Lower Landing Road is ambiguous. In 1983 while working in this area for the Town of Wells we contacted the Town Clerk and she provided me with the following information. The Town of Wells held a Special Town Meeting August 15, 1963. Article No. 3 pertained to the Lower Landing Road and was voted on and accepted as read. Article No. 3 stated "to see if the Town will vote to accept that part of the Lower Landing Road which extends from the existing tar road to the gravel parking lot at Wells Harbor as laid out by Municipal Officers". A copy of the warrant is enclosed. The Town Clerk also provided me with a legal description for a portion of the road titled "Town Landing Road". The heading for this description says it was "Accepted at Town Meeting August 1963". A copy of this description is also enclosed. The area described begins at the easterly side of the New England Tel. & Tel. Easement and runs westerly to the upland. The road is to be 100 feet wide and the description apparently was made from data shown on the 1962 E. C. Jordan plan titled "Harbor Development West Side Facilities". The Town Clerk could not find a legal description of the road or a road width from the telephone easement to the gravel parking lot. As you know there is a paved road and utilities currently exist and extend to the gravel parking area. The road and utilities are shown on our 1983 plan made for the Town of Wells. I suggest that the right-of-way be defined at some point in time to prevent problems.

Continued

BOOK 3619 PAGE 232

Dato & Coulombe, Inc.
ENGINEERS AND SURVEYORS
SINCE 1864
LAND USE & PLANNING CONSULTANTS
85 Park Street
Saco, Maine 04072

(207) 284-4521

Exhibit A (page 4 of 4)

Page -2-

April 16, 1986

Mort Mather

Per your request we calculated the area of upland being conveyed to the State of Maine. We calculate the upland area to be 12.9 acres, more or less. If the area for a 50 foot wide road were deducted from this upland acreage the area would be reduced to 11.8 acres, more or less.

If you have any questions, do not hesitate to contact us.

Yours truly,

Peter Deletetsky
Peter Deletetsky *P.D.*

PD/gd
Enclosures

RECEIVED YORK.SS.
1986 APR 24 PM 4:05
RECORDED REGISTRY OF DEEDS

APPENDICES

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USFWS AND RMA

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Appendix C-1: Act to Establish Wells NERR

APPROVED

CHAPTER

~~MAR~~ 30 '90

1 08

BY GOVERNOR

P & S LAW

STATE OF MAINE

IN THE YEAR OF OUR LORD
NINETEEN HUNDRED AND NINETY

H.P. 1457 - L.D. 2031

An Act to Establish the Wells National Estuarine Research Reserve Management Authority

Be it enacted by the People of the State of Maine as follows:

Sec. 1. Definitions. As used in this Act, unless the context otherwise indicates, the following terms have the following meanings.

1. Authority. "Authority" means the Wells National Estuarine Research Reserve Management Authority.

2. Reserve. "Reserve" means the Wells National Estuarine Reserve, created in 1984 as part of the federal National Estuarine Research Reserve System authorized by the federal Coastal Zone Management Act.

3. Reserve Management Plan. "Reserve Management Plan" means the approved plan for managing the reserve authorized by 15 Code of Federal Regulations, Part 921.

Sec. 2. Authority created. The Wells National Estuarine Research Reserve Management Authority is established as an instrumentality of the State to support and promote the interests of the reserve.

The authority shall manage and sustain the coastal lands and other resources within the reserve, further coordination and cooperation among state agencies, the Town of Wells and the United States Fish and Wildlife Service, and the Laudholm Trust, develop and implement programs for estuarine research and education and provide public access and opportunities for public enjoyment compatible with the protection of the reserve's natural resources.

1-2680(5)

Sec. 3. Duties of the authority. The authority shall:

1. Ensure a natural environment for research through long-term protection and management of estuarine areas and resources;
2. Identify coastal management issues that can be addressed through coordinated estuarine research within the national system of which the reserve is a part;
3. Enhance public awareness and understanding of the estuarine environment and provide suitable opportunities for public education, interpretation and enjoyment of these resources;
4. Conduct and coordinate estuarine research within the reserve, gathering and making available information necessary for improved understanding and management of estuarine areas;
5. Establish, coordinate and implement research, education and resource management projects;
6. Facilitate public recreational use of Laudholm Beach and adjacent lands within the reserve; and
7. Establish and implement the Reserve Management Plan, and update that plan every 5 years. The plan must be adopted in accordance with the Maine Revised Statutes, the Maine Administrative Procedure Act, Title 5, chapter 375.

Sec. 4. Location of the reserve. The reserve contains approximately 1,600 acres in the Town of Wells and includes lands between the Little River to the north and the Eldridge River to the south. The boundary to the east parallels the shoreline, excluding the shoreline development and to the west is bordered by the coastal wetland margin. Specifically, the reserve contains:

1. Lands in the Rachel Carson National Wildlife Refuge managed by the United States Fish and Wildlife Service;
2. Land purchased or acquired for a state park managed by the Bureau of Parks and Recreation;
3. Submerged tidal lands managed by the Bureau of Public Lands;
4. Land purchased by the Town of Wells or the State; and
5. Land donated by the Town of Wells to the Department of Conservation as a conservation easement.

Sec. 5. Powers of the authority. The authority, in compliance with the Reserve Management Plan, is responsible for management of the reserve lands for which the authority holds a license, lease or other interest or lands that are under agreement with a cooperating agency. The authority has overall jurisdiction over the establishment and coordination of research education and resource management policies for the reserve.

The authority may exercise the following powers to manage the reserve, in accordance with its purposes, including, but not limited to:

1. Receiving and expending money, including money from any private or governmental source, for reserve operations, authority acquisitions, management, development and related projects. Expenditures by the authority must be consistent with and within the scope of an annual work plan and budget;
2. Establishing policies and work programs;
3. Hiring, managing and discharging staff;
4. Acquiring and selling or conveying real and personal property and interests therein;
5. Executing contracts and agreements with private and public entities as necessary;
6. Accommodating and providing services to the public and charging reasonable fees for these services and accommodations;
7. Adopting bylaws to administer the authority, including selection of officers, employment of staff, delegation of routine and administrative functions to the staff, establishment of committees and conducting other business of the authority;
8. Adopting rules for the protection of the reserve and its resources consistent with the Reserve Management Plan and for the protection and safety of the public;
9. Enforcing rules and other laws applicable to the reserve, including agreements providing for enforcement by local, state and federal law enforcement authorities;
10. Submitting an annual report to the Legislature describing the activities of the authority during the preceding year; and
11. Keeping books, records and accounts of the activities of the authority that are open to the public in accordance with the Maine Revised Statutes, Title 1, chapter 13.

Sec. 6. Administration. The administration of the authority is as follows.

1. The authority is exempt from the budget requirements of Title 5, chapter 149. Expenditures by the authority do not require allocation by the Legislature.

2. Staff employed by the authority is not subject to the civil service laws, as set out in Title 5, chapter 372.

3. Contracts and agreements entered into by the authority are not subject to the provisions of Title 5, chapters 153 and 155.

4. All rules adopted by the authority must be in accordance with the Maine Administrative Procedure Act, Title 5, chapter 375.

5. Within 120 days after the close of its fiscal year, the authority shall provide a copy of its annual financial report certified by an independent certified public accountant selected by the authority to the Commissioner of Conservation, the Director of the State Planning Office, the Treasurer of State, the State Auditor and the Joint Standing Committee on Energy and Natural Resources. The financial report must comply with federal Office of Management and Budget requirements.

6. The authority is a governmental entity for the purposes of the Maine Tort Claims Act, Maine Revised Statutes, Title 14, chapter 741.

7. The debts and liabilities of the authority are not the debts and liabilities of the State.

Sec. 7. Board. The authority is governed by a board of directors composed of the following:

1. The Commissioner of Conservation, or the commissioner's designee;

2. The Regional Director of Region 5 of the United States Fish and Wildlife Service, or the regional director's designee;

3. A representative of the Town of Wells, as designated by the town's board of selectmen;

4. A representative of the Laudholm Trust, as designated by the board of trustees; and

5. A public member with an established reputation in the field of marine or estuarine research, appointed by the Governor for a term of 3 years.

In addition, the following members are ex officio nonvoting members:

A. The Director of the State Planning Office or the director's designee; and

B. The Director of the Office of Ocean and Coastal Resources Management, National Oceanic Atmospheric Administration or the director's designee.

An employee of the authority or other person employed at the reserve may not serve on the board of the authority. Board members of the authority are not entitled to compensation by the authority for expenses.

Sec. 8. Meetings. The authority shall meet quarterly and at any other times necessary.

Sec. 9. Violations. A violation of the rules of the reserve is a Class E crime.

Sec. 10. Federal navigational project. The creation of the authority is not to be construed as legislative support for or opposition to the use and maintenance of the federal navigational project in Wells harbor.

Appendix C-2: Act to Amend Location

APPROVED

CHAPTER

MAY 06 '03

11

BY GOVERNOR

P & S LAW

STATE OF MAINE

IN THE YEAR OF OUR LORD
TWO THOUSAND AND THREE

H.P. 576 - L.D. 777

An Act To Amend the Laws Regarding the Location of the Wells National Estuarine Research Reserve

Be it enacted by the People of the State of Maine as follows:

Sec. 1. P&SL 1989, c. 108, §4 is amended to read:

Sec. 4. Location of the reserve. The reserve contains ~~approximately 1,600 acres~~ is located in the Town of Wells and includes lands between the Little River to the north and the Eldridge Ogunquit River to the south. The boundary to the east parallels the shoreline, excluding the shoreline development, and to the west ~~is bordered by the coastal wetland margin~~ includes lands adjacent to the Wells coastal wetlands and within the drainage basins of their tributary streams. Specifically, the reserve contains:

1. Lands in the Rachel Carson National Wildlife Refuge managed by the United States Fish and Wildlife Service;
2. Land purchased or acquired for a state park managed by the ~~Bureau of Parks and Recreation~~ Department of Conservation;
3. Submerged tidal lands managed by the ~~Bureau of Public Lands~~ Department of Conservation;
4. Land purchased by the Town of Wells or the State; and
5. Land donated by the Town of Wells to the Department of Conservation as a conservation easement ~~;~~ and

1-0673(4)

6. Other lands or interests in land in the location described in this section acquired by the reserve from willing sellers or added to the reserve by agreement for the purpose of furthering the reserve's conservation, research or educational programs.

Sec. 2. P&SL 1989, c. 108, §6, sub-§5 is amended to read:

5. Within 120 days after the close of its fiscal year, the authority shall provide a copy of its annual financial report certified by an independent certified public accountant selected by the authority to the Commissioner of Conservation, the Director of the State Planning Office, the Treasurer of State, the State Auditor and the ~~Joint Standing Committee on Energy and Natural Resources~~ joint standing committee of the Legislature having jurisdiction over conservation matters. The financial report must comply with federal Office of Management and Budget requirements.

2-0673(4)

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Appendix D: Rules for Public Use

Rules for Public Use of Wells Reserve: Summary

The Wells National Estuarine Research Reserve was established under 15 Code of Federal Regulations, Part 921. It is maintained to provide a natural field laboratory, which includes the protection of natural resources for short and long-term research, monitoring, and education. The Wells National Estuarine Research Reserve is also maintained to protect fish, wildlife, and plant communities. Multiple uses including low intensity recreational uses are allowed to the extent that they do not conflict with the operation of the Reserve for research, education, and natural resource protection.

The Wells National Estuarine Research Reserve Management Authority (the Authority) was established by the State legislature through passage of Private and Special Law #108 in 1990. The legislation was amended by Private and Special Law #777 in 2003. The purpose of the Authority is to manage and sustain the coastal lands and other resources within the reserve; further coordination and cooperation among state agencies, the Town of Wells and the United States Fish and Wildlife Service, and the Laudholm Trust; develop

and implement programs for estuarine research and education and provide public access and opportunities for public enjoyment compatible with the protection of the reserve's natural resources. The Authority, in compliance with the Reserve's Management Plan, is responsible for management of the Reserve lands for which the Authority holds a license, lease or other interest or lands that are under agreement with a cooperating agency. The Authority has overall jurisdiction over the establishment and coordination of research, education, and resource management policies for the Reserve. A violation of the rules of the Reserve is a Class E crime. Reserve regulations are superseded by US Fish and Wildlife Service regulations on the property of the US Fish and Wildlife Service's Rachel Carson National Wildlife Refuge.

The full list of rules outlining public use of the Reserve are on file with the State of Maine Secretary of State's Bureau of Corporations, Elections, and Commissions. They are available on the Bureau's website, or upon request from Reserve's administrative office located in the Visitor Center.

*Wells National Estuarine Research Reserve
Management Authority*

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Appendix E: Natural Resource Laws

The Federal Endangered Species Act of 1973

The purpose of the Endangered Species Act (ESA) is to provide a means to conserve the ecosystems which endangered and threatened species depend on for their survival, and to conserve and recover listed species. Under the ESA, species may be listed as either “threatened” or “endangered.” All species of plants and animals, except pest insects, are eligible for listing as either threatened or endangered.

The ESA is administered by the Department of Interior’s US Fish and Wildlife Service (FWS) and the Department of Commerce’s National Oceanic and Atmospheric Administration – Fisheries (NOAA-Fisheries). The FWS has primary responsibility for terrestrial and freshwater organisms, while NOAA-Fisheries responsibilities are mainly for marine species.

Under ESA, the Secretaries of either Commerce or the Interior are responsible for determining whether any species is an endangered species or a threatened species. The Federal agencies must utilize their authorities to conserve listed species and make sure that their actions do not jeopardize the survival of listed species. Recovery plans must also be developed and implemented for the purpose of conserving and improving the survival of endangered and threatened species.

Species are also protected through partnerships with the States. Section 6 of the ESA encourages each State to develop and maintain conservation programs for resident federally listed threatened and endangered species. States may also have their own laws to protect species of plants and animals. Financial assistance for state programs may be obtained from the Secretary. These funds may be used to carry out species status inventories and monitoring, and to establish conservation programs.

There are other laws that help protect declining populations of rare species and their habitats, including the Marine Mammal Protection Act, the Migratory Bird Treaty Act, and the Anadromous Fish Conservation Act. The Lacey Act prohibits certain actions related to animal trade, including importation, exportation, possession, trade, purchase and sales, possession, and transportation.

Maine Endangered Species Act

The Maine Endangered Species Act was passed by the Maine Legislature in 1975 and is administered by the Maine Department of Inland Fisheries and Wildlife (MDIFW). If a species or species of fish and wildlife are in danger of being rendered extinct within the State – and the species is determined to be of aesthetic, ecological, educational, historical, recreational, and of scientific value—MDIFW will take action to conserve and protect the species and the ecosystems upon which they depend.

To achieve that purpose of the Act, MDIFW will conduct investigations on any species of fish or wildlife to determine whether it is threatened or endangered, and to develop information on population size, distribution, habitat needs, limiting factors or other data relating to their status and requirements for survival. It will then develop the necessary programs to enhance or maintain the species. If warranted, MDIFW will designate a species endangered or threatened, thereby making them eligible for additional recognition and protection under the law and to establish the programs necessary for their recovery.

The National Flood Insurance Act

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victims and the increasing amount of damage caused by floods.

The Federal Insurance and Mitigation Administration (FIMA), a component of the Federal Emergency Management Agency (FEMA), manages the NFIP and oversees the floodplain management and mapping components of the Program. The NFIP is a voluntary program that offers community residents the opportunity to purchase flood insurance provided by the Program in exchange for the community’s commitment to practice sound land use management. Communities in Maine and the nation participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP provides flood mapping and makes Federally backed flood insurance available to homeowners, renters, and business owners in these communities.

The Maine Floodplain Management Program in the Department of Agriculture, Conservation, and Forestry

provides technical information, floodplain maps and model ordinances to communities interested in joining the NFIP, as well as to participating communities.

National Historic Preservation Act

The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. Historic structures and sites may be listed in the National Register of Historic Places. The Wells Reserve's Laudholm Farm campus is listed on the National Register.

The U.S. Secretary of the Interior, with the approval of the State Historic Preservation Officer, designates which sites and structures will be included in the National Historic Register. Established through a legislative act in 1971, the Maine Historic Preservation Commission is the state agency which functions as the State Historic Preservation Office in Maine. Historic designation of structures and sites provides protection with respect to certain agency activities. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior. Any federal agency having jurisdiction over a proposed federal or federally-assisted undertaking — such as the Wells Reserve — must take into account the effect of that activity on property included in, or eligible for inclusion on the National Register, before funds may be approved for expenditure.

Rivers and Harbors Act of 1899

The Rivers and Harbors Act governs the excavation, filling or other alteration of navigable rivers and harbors. The following actions must have approval from the Chief of Engineers and secretary of the Army Corps: 1) Build or commence the building of any wharf, pier, boom, weir, breakwater, bulkhead, jetty or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the U.S. outside established harbor lines or where no harbor lines have been established; 2) Excavate or fill, or in any other

manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, canal, lake, harbor or refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) was one of the first laws ever written that establishes the broad national framework for protecting environment of the United States. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment.

NEPA requirements are invoked when airports, buildings, military complexes, highways, parkland purchases, and other federal activities are proposed. Environmental Assessments (EAs) and Environmental Impact Statements (EISs), which are assessments of the likelihood of impacts from alternative courses of action, are required from all Federal agencies and are the most visible NEPA requirements.

Clean Water Act

The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. The statute employs a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water." The CWA was passed by Congress in 1972 and is administered by the US Environmental Protection Agency in cooperation with other federal agencies and state agencies. The CWA contains several sections, including the two noted below:

Section 404 deals with one broad type of pollution – the placement of dredged or fill material into the waters of the United States. Wetlands are one component of the waters of the nation. This section of the CWA deals most commonly with activities associated with the filling or altering wetlands. Wetlands are those "areas that are inundated or saturated by surface or

ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil.”

Section 319 addresses non-point source pollution, which represents the most significant source of pollution overall in the country. The CWA does not provide a detailed definition of non-point sources. Rather, they are defined by exclusion—anything not considered a “point source” according to the Act and EPA regulations. All nonpoint sources of pollution are caused by runoff of precipitation (rain and/or snow) over or through the ground. Pollutants commonly associated with NPS include nutrients (phosphorus and nitrogen), pathogens, clean sediments, oil and grease, salt, and pesticides. EPA and Maine DEP have non-regulatory programs that address non-point source pollution, including those that encourage a watershed approach to reducing NPS into coastal and estuarine waters.

Coastal Barrier Resources System

Maine’s coastal barriers and the adjacent wetlands, marshes, estuaries, inlets and nearshore waters contain resources of extraordinary scenic, scientific, recreational, natural, historic, archeological and economic importance that may be irretrievably damaged and lost due to development on and adjacent to those barriers. Maine’s coastal barriers provide habitats for migratory birds and other wildlife and habitats which are essential spawning, nursery, nesting and feeding areas for commercially and recreationally important species of finfish and shellfish, as well as other aquatic organisms. And Maine’s coastal barriers serve as natural storm protective buffers and are generally unsuitable for development because they are vulnerable to hurricane and other storm damage and because natural shoreline recession and the movement of unstable sediments undermine manmade structures.

The United States Congress has recognized the importance of coastal barriers through the United States Coastal Barrier Resources Act of 1982, which established a detailed process to identify coastal barriers and prohibited the expenditure of federal funds that support activities incompatible with the ability of these fragile areas to accommodate those activities

The Maine Legislature has declared that certain areas of the Maine coast, because of their fragile nature, valuable habitat and their storm buffering abilities

should be protected and conserved in their natural state and that it is inappropriate to use state funds to encourage or support activities incompatible with the ability of these areas to sustain these activities. Thirty-two coastal areas – including Crescent Surf Beach in Kennebunk and Ogunquit Beach in Ogunquit – are within the State’s Coastal Barrier System.

Coastal Management Policies, Title 38, Section 1801-1803

This section presents the policies which guide Maine’s regulatory coastal development. The Maine Legislature directs the state and local agencies, which are required by the U.S. Coastal Zone Management Act to be responsible for regulating, planning, developing or managing coastal resources must conduct their activities in a way which is consistent with the following policies:

- promote the maintenance, development and revitalization of the State’s ports and harbors for fishing, transportation and recreation;
- manage the marine environment and its related resources to preserve and improve the ecological integrity and diversity of marine communities and habitats, to expand our understanding of the productivity of the Gulf of Maine and coastal waters, and to enhance the economic value of the State’s renewable marine resources;
- support shoreline management that gives preference to water dependent uses over other uses, that promotes public access to the shoreline and that considers the cumulative effects of development on coastal resources;
- discourage growth and new development in coastal areas where, because of coastal storms, flooding, landslides or sea-level rise, it is hazardous to human health and safety;
- encourage and support cooperative state and municipal management of coastal resources;
- protect and manage critical habitat and natural areas of state and national significance and maintain the scenic beauty and character of the coast, even in areas where development occurs;
- expand the opportunities for outdoor recreation and encourage appropriate coastal tourist activities and development;
- restore and maintain the quality of our fresh, marine and estuarine waters to allow for the broadest possible diversity of public and private uses; and

- restore and maintain coastal air quality to protect the health of citizens and visitors and to protect enjoyment of the natural beauty and maritime characteristics of the Maine coast.

Submerged and Intertidal Lands Law

This law authorizes the Director of the Bureau of Parks and Lands to lease or grant assignable easements, for terms of up to thirty years, on submerged and intertidal lands owned by the state. The Director may, after consultation with the Commissioners of the Departments of Agriculture, Conservation, and Forestry; Marine Resources; Inland Fisheries and Wildlife; and such other agencies or organizations as he or she deems appropriate, grant the right to dredge, fill or erect permanent causeways, bridges, marinas, wharves, docks, pilings, moorings or other permanent structures. The rental fee charged for leases is to approximate the fair market rental value of the land, adjusted based on the nature of the proposed use (recreational, commercial, commercial fishing, or upland use), and the extent to which public access is provided free of charge or for a nominal fee. Certain uses such as harbor improvement by the Federal Government are exempted from the Bureau’s leasing requirements.

State Fish and Wildlife Laws

The Maine Department of Inland Fisheries and Wildlife is the State agency charged with the stewardship of the State’s fish and wildlife resources, and the habitats upon which they depend for their survival. Its mission is focused on the protection and enhancement of the state’s inland fisheries and wildlife, while at the same time providing for the wise use of these resources. The Department carries out a wide variety of fish and wildlife conservation programs. These programs focus on maintaining abundant game resources, as well as managing non-game wildlife and restoring endangered species. In addition to fish and wildlife research, management, and education programs, the Department’s Bureau of Warden Service is responsible for enforcing the State’s fish and wildlife laws – for game and non-game species. Maine Warden Service is also the regulatory authority for recreational boating, snowmobiling, all terrain vehicle operation, white water rafting and search and rescue in the forests, fields, waterways, and on the ice of the state.

Marine Resource Laws

The Maine Department of Marine Resources (DMR) conserves marine and estuarine resources of the state. It conducts and sponsors scientific research; promotes and develops the Maine coastal fishing industries; advises and cooperates with local, state and federal officials concerning activities in coastal waters; and implements, administers and enforces the laws and regulations necessary to conserve marine resources.

The DMR is the State agency that enforces the laws relating to marine resources. The purpose of the marine resources laws is to protect all renewable marine and estuarine resources, such as fish, shellfish, marine worms, marine plants, and their habitat and supporting ecology. DMR has the authority to enter into reciprocal enforcement agreements with other states, interstate regional authorities and the Federal government. DMR may adopt fisheries management plans and regulations for conservation purposes using any of the following factors: time, method, number, weight, length, or location. It may adopt regulations as emergency for purposes of resources protection in the face of “unusual damage or imminent depletion.” The DMR may adopt regulations to address problems concerning gear conflict for purposes of, among other concerns, “optimum economic and biological management.”

Comprehensive Planning and Land Use Regulation Act

This Comprehensive Planning and Land Use Regulation Act (30-A MRSA, Chapter 187, commonly known as “the Growth Management Act”) was established in 1987 to ensure that each municipality of the state would conduct comprehensive planning and land use management. The following goals of this act pertain to environmental and historic protection:

- to encourage orderly growth and development in appropriate areas of each community while protecting the state’s rural character—and preventing development sprawl;
- to protect the quality and manage the quantity of the state’s water resources, including lakes, aquifers, great ponds, estuaries, rivers and coastal areas;
- to protect the state’s other critical natural resources, including without limitation, wetlands, wildlife and fisheries habitat, sand dunes, shorelands, scenic vistas and unique natural areas;

- to protect the state's marine resources industry, ports and harbors from incompatible development and to promote access to the shore for commercial fishermen and the public;
- to safeguard the state's agricultural and forest resources from development that threatens those resources;
- to preserve the state's historic and archaeological resources; and
- to promote and protect the availability of outdoor recreational opportunities for all Maine citizens, including access to waters.

As initially enacted, the Act required municipalities, on a tiered basis, to undertake local planning. The local plans had to address and be consistent with the legislatively adopted state goals. The state provided substantial funding to facilitate local planning efforts. High-growth areas were to receive funds first. Towns experiencing less growth were given a longer time to comply with the Act. However, in 1991, budget cuts removed most of the state financial support and technical assistance, and dismantled most of the mandatory provisions of the Act. The tiered-deadlines to regulate land uses were replaced by a January 1, 2003 deadline that applies only to communities that have enacted zoning (other than shoreland zoning), building or growth caps, or impact fee ordinances.

The Act encourages municipalities, except those municipalities within the jurisdiction of LURC, to develop a local growth management program that is consistent with the ten state goals. A local growth management program consists of two steps, the preparation of a comprehensive plan that complies with the Act and the preparation of an implementation program that is consistent with the comprehensive plan. The comprehensive plan is the primary mechanism in the local growth management program. It sets forth a vision of the municipality's future and is a source of basic information about existing and expected conditions in the municipality. However, the comprehensive plan is not effective until it is implemented through policies and ordinances or other land use regulations that carry out the purposes and general policy statements and strategies of the comprehensive plan. These policies and ordinances constitute the implementation program.

The Municipal Planning Assistance Program (MPAP) in the Maine Department of Agriculture, Conservation

and Forestry is responsible for the overall implementation of this Act. MPAP aids municipalities by developing and supplying information on available technical assistance resources, as well as planning grant financial assistance.

Site Location and Development Law (Site Law)

Administered by the Maine Department of Environmental Protection, this law requires review of developments that may have a substantial effect upon the environment. These types of development have been identified by the Maine Legislature, and include developments such as projects occupying more than 20 acres, metallic mineral and advanced exploration projects, large structures and subdivisions, and oil terminal facilities. A permit is issued if the project meets applicable standards addressing areas such as stormwater management, groundwater protection, infrastructure, wildlife and fisheries, noise, and unusual natural areas.

The applicant for a new Site Law development (except for a residential subdivision with 20 or fewer developable lots) is required to attend a pre-application meeting. This meeting is an opportunity for the applicant to determine the requirements that apply to the project. The meeting with licensing staff is intended to help identify issues, processing times, fees, and the types of information and documentation necessary for the DEP to properly assess the project.

Certain exemptions apply. The Site Law applies in organized areas of the State for purposes of all types of development, and in unorganized areas of the State for purposes of oil terminal facilities, and metallic mineral mining and advanced exploration.

Natural Resources Protection Act

The purpose section of the Natural Resources Protection Act (NRPA) is to protect areas of the State that are of statewide significance, including resources such as rivers and streams, great ponds, fragile mountain areas, freshwater wetlands, significant wildlife habitats, coastal wetlands, and coastal sand dune systems. These resources have been determined to have great scenic beauty and unique characteristics, as well as recreational, cultural, historical and environmental value to the people of Maine, and that uses are causing the rapid degradation and, in some cases,

the destruction of these critical resources, producing significant adverse economic and environmental impacts and threatening the health, safety and general welfare of the citizens of the State.

The law is focused on “protected natural resources.” A permit is required when an “activity” will be:

- Located in, on or over any protected natural resource, or
- Located adjacent to (A) a coastal wetland, great pond, river, stream or brook or significant wildlife habitat contained within a freshwater wetland, or (B) certain freshwater wetlands.

An “activity” is (A) dredging, bulldozing, removing or displacing soil, sand, vegetation or other materials; (B) draining or otherwise dewatering; (C) filling, including adding sand or other material to a sand dune; or (D) any construction, repair or alteration of any permanent structure.

Shoreland Zoning Law

This law focuses upon areas near great ponds, rivers and larger streams, coastal areas, and wetlands. The Shoreland Zoning law helps to accomplish the following goals: prevent and control water pollution; protect fish spawning grounds, bird and wildlife habitat; protect buildings and lands from flooding and accelerated erosion; protect archeological and historic resources; to protect commercial fishing and maritime industries; protect freshwater and coastal wetlands; control building sites, placement of structures and land uses; conserve shore cover, and visual as well as actual points of access to inland and coastal waters; conserve natural beauty and open space; and anticipate and respond to the impacts of development in shoreland areas.

The Shoreland Zoning law requires that municipalities protect shoreland areas through adopting shoreland zoning maps and ordinances. Zoning ordinances provide for what types of activities can occur in certain areas. For example, they address building size and setbacks, and the establishment of resource protection, general development, residential, and other zones. Shoreland areas include areas within 250 of the normal high-water line of any great pond, river or saltwater body, areas within 250 feet of the upland edge of a coastal wetland, areas within 250 feet of the upland edge of a freshwater wetland except in certain situations, and areas within 75 feet of the high-water line of a stream.

The law is primarily administered through each municipality, and the local code enforcement officer is usually the first point of contact on shoreland zoning issues. The MDEP also has a Shoreland Zoning Unit.

Stormwater Management Law

The Stormwater Program works toward protecting and restoring surface and groundwater impacted by stormwater flows. Stormwater runoff from developed areas in watersheds carries pollutants, and affects the rates and volumes of flows in natural water bodies in ways that can cause damage. Every citizen and visitor of Maine has a role in reducing impacts from stormwater runoff, from the large developer constructing a new parking lot, to the homeowner using good erosion control methods and handling chemicals carefully around the house.

The Stormwater Program at the Maine Department of Environmental Protection includes the regulation of stormwater under two core laws: The Site Location of Development law (noted above) and Stormwater Management Law. Aspects of stormwater are also addressed under industry specific laws such as the borrow pit and solid waste laws, and the rules administered by the Land Use Regulation Commission. DEP also regulates stormwater discharges under the Waste Discharge Law, primarily through the use of general permits.

Erosion and Sedimentation Control Law

The erosion control law has a brief and basic standard requiring that a person who conducts an activity involving filling, displacing or exposing earthen materials take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource. Erosion control measures must be in place before an activity begins, and remain in place and functional until the site is permanently stabilized. No permit is required. Agricultural fields are exempt, and forest management activities conducted in accordance with Maine Land Use Regulation Commission standards are deemed to comply.

The Department of Environmental Protection uses the erosion control law to support education efforts concerning the importance of erosion control in watersheds, both within and beyond immediate shoreland areas, and the use of best management

practices. The law is enforceable by both the DEP and certain municipal code enforcement officers.

Waste Discharge Law

Administered by DEP, the wastewater discharge law requires that a license be obtained for the discharge of pollutants to the waters of the State, such as streams, rivers, or lakes, wetlands, or the ocean. Typical discharges include sanitary waste water and process water from industrial or commercial activities. A license is also required for the discharge of pollutants to groundwater, except for subsurface disposal systems installed under the State Plumbing Code.

Maine Waterway Development and Conservation Act

The Maine Waterway Development and Conservation Act (MWDC) requires that a permit be issued for the construction, reconstruction, or structural alteration (including maintenance and repair) of new or existing hydropower projects. Hydropower projects include water-powered electrical and mechanical generating projects and water storage projects. The MWDC sets up a comprehensive, one-stop state permitting process that is administered by DEP for projects in organized municipalities and by LURC in unorganized territories. The law requires consideration of the full range of economic, environmental, and energy benefits and adverse impacts of a hydro project.

Subdivision Law

This law grants municipalities the authority to adopt subdivision regulations. It requires that all requests for subdivision approval be reviewed by the applicable municipal planning board, agency or office, or if none, by the municipal officers. The municipal reviewing authority may, after a public hearing, adopt, amend or repeal additional reasonable regulations governing subdivisions. The regulations may provide for a multi-stage application or review procedure consisting of no more than three stages: pre-application sketch plan, preliminary plan and final plan. The municipal reviewing authority shall consider the following criteria when examining proposed subdivisions:

- will not result in undue water or air pollution;
- has sufficient water available for the reasonable foreseeable needs of the subdivision;

- will not cause unreasonable burden on an existing water supply, if one is to be utilized;
- will not cause unreasonable soil erosion or reduction in the capacity of the land to hold water so that a dangerous or unhealthy condition may result;
- will not cause unreasonable highway or public road congestion or unsafe conditions with respect to use of highways or public roads existing or proposed;
- will provide for adequate sewage waste disposal;
- will not cause unreasonable burden on the ability of a municipality to dispose of solid waste and sewage, if municipal services are to be utilized;
- will not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historical sites or rare and irreplaceable natural areas, or any public rights for physical or visual access to the shoreline;
- is in conformance with the municipality's subdivision regulations, comprehensive plan, development plan or land use plan, if any;
- subdivider must have adequate financial and technical capacity to meet above standards;
- whenever situated, in whole or in part, within 250 feet of any pond, lake, river or tidal water, will not adversely affect the quality of that body of water or unreasonably affect the shoreline of that water;
- will not, alone or in conjunction with existing activities, adversely affect the quality and quantity of groundwater; and
- the subdivider will determine based on the Federal Emergency Management Agency's Flood Boundary and Floodway Maps and Flood Insurance Rate Maps, whether the subdivision is in a flood prone area,
- all freshwater wetlands have been identified on any maps submitted as part of the application, regardless of size of wetland,
- any river stream or brook has been identified on any maps submitted as part of application,
- will provide for adequate storm water management,
- prohibition on spaghetti-lots (i.e., lot depth to shore frontage ratio greater than 5 to 1 prohibited)
- cumulative effects of subdivision will not unreasonably increase a great pond's phosphorus concentration during the construction phase and life of subdivision,
- will not cause unreasonable traffic congestion or unsafe conditions with respect to the use of existing public ways when crossing through abutting municipality,

- timber harvesting standards must be met for proposed project as well as period within 5 years prior to subdivision proposal.

Coastal Zone Management Act of 1972

The Coastal Zone Management Act (CZMA) was passed in 1972 to conserve our nation's coastal and estuarine resources. It provides a framework for management of our coastal areas while providing guidance and funding to individual state programs. This Act called for the protection and wise use of the land and water resources in the nation's coastal zone. The federal government was charged with assisting states, primarily through providing financial assistance, in the development and implementation of programs in each state's respective coastal zone, including unified policies, criteria, standards, methods and processes for dealing with land and water use decisions of local, regional, and statewide importance.

The Coastal Zone Management Programs and the National Estuarine Research Reserve System (NERRS) were established in participating coastal and Great Lake states under the CZMA. Maine's Coastal Program is located in the Department of Agriculture, Conservation and Forestry. The NERRS was created by Section 315 in the CZMA (see Appendix G). It calls for States to set aside designated areas for long-term protection, and to conduct education and research critical to the management and conservation of estuarine and coastal resources.

APPENDICES

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USFWS AND RMA

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MDPL AND RMA — SUBMERGED LANDS

TOWN OF WELLS AND RMA

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Authority: Section 315 of the Coastal Zone Management Act, as amended (16 U.S.C. 1461).

Source: 58 FR 38215, July 15, 1993, unless otherwise noted.

Subpart A—General

Sec. 921.1 Mission, goals and general provisions.

(a) The mission of the National Estuarine Research Reserve Program is the establishment and management, through Federal-state cooperation, of a national system (National Estuarine Research Reserve System or System) of estuarine research reserves (National Estuarine Research Reserves or Reserves) representative of the various regions and estuarine types in the United States. National Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.

(b) The goals of the Program are to:

1. Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
2. Address coastal management issues identified as significant through coordinated estuarine research within the System;
3. Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
4. Promote Federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research; and
5. Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

(c) National Estuarine Research Reserves shall be open to the public to the extent permitted under state and Federal law. Multiple uses are allowed to the degree compatible with each Reserve's overall purpose as provided in the management plan (see sec. 921.13) and consistent with paragraphs (a) and (b) of this section. Use levels are set by the state where the Reserve is located and analyzed in the management plan. The Reserve management plan shall describe the uses and establish priorities among these uses. The plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Consistent with resource protection and research objectives, public access and use may be restricted to certain areas or components within a Reserve.

(d) Habitat manipulation for research purposes is allowed consistent with the following limitations.

Manipulative research activities must be specified in the management plan, be consistent with the mission and goals of the program (see paragraphs (a) and (b) of this section) and the goals and objectives set forth in the Reserve's management plan, and be limited in nature and extent to the minimum manipulative activity necessary to accomplish the stated research objective. Manipulative research activities with a significant or long-term impact on Reserve resources require the prior approval of the state and the National Oceanic and Atmospheric Administration (NOAA). Manipulative research activities which can reasonably be expected to have a significant adverse impact on the estuarine resources and habitat of a Reserve, such that the activities themselves or their resulting short- and long-term consequences compromise the representative character and integrity of a Reserve, are prohibited. Habitat manipulation for resource management purposes is prohibited except as specifically approved by NOAA as: (1) A restoration activity consistent with paragraph (e) of this section; or (2) an activity necessary for the protection of public health or the preservation of other sensitive resources which have been listed or are eligible for protection under relevant Federal or state authority (e.g., threatened/endangered species or significant historical or cultural resources) or if the manipulative activity is a long-term pre-existing use (i.e., has occurred prior to designation) occurring in a buffer area. If habitat manipulation is determined to be necessary for the protection of public health, the preservation of sensitive resources, or if the manipulation is a long-term pre-existing use in a buffer area, then these activities shall be specified in the Reserve management plan in accordance with sec. 921.13(a)(10) and shall be limited to the reasonable alternative which has the least adverse and shortest term impact on the representative and ecological integrity of the Reserve.

(e) Under the Act an area may be designated as an estuarine Reserve only if the area is a representative estuarine ecosystem that is suitable for long-term research. Many estuarine areas have undergone some ecological change as a result of human activities (e.g., hydrological changes, intentional/unintentional species composition changes—introduced and exotic species). In those areas proposed or designated as National Estuarine Research Reserves, such changes may have diminished the representative character and integrity of the site. Although restoration of degraded areas is not a primary purpose of the System, such activities may be permitted to improve the representative character and integrity of a Reserve. Restoration activities must be carefully planned and approved by NOAA through the Reserve management plan. Historical research may be necessary to

determine the “natural” representative state of an estuarine area (i.e., an estuarine ecosystem minimally affected by human activity or influence). Frequently, restoration of a degraded estuarine area will provide an excellent opportunity for management oriented research.

(f) NOAA may provide financial assistance to coastal states, not to exceed, per Reserve, 50 percent of all actual costs or \$5 million whichever amount is less, to assist in the acquisition of land and waters, or interests therein. NOAA may provide financial assistance to coastal states not to exceed 70 percent of all actual costs for the management and operation of, the development and construction of facilities, and the conduct of educational or interpretive activities concerning Reserves (see subpart I). NOAA may provide financial assistance to any coastal state or public or private person, not to exceed 70 percent of all actual costs, to support research and monitoring within a Reserve. Notwithstanding any financial assistance limits established by this Part, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. Predesignation, acquisition and development, operation and management, special research and monitoring, and special education and interpretation awards are available under the National Estuarine Reserve Program. Predesignation awards are for site selection/feasibility, draft management plan preparation and conduct of basic characterization studies. Acquisition and development awards are intended primarily for acquisition of interests in land, facility construction and to develop and/or upgrade research, monitoring and education programs. Operation and management awards provide funds to assist in implementing, operating and managing the administrative, and basic research, monitoring and education programs, outlined in the Reserve management plan. Special research and monitoring awards provide funds to conduct estuarine research and monitoring projects with the System. Special educational and interpretive awards provide funds to conduct estuarine educational and interpretive projects within the System.

(g) Lands already in protected status managed by other Federal agencies, state or local governments, or private organizations may be included within National Estuarine Research Reserves only if the managing entity commits to long-term management consistent with paragraphs (d) and (e) of this section in the Reserve management plan. Federal lands already in protected status may not comprise a majority of the key land and

water areas of a Reserve (see sec. 921.11(c)(3)).

(h) To assist the states in carrying out the Program’s goals in an effective manner, NOAA will coordinate a research and education information exchange throughout the National Estuarine Research Reserve System. As part of this role, NOAA will ensure that information and ideas from one Reserve are made available to others in the System. The network will enable Reserves to exchange information and research data with each other, with universities engaged in estuarine research, and with Federal, state, and local agencies. NOAA’s objective is a system-wide program of research and monitoring capable of addressing the management issues that affect long-term productivity of our Nation’s estuaries.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998].

Sec. 921.2 Definitions

(a) Act means the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 et seq.

(b) Assistant Administrator means the Assistant Administrator for Ocean Services and Coastal Zone Management or delegee.

(c) Coastal state means a state of the United States, in or bordering on, the Atlantic, Pacific, or Arctic Ocean, the Gulf of Mexico, Long Island Sound, or one or more of the Great Lakes. For the purposes of these regulations the term also includes Puerto Rico, the Virgin Islands, Guam, the Commonwealth of the Northern Marianas Islands, the Trust Territories of the Pacific Islands, and American Samoa (see 16 U.S.C. 1453(4)).

(d) State agency means an instrumentality of a coastal state to whom the coastal state has delegated the authority and responsibility for the creation and/or management/operation of a National Estuarine Research Reserve. Factors indicative of this authority may include the power to receive and expend funds on behalf of the Reserve, acquire and sell or convey real and personal property interests, adopt rules for the protection of the Reserve, enforce rules applicable to the Reserve, or develop and implement research and education programs for the reserve. For the purposes of these regulations, the terms “coastal state” and “State agency” shall be synonymous.

(e) Estuary means that part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water derived from land drainage. The term

also includes estuary-type areas with measurable freshwater influence and having unimpaired connections with the open sea, and estuary-type areas of the Great Lakes and their connecting waters (see 16 U.S.C. 1453(7)).

(f) National Estuarine Research Reserve means an area that is a representative estuarine ecosystem suitable for long-term research, which may include all of the key land and water portion of an estuary, and adjacent transitional areas and uplands constituting to the extent feasible a natural unit, and which is set aside as a natural field laboratory to provide long-term opportunities for research, education, and interpretation on the ecological relationships within the area (see 16 U.S.C. 1453(8)) and meets the requirements of 16 U.S.C. 1461(b). This includes those areas designated as National Estuarine Sanctuaries or Reserves under section 315 of the Act prior to enactment of the Coastal Zone Act Reauthorization Amendments of 1990 and each area subsequently designated as a National Estuarine Research Reserve.

Sec. 921.3 National Estuarine Research Reserve System Biogeographic Classification Scheme and Estuarine Typologies.

(a) National Estuarine Research Reserves are chosen to reflect regional differences and to include a variety of ecosystem types. A biogeographic classification scheme based on regional variations in the nation's coastal zone has been developed. The biogeographic classification scheme is used to ensure that the National Estuarine Research Reserve System includes at least one site from each region. The estuarine typology system is utilized to ensure that sites in the System reflect the wide range of estuarine types within the United States.

(b) The biogeographic classification scheme, presented in appendix I, contains 29 regions. Figure 1 graphically depicts the biogeographic regions of the United States.

(c) The typology system is presented in appendix II.

Sec. 921.4 Relationship to other provisions of the Coastal Zone Management Act, and to the Marine Protection, Research and Sanctuaries Act.

(a) The National Estuarine Research Reserve System is intended to provide information to state agencies and other entities involved in addressing coastal management issues. Any coastal state, including those that do not have approved coastal management programs under section 306 of the Act, is eligible for an award under the National Estuarine Research Reserve Program (see sec. 921.2(c)).

(b) For purposes of consistency review by states with a federally approved coastal management program, the designation of a National Estuarine Research Reserve is deemed to be a Federal activity, which, if directly affecting the state's coastal zone, must be undertaken in a manner consistent to the maximum extent practicable with the approved state coastal management program as provided by section 1456(c) (1) of the Act, and implementing regulations at 15 C.F.R. part 930, subpart C. In accordance with section 1456(c) (1) of the Act and the applicable regulations NOAA will be responsible for certifying that designation of the Reserve is consistent with the state's approved coastal management program. The state must concur with or object to the certification. It is recommended that the lead state agency for Reserve designation consult, at the earliest practicable time, with the appropriate state officials concerning the consistency of a proposed National Estuarine Research Reserve.

(c) The National Estuarine Research Reserve Program will be administered in close coordination with the National Marine Sanctuary Program (Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 U.S.C. 1431-1445), also administered by NOAA. Title III authorizes the Secretary of Commerce to designate discrete areas of the marine environment as National Marine Sanctuaries to protect or restore such areas for their conservation, recreational, ecological, historical, research, educational or esthetic values. National Marine Sanctuaries and Estuarine Research Reserves may not overlap, but may be adjacent.

Subpart B—Site Selection, Post Site Selection and Management Plan Development

Sec. 921.10 General.

(a) A coastal state may apply for Federal financial assistance for the purpose of site selection, preparation of documents specified in sec. 921.13 (draft management plan (DMP) and environmental impact statement (EIS)), and the conduct of limited basic characterization studies. The total Federal share of this assistance may not exceed \$100,000. Federal financial assistance for preacquisition activities under sec. 921.11 and sec. 921.12 is subject to the total \$5 million for which each Reserve is eligible for land acquisition. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent

of all actual costs of activities carried out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more coastal states, each state is eligible for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Each separate National Estuarine Research Reserve is eligible for the full complement of funding. Financial assistance application procedures are specified in subpart I.

(b) In developing a Reserve program, a state may choose to develop a multiple-site Reserve reflecting a diversity of habitats in a single biogeographic region. A multiple-site Reserve allows the state to develop complementary research and educational programs within the individual components of its multi-site Reserve. Multiple-site Reserves are treated as one Reserve in terms of financial assistance and development of an overall management framework and plan. Each individual site of a proposed multiple-site Reserve shall be evaluated both separately under sec. 921.11(c) and collectively as part of the site selection process. A coastal state may propose to establish a multiple-site Reserve at the time of the initial site selection, or at any point in the development or operation of the Reserve. If the state decides to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award is made for a single site, the proposal is subject to the requirements set forth in sec. 921.33(b). However, a state may not propose to add one or more sites to an already designated Reserve if the operation and management of such Reserve has been found deficient and uncorrected or the research conducted is not consistent with the Estuarine Research Guidelines referenced in sec. 921.51. In addition, Federal funds for the acquisition of a multiple-site Reserve remain limited to \$5,000,000 (see sec. 921.20). The funding for operation of a multiple-site Reserve is limited to the maximum allowed for any one Reserve per year (see sec. 921.32(c)) and preacquisition funds are limited to \$100,000 per Reserve. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available.

[58 FR 38215, July 15, 1993, as amended at 63 FR 26717, May 14, 1998].

Sec. 921.11 Site selection and feasibility.

(a) A coastal state may use Federal funds to establish and implement a site selection process which is approved by NOAA.

(b) In addition to the requirements set forth in subpart I, a request for Federal funds for site selection must contain the following programmatic information:

1. A description of the proposed site selection process and how it will be implemented in conformance with the biogeographic classification scheme and typology (sec. 921.3);
2. An identification of the site selection agency and the potential management agency; and
3. A description of how public participation will be incorporated into the process (see sec. 921.11(d)).

(c) As part of the site selection process, the state and NOAA shall evaluate and select the final site(s). NOAA has final authority in approving such sites. Site selection shall be guided by the following principles:

1. The site's contribution to the biogeographical and typological balance of the National Estuarine Research Reserve System. NOAA will give priority consideration to proposals to establish Reserves in biogeographic regions or subregions or incorporating types that are not represented in the system. (see the biogeographic classification scheme and typology set forth in sec. 921.3 and appendices I and II);
2. The site's ecological characteristics, including its biological productivity, diversity of flora and fauna, and capacity to attract a broad range of research and educational interests. The proposed site must be a representative estuarine ecosystem and should, to the maximum extent possible, be an estuarine ecosystem minimally affected by human activity or influence (see sec. 921.1(e)).
3. Assurance that the site's boundaries encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation. Boundary size will vary greatly depending on the nature of the ecosystem. Reserve boundaries must encompass the area within which adequate control has or will be established by the managing entity over human activities occurring within the Reserve. Generally,

Reserve boundaries will encompass two areas: Key land and water areas (or “core area”) and a buffer zone. Key land and water areas and a buffer zone will likely require significantly different levels of control (see sec. 921.13(a)(7)). The term “key land and water areas” refers to that core area within the Reserve that is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the Reserve for research on natural processes. Key land and water areas, which comprise the core area, are those ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary. The determination of which land and water areas are “key” to a particular Reserve must be based on specific scientific knowledge of the area. A basic principle to follow when deciding upon key land and water areas is that they should encompass resources representative of the total ecosystem, and which if compromised could endanger the research objectives of the Reserve. The term buffer zone refers to an area adjacent to or surrounding key land and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological or geomorphological change which reasonably could be expected to occur. National Estuarine Research Reserves may include existing Federal or state lands already in a protected status where mutual benefit can be enhanced. However, NOAA will not approve a site for potential National Estuarine Research Reserve status that is dependent primarily upon the inclusion of currently protected Federal lands in order to meet the requirements for Reserve status (such as key land and water areas). Such lands generally will be included within a Reserve to serve as a buffer or for other ancillary purposes; and may be included, subject to NOAA approval, as a limited portion of the core area;

4. The site’s suitability for long-term estuarine research, including ecological factors and proximity to existing research facilities and educational institutions;
5. The site’s compatibility with existing and potential land and water uses in contiguous areas as well as approved coastal and estuarine management plans; and
6. The site’s importance to education and interpretive efforts, consistent with the need for continued protection of the natural system.

(d) Early in the site selection process the state must seek the views of affected landowners, local governments, other state and Federal agencies and other parties who are interested in the area(s) being considered for selection as a potential National Estuarine Research Reserve. After the local government(s) and affected landowner(s) have been contacted, at least one public meeting shall be held in the vicinity of the proposed site. Notice of such a meeting, including the time, place, and relevant subject matter, shall be announced by the state through the area’s principal newspaper at least 15 days prior to the date of the meeting and by NOAA in the Federal Register.

(e) A state request for NOAA approval of a proposed site (or sites in the case of a multi-site Reserve) must contain a description of the proposed site(s) in relationship to each of the site selection principals (sec. 921.11(c)) and the following information:

1. An analysis of the proposed site(s) based on the biogeographical scheme/typology discussed in sec. 921.3 and set forth in appendices I and II;
2. A description of the proposed site(s) and its (their) major resources, including location, proposed boundaries, and adjacent land uses. Maps are required;
3. A description of the public participation process used by the state to solicit the views of interested parties, a summary of comments, and, if interstate issues are involved, documentation that the Governor(s) of the other affected state(s) has been contacted. Copies of all correspondence, including contact letters to all affected landowners must be appended;

4. A list of all sites considered and a brief statement of the reasons why a site was not preferred; and
5. A nomination of the proposed site(s) for designation as a National Estuarine Research Reserve by the Governor of the coastal state in which the state is located.

(f) A state proposing to reactivate an inactive site, previously approved by NOAA for development as an Estuarine Sanctuary or Reserve, may apply for those funds remaining, if any, provided for site selection and feasibility (sec. 921.11a)) to determine the feasibility of reactivation. This feasibility study must comply with the requirements set forth in sec. 921.11 (c) through (e).

Sec. 921.12 Post site selection.

(a) At the time of the coastal state’s request for NOAA approval of a proposed site, the state may submit a request for funds to develop the draft management plan and for preparation of the EIS. At this time, the state may also submit a request for the remainder of the predesignation funds to perform a limited basic characterization of the physical, chemical and biological characteristics of the site approved by NOAA necessary for providing EIS information to NOAA. The state’s request for these post site selection funds must be accompanied by the information specified in subpart I and, for draft management plan development and EIS information collection, the following programmatic information:

1. A draft management plan outline (see sec. 921.13(a) below); and
2. An outline of a draft memorandum of understanding (MOU) between the state and NOAA detailing the Federal-state role in Reserve management during the initial period of Federal funding and expressing the state’s long-term commitment to operate and manage the Reserve.

(b) The state is eligible to use the funds referenced in sec. 921.12(a) after the proposed site is approved by NOAA under the terms of sec. 921.11.

Sec. 921.13 Management plan and environmental impact statement development.

(a) After NOAA approves the state’s proposed site and application for funds submitted pursuant to sec. 921.12, the state may begin draft management plan development and the collection of information necessary for the preparation by NOAA of an EIS. The state shall develop a draft management plan, including an MOU. The plan shall set out in detail:

1. Reserve goals and objectives, management issues, and strategies or actions for meeting the goals and objectives;
2. An administrative plan including staff roles in administration, research, education/interpretation, and surveillance and enforcement;
3. A research plan, including a monitoring design;
4. An education/interpretive plan;
5. A plan for public access to the Reserve;
6. A construction plan, including a proposed construction schedule, general descriptions of proposed developments and general cost estimates. Information should be provided for proposed minor construction projects in sufficient detail to allow these projects to begin in the initial phase of acquisition and development. A categorical exclusion, environmental assessment, or EIS may be required prior to construction;
7. (i) An acquisition plan identifying the ecologically key land and water areas of the Reserve, ranking these areas according to their relative importance, and including a strategy for establishing adequate long-term state control over these areas sufficient to provide protection for Reserve resources to ensure a stable environment for research. This plan must include an identification of ownership within the proposed Reserve boundaries, including land already in the public domain; the method(s) of acquisition which the state proposes to use—acquisition (including less-than-fee simple options) to establish adequate long-term state control; an estimate of the fair market value of any property interest—which is proposed for acquisition; a schedule estimating the time required to complete the process of establishing adequate state control of the proposed research reserve; and a discussion of any anticipated problems. In selecting a preferred method(s) for establishing adequate state control over areas within the proposed boundaries of the Reserve, the state shall perform the following steps for each parcel determined to be part of the key land and water areas (control over which is necessary to protect the integrity of the Reserve for research purposes), and for those parcels required for research and interpretive support

facilities or buffer purposes:

(A) Determine, with appropriate justification, the minimum level of control(s) required [e.g., management agreement, regulation, less-than-fee simple property interest (e.g., conservation easement), fee simple property acquisition, or a combination of these approaches]. This does not preclude the future necessity of increasing the level of state control;

(B) Identify the level of existing state control(s);

(C) Identify the level of additional state control(s), if any, necessary to meet the minimum requirements identified in paragraph (a)(7)(i)(A) of this section;

(D) Examine all reasonable alternatives for attaining the level of control identified in paragraph (a)(7)(i)(C) of this section, and perform a cost analysis of each; and

(E) Rank, in order of cost, the methods (including acquisition) identified in paragraph (a)(7)(i)(D) of this section.

(ii) An assessment of the relative cost-effectiveness of control alternatives shall include a reasonable estimate of both short-term costs (e.g., acquisition of property interests, regulatory program development including associated enforcement costs, negotiation, adjudication, etc.) and long-term costs (e.g., monitoring, enforcement, adjudication, management and coordination). In selecting a preferred method(s) for establishing adequate state control over each parcel examined under the process described above, the state shall give priority consideration to the least costly method(s) of attaining the minimum level of long-term control required. Generally, with the possible exception of buffer areas required for support facilities, the level of control(s) required for buffer areas will be considerably less than that required for key land and water areas. This acquisition plan, after receiving the approval of NOAA, shall serve as a guide for negotiations with landowners. A final boundary for the reserve shall be delineated as a part of the final management plan;

8. A resource protection plan detailing applicable authorities, including allowable uses, uses requiring a permit and permit requirements, any restrictions on use of the research reserve, and a strategy for research reserve surveillance and enforcement of such use restrictions, including appropriate government enforcement agencies;

9. If applicable, a restoration plan describing those portions of the site that may require habitat modification to restore natural conditions;
10. If applicable, a resource manipulation plan, describing those portions of the Reserve buffer in which long-term pre-existing (prior to designation) manipulation for reasons not related to research or restoration is occurring. The plan shall explain in detail the nature of such activities, shall justify why such manipulation should be permitted to continue within the reserve buffer; and shall describe possible effects of this manipulation on key land and water areas and their resources;
11. A proposed memorandum of understanding (MOU) between the state and NOAA regarding the Federal-state relationship during the establishment and development of the National Estuarine Research Reserve, and expressing a long-term commitment by the state to maintain and manage the Reserve in accordance with section 315 of the Act, 16 U.S.C. 1461, and applicable regulations. In conjunction with the MOU, and where possible under state law, the state will consider taking appropriate administrative or legislative action to ensure the long-term protection and operation of the National Estuarine Research Reserve. If other MOUs are necessary (such as with a Federal agency, another state agency or private organization), drafts of such MOUs must be included in the plan. All necessary MOU's shall be signed prior to Reserve designation; and
12. If the state has a federally approved coastal management program, a certification that the National Estuarine Research Reserve is consistent to the maximum extent practicable with that program. See Secs. 921.4(b) and 921.30(b).

(b) Regarding the preparation of an EIS under the National Environmental Policy Act on a National Estuarine Research Reserve proposal, the state and NOAA shall collect all necessary information concerning the socioeconomic and environmental impacts associated with implementing the draft management plan and feasible alternatives to the plan. Based on this information, the state will draft and provide NOAA with a preliminary EIS.

(c) Early in the development of the draft management plan and the draft EIS, the state and NOAA shall hold

a scoping meeting (pursuant to NEPA) in the area or areas most affected to solicit public and government comments on the significant issues related to the proposed action. NOAA will publish a notice of the meeting in the Federal Register at least 15 days prior to the meeting. The state shall be responsible for publishing a similar notice in the local media.

(d) NOAA will publish a Federal Register notice of intent to prepare a draft EIS. After the draft EIS is prepared and filed with the Environmental Protection Agency (EPA), a Notice of Availability of the draft EIS will appear in the Federal Register. Not less than 30 days after publication of the notice, NOAA will hold at least one public hearing in the area or areas most affected by the proposed national estuarine research reserve. The hearing will be held no sooner than 15 days after appropriate notice of the meeting has been given in the principal news media by the state and in the Federal Register by NOAA. After a 45-day comment period, a final EIS will be prepared by the state and NOAA.

Subpart C—Acquisition, Development and Preparation of the Final Management Plan

Sec. 921.20 General.

The acquisition and development period is separated into two major phases. After NOAA approval of the site, draft management plan and draft MOU, and completion of the final EIS, a coastal state is eligible for an initial acquisition and development award(s). In this initial phase, the state should work to meet the criteria required for formal research reserve designation; e.g., establishing adequate state control over the key land and water areas as specified in the draft management plan and preparing the final management plan. These requirements are specified in sec. 921.30. Minor construction in accordance with the draft management plan may also be conducted during this initial phase. The initial acquisition and development phase is expected to last no longer than three years. If necessary, a longer time period may be negotiated between the state and NOAA. After Reserve designation, a state is eligible for a supplemental acquisition and development award(s) in accordance with sec. 921.31. In this post-designation acquisition and development phase, funds may be used in accordance with the final management plan to construct research and educational facilities, complete any remaining land acquisition, for program development, and for restorative activities identified in the final management plan. In any case, the amount of

Federal financial assistance provided to a coastal state with respect to the acquisition of lands and waters, or interests therein, for any one National Estuarine Research Reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein or \$5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998].

Sec. 921.21 Initial acquisition and development awards.

(a) Assistance is provided to aid the recipient prior to designation in:

1. Acquiring a fee simple or less-than-fee simple real property interest in land and water areas to be included in the Reserve boundaries (see sec. 921.13(a)(7); sec. 921.30(d));
2. Minor construction, as provided in paragraphs (b) and (c) of this section;
3. Preparing the final management plan; and
4. Initial management costs, e.g., for implementing the NOAA approved draft management plan, hiring a Reserve manager and other staff as necessary and for other management-related activities. Application procedures are specified in subpart I.

(b) The expenditure of Federal and state funds on major construction activities is not allowed during the initial acquisition and development phase. The preparation of architectural and engineering plans, including specifications, for any proposed construction, or for proposed restorative activities, is permitted. In addition, minor construction activities, consistent with paragraph (c) of this section also are allowed. The NOAA-approved draft management plan must, however, include a construction plan and a public access plan before any award funds can be spent on construction activities.

(c) Only minor construction activities that aid in implementing portions of the management plan (such as boat ramps and nature trails) are permitted during the initial acquisition and development phase. No more than five (5) percent of the initial acquisition and development award may be expended on such activities. NOAA must make a specific determination,

based on the final EIS, that the construction activity will not be detrimental to the environment.

(d) Except as specifically provided in paragraphs (a) through (c) of this section, construction projects, to be funded in whole or in part under an acquisition and development award(s), may not be initiated until the Reserve receives formal designation (see sec. 921.30). This requirement has been adopted to ensure that substantial progress in establishing adequate state control over key land and water areas has been made and that a final management plan is completed before major sums are spent on construction. Once substantial progress in establishing adequate state control/acquisition has been made, as defined by the state in the management plan, other activities guided by the final management plan may begin with NOAA's approval.

(e) For any real property acquired in whole or part with Federal funds for the Reserve, the state shall execute suitable title documents to include substantially the following provisions, or otherwise append the following provisions in a manner acceptable under applicable state law to the official land record(s):

1. Title to the property conveyed by this deed shall vest in the [recipient of the award granted pursuant to section 315 of the Act, 16 U.S.C. 1461 or other NOAA approved state agency] subject to the condition that the designation of the [name of National Estuarine Reserve] is not withdrawn and the property remains part of the federally designated [name of National Estuarine Research Reserve]; and
2. In the event that the property is no longer included as part of the Reserve, or if the designation of the Reserve of which it is part is withdrawn, then NOAA or its successor agency, after full and reasonable consultation with the State, may exercise the following rights regarding the disposition of the property:
 - (i) The recipient may retain title after paying the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the current fair market value of the property;
 - (ii) If the recipient does not elect to retain title, the Federal Government may either direct the recipient to sell the property and pay the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the proceeds from the sale (after deducting

actual and reasonable selling and repair or renovation expenses, if any, from the sale proceeds), or direct the recipient to transfer title to the Federal Government. If directed to transfer title to the Federal Government, the recipient shall be entitled to compensation computed by applying the recipient's percentage of participation in the cost of the original project to the current fair market value of the property; and

(iii) Fair market value of the property must be determined by an independent appraiser and certified by a responsible official of the state, as provided by Department of Commerce regulations at 15 C.F.R. part 24, and Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally assisted programs at 15 C.F.R. part 11.

(f) Upon instruction by NOAA, provisions analogous to those of sec. 921.21(e) shall be included in the documentation underlying less-than-fee-simple interests acquired in whole or part with Federal funds.

(g) Federal funds or non-Federal matching share funds shall not be spent to acquire a real property interest in which the state will own the land concurrently with another entity unless the property interest has been identified as a part of an acquisition strategy pursuant to sec. 921.13(7) which has been approved by NOAA prior to the effective date of these regulations.

(h) Prior to submitting the final management plan to NOAA for review and approval, the state shall hold a public meeting to receive comment on the plan in the area affected by the estuarine research reserve. NOAA will publish a notice of the meeting in the Federal Register at least 15 days prior to the public meeting. The state shall be responsible for having a similar notice published in the local newspaper(s).

Subpart D—Reserve Designation and Subsequent Operation

Sec. 921.30 Designation of National Estuarine Research Reserves.

(a) The Under Secretary may designate an area proposed for designation by the Governor of the state in which it is located, as a National Estuarine Research Reserve if the Under Secretary finds:

1. 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;

2. Key land and water areas of the proposed Reserve, as identified in the management plan, are under adequate state control sufficient to provide long-term protection for reserve resources to ensure a stable environment for research;
3. Designation of the area as a Reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation;
4. A final management plan has been approved by NOAA;
5. An MOU has been signed between the state and NOAA ensuring a long-term commitment by the state to the effective operation and implementation of the area as a National Estuarine Research Reserve;
6. All MOU's necessary for reserve management (i.e., with relevant Federal, state, and local agencies and/or private organizations) have been signed; and
7. The coastal state in which the area is located has complied with the requirements of subpart B.

(b) NOAA will determine whether the designation of a National Estuarine Research Reserve in a state with a federally approved coastal zone management program directly affects the coastal zone. If the designation is found to directly affect the coastal zone, NOAA will make a consistency determination pursuant to sec. 307(c)(1) of the Act, 16 U.S.C. 1456, and 15 C.F.R. part 930, subpart C. See sec. 921.4(b). The results of this consistency determination will be published in the Federal Register when the notice of designation is published. See sec. 921.30(c).

(c) NOAA will publish the notice of designation of a National Estuarine Research Reserve in the Federal Register. The state shall be responsible for having a similar notice published in the local media.

(d) The term state control in sec. 921.30(a)(3) does not necessarily require that key land and water areas be owned by the state in fee simple. Acquisition of less-than-fee simple interests e.g., conservation easements) and utilization of existing state regulatory measures are encouraged where the state can demonstrate that these interests and measures assure adequate long-term state control consistent with the purposes of the research reserve (see also Secs. 921.13(a)(7); 921.21(g)). Should the state later elect to purchase an interest in such lands

using NOAA funds, adequate justification as to the need for such acquisition must be provided to NOAA.

Sec. 921.31 Supplemental acquisition and development awards.

After National Estuarine Research Reserve designation, and as specified in the approved management plan, a coastal state may request a supplemental acquisition and/or development award(s) for acquiring additional property interests identified in the management plan as necessary to strengthen protection of key land and water areas and to enhance long-term protection of the area for research and education, for facility and exhibit construction, for restorative activities identified in the approved management plan, for administrative purposes related to acquisition and/or facility construction and to develop and/or upgrade research, monitoring and education/interpretive programs. Federal financial assistance provided to a National Estuarine Research Reserve for supplemental development costs directly associated with facility construction (i.e., major construction activities) may not exceed 70 percent of the total project cost, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs. NOAA must make a specific determination that the construction activity will not be detrimental to the environment. Acquisition awards for the acquisition of lands or waters, or interests therein, for any one reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein of \$5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more states, each state is eligible independently for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Application procedures are specified in subpart I. Land acquisition must follow the procedures specified in Secs. 921.13(a)(7), 921.21(e) and (f) and 921.81.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998].

Sec. 921.32 Operation and management: Implementation of the management plan.

(a) After the Reserve is formally designated, a coastal

state is eligible to receive Federal funds to assist the state in the operation and management of the Reserve including the management of research, monitoring, education, and interpretive programs. The purpose of this Federally funded operation and management phase is to implement the approved final management plan and to take the necessary steps to ensure the continued effective operation of the Reserve.

(b) State operation and management of the Reserves shall be consistent with the mission, and shall further the goals of the National Estuarine Research Reserve program (see sec. 921.1).

(c) Federal funds are available for the operation and management of the Reserve. Federal funds provided pursuant to this section may not exceed 70 percent of the total cost of operating and managing the Reserve for any one year, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs. In the case of a biogeographic region (see Appendix I) shared by two or more states, each state is eligible for Federal financial assistance to establish a separate Reserve within their respective portion of the shared biogeographic region (see sec. 921.10).

(d) Operation and management funds are subject to the following limitations:

1. Eligible coastal state agencies may apply for up to the maximum share available per Reserve for that fiscal year. Share amounts will be announced annually by letter from the Sanctuary and Reserves Division to all participating states. This letter will be provided as soon as practicable following approval of the Federal budget for that fiscal year.
2. No more than ten percent of the total amount (state and Federal shares) of each operation and management award may be used for construction-type activities.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997].

Sec. 921.33 Boundary changes, amendments to the management plan, and addition of multiple-site components.

(a) Changes in the boundary of a Reserve and major changes to the final management plan, including state laws or regulations promulgated specifically for the Reserve, may be made only after written approval by NOAA. NOAA may require public notice,

including notice in the Federal Register and an opportunity for public comment before approving a boundary or management plan change. Changes in the boundary of a Reserve involving the acquisition of properties not listed in the management plan or final EIS require public notice and the opportunity for comment; in certain cases, a categorical exclusion, an environmental assessment and possibly an environmental impact statement may be required. NOAA will place a notice in the Federal Register of any proposed changes in Reserve boundaries or proposed major changes to the final management plan. The state shall be responsible for publishing an equivalent notice in the local media. See also requirements of Secs. 921.4(b) and 921.13(a)(11).

(b) As discussed in sec. 921.10(b), a state may choose to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award for a single site has been made. NOAA will publish notice of the proposed new site including an invitation for comments from the public in the Federal Register. The state shall be responsible for publishing an equivalent notice in the local newspaper(s). An EIS, if required, shall be prepared in accordance with section sec. 921.13 and shall include an administrative framework for the multiple-site Reserve and a description of the complementary research and educational programs within the Reserve. If NOAA determines, based on the scope of the project and the issues associated with the additional site(s), that an environmental assessment is sufficient to establish a multiple-site Reserve, then the state shall develop a revised management plan which, concerning the additional component, incorporates each of the elements described in sec. 921.13(a). The revised management plan shall address goals and objectives for all components of the multi-site Reserve and the additional component's relationship to the original site(s).

(c) The state shall revise the management plan for a Reserve at least every five years, or more often if necessary. Management plan revisions are subject to (a) above.

(d) NOAA will approve boundary changes, amendments to management plans, or the addition of multiple-site components, by notice in the Federal Register. If necessary NOAA will revise the designation document (findings) for the site.

Subpart E—Ongoing Oversight, Performance Evaluation and Withdrawal of Designation

Sec. 921.40 Ongoing oversight and evaluations of designated National Estuarine Research Reserves.

(a) The Sanctuaries and Reserve Division shall conduct, in accordance with section 312 of the Act and procedures set forth in 15 C.F.R. part 928, ongoing oversight and evaluations of Reserves. Interim sanctions may be imposed in accordance with regulations promulgated under 15 C.F.R. part 928.

(b) The Assistant Administrator may consider the following indicators of non-adherence in determining whether to invoke interim sanctions:

1. Inadequate implementation of required staff roles in administration, research, education/interpretation, and surveillance and enforcement. Indicators of inadequate implementation could include: No Reserve Manager, or no staff or insufficient staff to carry out the required functions.
2. Inadequate implementation of the required research plan, including the monitoring design. Indicators of inadequate implementation could include: Not carrying out research or monitoring that is required by the plan, or carrying out research or monitoring that is inconsistent with the plan.
3. Inadequate implementation of the required education/interpretation plan. Indicators of inadequate implementation could include: Not carrying out education or interpretation that is required by the plan, or carrying out education/interpretation that is inconsistent with the plan.
4. Inadequate implementation of public access to the Reserve. Indicators of inadequate implementation of public access could include: Not providing necessary access, giving full consideration to the need to keep some areas off limits to the public in order to protect fragile resources.
5. Inadequate implementation of facility development plan. Indicators of inadequate implementation could include: Not taking action to propose and budget for necessary facilities, or not undertaking necessary construction in a timely manner when funds are available.
6. Inadequate implementation of acquisition plan. Indicators of inadequate implementation could include: Not pursuing an aggressive acquisition program with all available funds for that purpose, not requesting promptly additional funds when necessary, and evidence that adequate long-term state control has not been established over some core or buffer areas, thus jeopardizing the ability to protect the Reserve site and resources from offsite impacts.
7. Inadequate implementation of Reserve protection plan. Indicators of inadequate implementation could include: Evidence of non-compliance with Reserve restrictions, insufficient surveillance and enforcement to assure that restrictions on use of the Reserve are adhered to, or evidence that Reserve resources are being damaged or destroyed as a result of the above.
8. Failure to carry out the terms of the signed Memorandum of Understanding (MOU) between the state and NOAA, which establishes a long-term state commitment to maintain and manage the Reserve in accordance with section 315 of the Act. Indicators of failure could include: State action to allow incompatible uses of state-controlled lands or waters in the Reserve, failure of the state to bear its fair share of costs associated with long-term operation and management of the Reserve, or failure to initiate timely updates of the MOU when necessary.

Sec. 921.41 Withdrawal of designation.

The Assistant Administrator may withdraw designation of an estuarine area as a National Estuarine Research Reserve pursuant to and in accordance with the procedures of section 312 and 315 of the Act and regulations promulgated thereunder.

Subpart F—Special Research Projects

Sec. 921.50 General.

(a) To stimulate high quality research within designated National Estuarine Research Reserves, NOAA may provide financial support for research projects which are consistent with the Estuarine Research Guidelines referenced in sec. 921.51. Research awards may be awarded under this subpart to only those designated Reserves with approved final management plans. Although research may be

conducted within the immediate watershed of the Reserve, the majority of research activities of any single research project funded under this subpart may be conducted within Reserve boundaries. Funds provided under this subpart are primarily used to support management-related research projects that will enhance scientific understanding of the Reserve ecosystem, provide information needed by Reserve management and coastal management decision-makers, and improve public awareness and understanding of estuarine ecosystems and estuarine management issues. Special research projects may be oriented to specific Reserves; however, research projects that would benefit more than one Reserve in the National Estuarine Research System are encouraged.

(b) Funds provided under this subpart are available on a competitive basis to any coastal state or qualified public or private person. A notice of available funds will be published in the Federal Register. Special research project funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with sec. 921.81(e)(4) (“allowable costs”), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs. [58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

Sec. 921.51 Estuarine research guidelines.

(a) Research within the National Estuarine Research Reserve System shall be conducted in a manner consistent with Estuarine Research Guidelines developed by NOAA.

(b) A summary of the Estuarine Research Guidelines is published in the [[Page 104]] Federal Register as a part of the notice of available funds discussed in sec. 921.50(c).

(c) The Estuarine Research Guidelines are reviewed annually by NOAA. This review will include an opportunity for comment by the estuarine research community.

Sec. 921.52 Promotion and coordination of estuarine research.

(a) NOAA will promote and coordinate the use of the National Estuarine Research Reserve System for research purposes.

(b) NOAA will, in conducting or supporting estuarine research other than that authorized under section 315 of the Act, give priority consideration to research that

make use of the National Estuarine Research Reserve System.

(c) NOAA will consult with other Federal and state agencies to promote use of one or more research reserves within the National Estuarine Research Reserve System when such agencies conduct estuarine research.

Subpart G—Special Monitoring Projects

Sec. 921.60 General.

(a) To provide a systematic basis for developing a high quality estuarine resource and ecosystem information base for National Estuarine Research Reserves and, as a result, for the System, NOAA may provide financial support for basic monitoring programs as part of operations and management under sec. 921.32. Monitoring funds are used to support

three major phases of a monitoring program:

- (1) Studies necessary to collect data for a comprehensive site description/characterization;
- (2) Development of a site profile; and
- (3) Formulation and implementation of a monitoring program.

(b) Additional monitoring funds may be available on a competitive

basis to the state agency responsible for Reserve management or a qualified public or private person or entity. However, if the applicant is other than the managing entity of a Reserve that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of the application by the managing entity of the Reserve. Funds provided under this subpart for special monitoring projects are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with sec. 921.81(e)(4) (“allowable costs”), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

(c) Monitoring projects funded under this subpart must focus on the resources within the boundaries of the Reserve and must be consistent with the applicable sections of the Estuarine Research Guidelines referenced in sec. 921.51. Portions of the project may occur within the immediate watershed of the Reserve beyond the site boundaries. However, the monitoring proposal must demonstrate why this is necessary for the success of the project.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

Subpart H—Special Interpretation and Education Projects

Sec. 921.70 General.

(a) To stimulate the development of innovative or creative interpretive and educational projects and materials to enhance public awareness and understanding of estuarine areas, NOAA may fund special interpretive and educational projects in addition to those activities provided for in operations and management under sec. 921.32. Special interpretive and educational awards may be awarded under this subpart to only those designated Reserves with approved final management plans.

(b) Funds provided under this subpart may be available on a competitive basis to any state agency. However, if the applicant is other than the managing entity of a Reserve, that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of the application by the managing entity of the Reserve. These funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with sec. 921.81(e) (4) (“allowable costs”), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

(c) Applicants for education/interpretive projects that NOAA determines benefit the entire National Estuarine Research Reserve System may receive Federal assistance of up to 100% of project costs.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

Subpart I—General Financial Assistance Provisions

Sec. 921.80 Application information.

(a) Only a coastal state may apply for Federal financial assistance awards for preacquisition, acquisition and development, operation and management, and special education and interpretation projects under subpart H. Any coastal state or public or private person may apply for Federal

financial assistance awards for special estuarine research or monitoring projects under subpart G. The announcement of opportunities to conduct research in the System appears on an annual basis in the Federal Register. If a state is participating in the national Coastal Zone Management Program, the applicant for an award under section 315 of the Act shall notify the state coastal management agency regarding the application.

(b) An original and two copies of the formal application must be submitted at least 120 working days prior to the proposed beginning of the project to the following address: Sanctuaries and Reserves Division Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, NW., suite 714, Washington, DC 20235. Application for Federal Assistance Standard Form 424 (Non-construction Program) constitutes the formal application for site selection, post-site selection, operation and management, research, and education and interpretive awards. The Application for Federal Financial Assistance Standard Form 424 (Construction Program) constitutes the formal application for land acquisition and development awards. The application must be accompanied by the information required in subpart B (predesignation), subpart C and sec. 921.31 (acquisition and development), and sec. 921.32 (operation and management) as applicable. Applications for development awards for construction projects, or restorative activities involving construction, must include a preliminary engineering report, a detailed construction plan, a site plan, a budget and categorical exclusion check list or environmental assessment. All applications must contain back up data for budget estimates (Federal and non-Federal shares), and evidence that the application complies with the Executive Order 12372, “Intergovernmental Review of Federal Programs.” In addition, applications for acquisition and development awards must contain:

- (1) State Historic Preservation Office comments;
- (2) Written approval from NOAA of the draft management plan for initial acquisition and development award(s); and
- (3) A preliminary engineering report for construction activities.

Sec. 921.81 Allowable costs.

(a) Allowable costs will be determined in accordance with applicable OMB Circulars and guidance for Federal financial assistance, the financial assistant agreement, these regulations, and other Department of Commerce and NOAA directives. The term “costs” applies to both the Federal and non-Federal shares.

(b) Costs claimed as charges to the award must be reasonable, beneficial and necessary for the proper

and efficient administration of the financial assistance award and must be incurred during the award period.

(c) Costs must not be allocable to or included as a cost of any other Federally-financed program in either the current or a prior award period.

(d) General guidelines for the non-Federal share are contained in Department of Commerce Regulations at 15 C.F.R. part 24 and OMB Circular A-110. Copies of Circular A-110 can be obtained from the Sanctuaries and Reserves Division; 1825 Connecticut Avenue, NW., suite 714; Washington, DC 20235. The following may be used in satisfying the matching requirement:

(1) Site selection and post site selection awards. Cash and in-kind contributions (value of goods and services directly benefiting and specifically identifiable to this part of the project) are allowable. Land may not be used as match.

(2) Acquisition and development awards. Cash and in-kind contributions are allowable. In general, the fair market value of lands to be included within the Reserve boundaries and acquired pursuant to the Act, with other than Federal funds, may be used as match. However, the fair market value of real property allowable as match is limited to the fair market value of a real property interest equivalent to, or required to attain, the level of control over such land(s) identified by the state and approved by the Federal Government as that necessary for the protection and management of the National Estuarine Research Reserve. Appraisals must be performed according to Federal appraisal standards as detailed in Department of Commerce regulations at 15 C.F.R. part 24 and the Uniform Relocation Assistance and Real Property Acquisition for Federal land Federally assisted programs in 15 C.F.R. part 11. The fair market value of privately donated land, at the time of donation, as established by an independent appraiser and certified by a responsible official of the state, pursuant to 15 C.F.R. part 11, may also be used as match. Land, including submerged lands already in the state's possession, may be used as match to establish a National Estuarine Research Reserve. The value of match for these state lands will be calculated by determining the value of the benefits foregone by the state, in the use of the land, as a result of new restrictions that may be imposed by Reserve designation. The appraisal of the benefits foregone must be made by an independent appraiser in accordance with Federal appraisal standards pursuant to **15 C.F.R.** part 24 and **15 C.F.R.** part 11. A state may initially use as match land valued at greater than the Federal share of the acquisition and development award. The value in excess of the amount required as match for the initial award may be used to match subsequent supplemental acquisition and development awards for the National Estuarine Research Reserve (see also sec. **921.20**). Costs related

to land acquisition, such as appraisals, legal fees and surveys, may also be used as match.

(3) Operation and management awards. Generally, cash and in-kind contributions (directly benefiting and specifically identifiable to operations and management), except land, are allowable.

(4) Research, monitoring, education and interpretive awards. Cash and in-kind contributions (directly benefiting and specifically identifiable to the scope of work), except land, are allowable.

Sec. 921.82 Amendments to financial assistance awards.

Actions requiring an amendment to the financial assistance award, such as a request for additional Federal funds, revisions of the approved project budget or original scope of work, or extension of the performance period must be submitted to NOAA on Standard Form 424 and approved in writing.

Appendix I to Part 921— Biogeographic Classification Scheme

Acadian

1. Northern of Maine (Eastport to the Sheepscot River.)
2. Southern Gulf of Maine (Sheepscot River to Cape Cod.)

Virginian

3. Southern New England (Cape Cod to Sandy Hook.)
4. Middle Atlantic (Sandy Hook to Cape Hatteras.)
5. Chesapeake Bay.

Carolinian

6. North Carolinas (Cape Hatteras to Santee River.)
7. South Atlantic (Santee River to St. John's River.)
8. East Florida (St. John's River to Cape Canaveral.)

West Indian

9. Caribbean (Cape Canaveral to Ft. Jefferson and south.)
10. West Florida (Ft. Jefferson to Cedar Key.)

Louisianian

11. Panhandle Coast (Cedar Key to Mobile Bay.)
12. Mississippi Delta (Mobile Bay to Galveston.)
13. Western Gulf (Galveston to Mexican border.)

Californian

14. Southern California (Mexican border to Point Conception.)

15. Central California (Point Conception to Cape Mendocino.)

16. San Francisco Bay.

Columbian

17. Middle Pacific (Cape Mendocino to the Columbia River.)

18. Washington Coast (Columbia River to Vancouver Island.)

19. Puget Sound.

Great Lakes

20. Lake Superior (including St. Mary's River.)

21. Lakes Michigan and Huron (including Straits of Mackinac, St. Clair River, and Lake St. Clair.)

22. Lake Erie (including Detroit River and Niagara Falls.)

23. Lake Ontario (including St. Lawrence River.)

Fjord

24. Southern Alaska (Prince of Wales Island to Cook Inlet.)

25. Aleutian Island (Cook Inlet Bristol Bay.)

Sub-Arctic

26. Northern Alaska (Bristol Bay to Damarcation Point.)

Insular

27. Hawaiian Islands.

28. Western Pacific Island.

29. Eastern Pacific Island.

Appendix II to Part 921—Typology of National Estuarine Research Reserves

This typology system reflects significant differences in estuarine characteristics that are not necessarily related to regional location. The purpose of this type of classification is to maximize ecosystem variety in the selection of national estuarine reserves. Priority will be given to important ecosystem types as yet unrepresented in the reserve system. It should be noted that any one site may represent several ecosystem types or physical characteristics.

Class I—Ecosystem Types

Group I—Shorelands

A. Maritime Forest-Woodland. That have developed under the influence of salt spray. It can be found on coastal uplands or recent features such as barrier islands and beaches, and may be divided into the following biomes:

1. Northern coniferous forest biome: This is an area of predominantly evergreens such as the sitka spruce (*Picea*), grand fir (*Abies*), and white cedar (*Thuja*), with poor development of the shrub and herb layer, but high annual productivity and pronounced seasonal periodicity.

2. Moist temperate (Mesothermal) coniferous forest biome: Found along the west coast of North America from California to Alaska, this area is dominated by conifers, has relatively small seasonal range, high humidity with rainfall ranging from 30 to 150 inches, and a well-developed understory of vegetation with an abundance of mosses and other moisture-tolerant plants.

3. Temperate deciduous forest biome: This biome is characterized by abundant, evenly distributed rainfall, moderate temperatures which exhibit a distinct seasonal pattern, well-developed soil biota and herb and shrub layers, and numerous plants which produce pulpy fruits and nuts. A distinct subdivision of this biome is the pine edible forest of the southeastern coastal plain, in which only a small portion of the area is occupied by climax vegetation, although it has large areas covered by edaphic climax pines.

4. Broad-leaved evergreen subtropical forest biome: The main characteristic of this biome is high moisture with less pronounced differences between winter and summer. Examples are the hammocks of Florida and the live oak forests of the Gulf and South Atlantic coasts. Floral dominants include pines, magnolias, bays, hollies, wild tamarine, strangler fig, gumbo limbo, and palms.

B. Coast shrublands. This is a transitional area between the coastal grasslands and woodlands and is characterized by woody species with multiple stems and a few centimeters to several meters above the ground developing under the influence of salt spray and occasional sand burial. This includes thickets, scrub, scrub savanna, heathlands, and coastal chaparral. There is a great variety of shrubland vegetation exhibiting regional specificity:

1. Northern areas: Characterized by *Hudsonia*, various erinaceous species, and thickets of *Myrica*, *prunus*, and *Rosa*.

2. Southeast areas: Floral dominants include *Myrica*, *Baccharis*, and *Iles*.

3. Western areas: *Adenostoma*, *arcotyphlos*, and *eucalyptus* are the dominant floral species.

C. Coastal grasslands. This area, which possesses sand dunes and coastal flats, has low rainfall (10 to 30 inches per year) and large amounts of humus in the soil. Ecological succession is slow, resulting in the presence of a number of seral stages of community development. Dominant vegetation includes mid-grasses (5 to 8 feet tall), such as *Spartina*, and trees such as willow (*Salix* sp.), cherry (*Prunus* sp.), and cottonwood (*Pupulus deltoides*.) This area is divided into four regions with the following typical strand vegetation:

1. Arctic/Boreal: *Elymus*;
2. Northeast/West: *Ammophla*;
3. Southeast Gulf: *Uniola*; and
4. Mid-Atlantic/Gulf: *Spartina patens*.

D. Coastal tundra. This ecosystem, which is found along the Arctic and Boreal coasts of North America, is characterized by low temperatures, a short growing season, and some permafrost, producing a low, treeless mat community made up of mosses, lichens, heath, shrubs, grasses, sedges, rushes, and herbaceous and dwarf woody plants. Common species include arctic/alpine plants such as *Empetrum nigrum* and *Betula nana*, the lichens *Cetraria* and *Cladonia*, and herbaceous plants such as *Potentilla tridentata* and *Rubus chamaemorus*. Common species on the coastal beach ridges of the high arctic desert include *Bryas intergrifolia* and *Saxifrage oppositifolia*. This area can be divided into two main subdivisions:

1. Low tundra: Characterized by a thick, spongy mat of living and undecayed vegetation, often with water and dotted with ponds when not frozen; and
2. High Tundra: A bare area except for a scanty growth of lichens and grasses, with underlying ice wedges forming raised polygonal areas.

E. Coastal cliffs. This ecosystem is an important nesting site for many sea and shore birds. It consists of communities of herbaceous, graminoid, or low woody plants (shrubs, heath, etc.) on the top or along rocky faces exposed to salt spray. There is a diversity of plant species including mosses, lichens, liverworts, and "higher" plant representatives.

Group II—Transition Areas

A. Coastal marshes. These are wetland areas dominated by grasses (*Poacea*), sedges (*Cyperaceae*), rushes (*Juncaceae*), cattails (*Typhaceae*), and other graminoid species and is subject to periodic flooding

by either salt or freshwater. This ecosystem may be subdivided into:

- (a) Tidal, which is periodically flooded by either salt or brackish water;
- (b) nontidal (freshwater); or
- (c) tidal freshwater. These are essential habitats for many important estuarine species of fish and invertebrates as well as shorebirds and waterfowl and serve important roles in shore stabilization, flood control, water purification, and nutrient transport and storage.

B. Coastal swamps. These are wet lowland areas that support mosses and shrubs together with large trees such as cypress or gum.

C. Coastal mangroves. This ecosystem experiences regular flooding on either a daily, monthly, or seasonal basis, has low wave action, and is dominated by a variety of salt-tolerant trees, such as the red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia Nitida*), and the white mangrove (*Laguncularia racemosa*.) It is also an important habitat for large populations of fish, invertebrates, and birds. This type of ecosystem can be found from central Florida to extreme south Texas to the islands of the Western Pacific.

D. Intertidal beaches. This ecosystem has a distinct biota of microscopic animals, bacteria, and unicellular algae along with macroscopic crustaceans, mollusks, and worms with a detritus-based nutrient cycle. This area also includes the driftline communities found at high tide levels on the beach. The dominant organisms in this ecosystem include crustaceans such as the mole crab (*Emerita*), amphipods (*Gammeridae*), ghost crabs (*Ocypode*), and bivalve mollusks such as the coquina (*Donax*) and surf clams (*Spisula* and *Mactra*.)

E. Intertidal mud and sand flats. These areas are composed of unconsolidated, high organic content sediments that function as a short-term storage area for nutrients and organic carbons. Macrophytes are nearly absent in this ecosystem, although it may be heavily colonized by benthic diatoms, dinoflagellates, filamentous blue-green and green algae, and chaemosynthetic purple sulfur bacteria. This system may support a considerable population of gastropods, bivalves, and polychaetes, and may serve as a feeding area for a variety of fish and wading birds. In sand, the dominant fauna include the wedge shell *Donax*, the scallop *Pecten*, tellin shells *Tellina*, the heart urchin *Echinocardium*, the lug worm *Arenicola*, sand dollar *Dendraster*, and the sea pansy *Renilla*. In mud, faunal dominants adapted to low oxygen levels include the terebellid *Amphitrite*, the boring clam *Playdon*, the deep sea scallop *Placopecten*, the Quahog *Mercenaria*, the echiurid worm *Urechis*, the mud snail *Nassarius*, and the sea cucumber *Thyone*.

F. Intertidal algal beds. These are hard substrates along the marine edge that are dominated by

macroscopic algae, usually thalloid, but also filamentous or unicellular in growth form. This also includes the rocky coast tidepools that fall within the intertidal zone. Dominant fauna of these areas are barnacles, mussels, periwinkles, anemones, and chitons. Three regions are apparent:

1. Northern latitude rocky shores: It is in this region that the community structure is best developed. The dominant algal species include *Chondrus* at the low tide level, *Fucus* and *Ascophyllum* at the mid-tidal level, and *Laminaria* and other kelp-like algae just beyond the intertidal, although they can be exposed at extremely low tides or found in very deep tidepools.

2. Southern latitudes: The communities in this region are reduced in comparison to those of the northern latitudes and possess algae consisting mostly of single-celled or filamentous green, blue-green, and red algae, and small thalloid brown algae.

3. Tropical and subtropical latitudes: The intertidal in this region is very reduced and contains numerous calcareous algae such as *Porolithon* and *Lithothamnion*, as well as green algae with calcareous particles such as *Halimeda*, and numerous other green, red, and brown algae.

Group III—Submerged Bottoms

A. Subtidal hardbottoms. This system is characterized by a consolidated layer of solid rock or large pieces of rock (neither of biotic origin) and is found in association with geomorphological features such as submarine canyons and fjords and is usually covered with assemblages of sponges, sea fans, bivalves, hard corals, tunicates, and other attached organisms. A significant feature of estuaries in many parts of the world is the oyster reef, a type of subtidal hardbottom. Composed of assemblages of organisms (usually bivalves), it is usually found near an estuary's mouth in a zone of moderate wave action, salt content, and turbidity. If light levels are sufficient, a covering of microscopic and attached macroscopic algae, such as kelp, may also be found.

B. Subtidal softbottoms. Major characteristics of this ecosystem are an unconsolidated layer of fine particles of silt, sand, clay, and gravel, high hydrogen sulfide levels, and anaerobic conditions often existing below the surface. Macrophytes are either sparse or absent, although a layer of benthic microalgae may be present if light levels are sufficient. The faunal community is dominated by a diverse population of deposit feeders including polychaetes, bivalves, and burrowing crustaceans.

C. Subtidal plants. This system is found in relatively shallow water (less than 8 to 10 meters) below mean low tide. It is an area of extremely high primary production that provides food and refuge for a diversity of faunal groups, especially juvenile and

adult fish, and in some regions, manatees and sea turtles. Along the North Atlantic and Pacific coasts, the seagrass *Zostera marina* predominates. In the South Atlantic and Gulf coast areas, *Thalassia* and *Diplanthera* predominate. The grasses in both areas support a number of epiphytic organisms.

Class II—Physical Characteristics

Group I—Geologic

A. Basin type. Coastal water basins occur in a variety of shapes, sizes, depths, and appearances. The eight basic types discussed below will cover most of the cases:

1. Exposed coast: Solid rock formations or heavy sand deposits characterize exposed ocean shore fronts, which are subject to the full force of ocean storms. The sand beaches are very resilient, although the dunes lying just behind the beaches are fragile and easily damaged. The dunes serve as a sand storage area making them chief stabilizers of the ocean shoreline.

2. Sheltered coast: Sand or coral barriers, built up by natural forces, provide sheltered areas inside a bar or reef where the ecosystem takes on many characteristics of confined waters—abundant marine grasses, shellfish, and juvenile fish. Water movement is reduced, with the consequent effects of pollution being more severe in this area than in exposed coastal areas.

3. Bay: Bays are larger confined bodies of water that are open to the sea and receive strong tidal flow. When stratification is pronounced the flushing action is augmented by river discharge. Bays vary in size and in type of shoreline.

4. Embayment: A confined coastal water body with narrow, restricted inlets and with a significant freshwater inflow can be classified as an embayment. These areas have more restricted inlets than bays, are usually smaller and shallower, have low tidal action, and are subject to sedimentation.

5. Tidal river: The lower reach of a coastal river is referred to as a tidal river. The coastal water segment extends from the sea or estuary into which the river discharges to a point as far upstream as there is significant salt content in the water, forming a salt front. A combination of tidal action and freshwater outflow makes tidal rivers well-flushed. The tidal river basin may be a simple channel or a complex of tributaries, small associated embayments, marshfronts, tidal flats, and a variety of others.

6. Lagoon: Lagoons are confined coastal bodies of water with restricted inlets to the sea and without significant freshwater inflow. Water circulation is limited, resulting in a poorly flushed, relatively stagnant body of water. Sedimentation is rapid with

a great potential for basin shoaling. Shores are often gently sloping and marshy.

7. Perched coastal wetlands: Unique to Pacific islands, this wetland type found above sea level in volcanic crater remnants forms as a result of poor drainage characteristics of the crater rather than from sedimentation. Floral assemblages exhibit distinct zonation while the faunal constituents may include freshwater, brackish, and/or marine species. Example: Aunu's Island, American Samoa.

8. Anchialine systems: These small coastal exposures of brackish water form in lava depressions or elevated fossil reefs have only a subsurface connection in the ocean, but show tidal fluctuations. Differing from true estuaries in having no surface continuity with streams or ocean, this system is characterized by a distinct biotic community dominated by benthic algae such as Rhizoclonium, the mineral encrusting Schizothrix, and the vascular plant Ruppia maritima. Characteristic fauna which exhibit a high degree of endemism, include the mollusks Theosoxus neglectus and Tcariosus. Although found throughout the world, the high islands of the Pacific are the only areas within the U.S. where this system can be found.

B. Basin structure. Estuary basins may result from the drowning of a river valley (coastal plains estuary), the drowning of a glacial valley (fjord), the occurrence of an offshore barrier (bar-bounded estuary), some tectonic process (tectonic estuary), or volcanic activity (volcanic estuary).

1. Coastal plains estuary: Where a drowned valley consists mainly of a single channel, the form of the basin is fairly regular forming a simple coastal plains estuary. When a channel is flooded with numerous tributaries an irregular estuary results. Many estuaries of the eastern United States are of this type.

2. Fjord: Estuaries that form in elongated steep headlands that alternate with deep U-shaped valleys resulting from glacial scouring are called fjords. They generally possess rocky floors or very thin veneers of sediment, with deposition generally being restricted to the head where the main river enters. Compared to total fjord volume river discharge is small. But many fjords have restricted tidal ranges at their mouths due to sills, or upreaching sections of the bottom which limit free movement of water, often making river flow large with respect to the tidal prism. The deepest portions are in the upstream reaches, where maximum depths can range from 800m to 1200m while sill depths usually range from 40m to 150m.

3. Bar-bounded estuary: These result from the development of an offshore barrier such as a beach strand, a line of barrier islands, reef formations a line of moraine debris, or the subsiding remnants of a deltaic lobe. The basin is often partially exposed at low tide and is enclosed by a chain of offshore bars of barrier islands broken at intervals by inlets. These bars may be

either deposited offshore or may be coastal dunes that have become isolated by recent seal level rises.

4. Tectonic estuary: These are coastal indentures that have formed through tectonic processes such as slippage along a fault line (San Francisco Bay), folding or movement of the earth's bedrock often with a large inflow of freshwater.

5. Volcanic estuary: These coastal bodies of open water, a result of volcanic processes are depressions or craters that have direct and/or subsurface connections with the ocean and may or may not have surface continuity with streams. These formations are unique to island areas of volcanic origin.

C. Inlet type. Inlets in various forms are an integral part of the estuarine environment as they regulate to a certain extent, the velocity and magnitude of tidal exchange, the degree of mixing, and volume of discharge to the sea.

1. Unrestricted: An estuary with a wide unrestricted inlet typically has slow currents, no significant turbulence, and receives the full effect of ocean waves and local disturbances which serve to modify the shoreline. These estuaries are partially mixed, as the open mouth permits the incursion of marine waters to considerable distances upstream, depending on the tidal amplitude and stream gradient.

2. Restricted: Restrictions of estuaries can exist in many forms: Bars, barrier islands, spits, sills, and more. Restricted inlets result in decreased circulation, more pronounced longitudinal and vertical salinity gradients, and more rapid sedimentation. However, if the estuary mouth is restricted by depositional features or land closures, the incoming tide may be held back until it suddenly breaks forth into the basin as a tidal wave, or bore. Such currents exert profound effects on the nature of the substrate, turbidity, and biota of the estuary.

3. Permanent: Permanent inlets are usually opposite the mouths of major rivers and permit river water to flow into the sea.

4. Temporary (Intermittent): Temporary inlets are formed by storms and frequently shift position, depending on tidal flow, the depth of the sea, and sound waters, the frequency of storms, and the amount of littoral transport.

D. Bottom composition. The bottom composition of estuaries attests to the vigorous, rapid, and complex sedimentation processes characteristic of most coastal regions with low relief. Sediments are derived through the hydrologic processes of erosion, transport, and deposition carried on by the sea and the stream.

1. Sand: Near estuary mouths, where the predominating forces of the sea build spits or other depositional features, the shore and substrates of the estuary are sandy. The bottom sediments in this area are usually coarse, with a gradation toward

finer particles in the head region and other zones of reduced flow, fine silty sands are deposited. Sand deposition occurs only in wider or deeper regions where velocity is reduced.

2. Mud: At the base level of a stream near its mouth, the bottom is typically composed of loose muds, silts, and organic detritus as a result of erosion and transport from the upper stream reaches and organic decomposition. Just inside the estuary entrance, the bottom contains considerable quantities of sand and mud, which support a rich fauna. Mud flats, commonly built up in estuarine basins, are composed of loose, coarse, and fine mud and sand, often dividing the original channel.

3. Rock: Rocks usually occur in areas where the stream runs rapidly over a steep gradient with its coarse materials being derived from the higher elevations where the stream slope is greater. The larger fragments are usually found in shallow areas near the stream mouth.

4. Oyster shell: Throughout a major portion of the world, the oyster reef is one of the most significant features of estuaries, usually being found near the mouth of the estuary in a zone of moderate wave action, salt content, and turbidity. It is often a major factor in modifying estuarine current systems and sedimentation, and may occur as an elongated island or peninsula oriented across the main current, or may develop parallel to the direction of the current.

Group II—Hydrographic

A. Circulation. Circulation patterns are the result of combined influences of freshwater inflow, tidal action, wind and oceanic forces, and serve many functions: Nutrient transport, plankton dispersal, ecosystem flushing, salinity control, water mixing, and more.

1. Stratified: This is typical of estuaries with a strong freshwater inflow and is commonly found in bays formed from "drowned" river valleys, fjords, and other deep basins. There is a net movement of freshwater outward at the top layer and saltwater at the bottom layer, resulting in a net outward transport of surface organisms and net inward transport of bottom organisms.

2. Non-stratified: Estuaries of this type are found where water movement is sluggish and flushing rate is low, although there may be sufficient circulation to provide the basis for a high carrying capacity. This is common to shallow embayments and bays lacking a good supply of freshwater from land drainage.

3. Lagoonal: An estuary of this type is characterized by low rates of water movement resulting from a lack of significant freshwater inflow and a lack of strong tidal exchange because of the typically narrow inlet connecting the lagoon to the sea. Circulation whose

major driving force is wind, is the major limiting factor in biological productivity within lagoons.

B. Tides. This is the most important ecological factor in an estuary

as it affects water exchange and its vertical range determines the extent of tidal flats which may be exposed and submerged with each tidal cycle. Tidal action against the volume of river water discharged into an estuary results in a complex system whose properties vary according to estuary structure as well as the magnitude of river flow and tidal range. Tides are usually described in terms of the cycle and their relative heights. In the United States, tide height is reckoned on the basis of average low tide, which is referred to as datum. The tides, although complex, fall into three main categories:

1. Diurnal: This refers to a daily change in water level that can be observed along the shoreline. There is one high tide and one low tide per day.

2. Semidiurnal: This refers to a twice daily rise and fall in water that can be observed along the shoreline.

3. Wind/Storm tides: This refers to fluctuations in water elevation to wind and storm events, where influence of lunar tides is less.

C. Freshwater. According to nearly all the definitions advanced, it is inherent that all estuaries need freshwater, which is drained from the land and measurably dilutes seawater to create a brackish condition. Freshwater enters an estuary as runoff from the land either from a surface and/or subsurface source.

1. Surface water: This is water flowing over the ground in the form of streams. Local variation in runoff is dependent upon the nature of the soil (porosity and solubility), degree of surface slope, vegetational type and development, local climatic conditions, and volume and intensity of precipitation.

2. Subsurface water: This refers to the precipitation that has been absorbed by the soil and stored below the surface. The distribution of subsurface water depends on local climate, topography, and the porosity and permeability of the underlying soils and rocks. There are two main subtypes of surface water:

a. Vadose water: This is water in the soil above the water table. Its volume with respect to the soil is subject to considerable fluctuation.

b. Groundwater: This is water contained in the rocks below the water table, is usually of more uniform volume than vadose water, and generally follows the topographic relief of the land being high hills and sloping into valleys.

Group III—Chemical

A. Salinity. This reflects a complex mixture of salts, the most abundant being sodium chloride, and is a very critical factor in the distribution and maintenance

of many estuarine organisms. Based on salinity, there are two basic estuarine types and eight different salinity zones (expressed in parts per thousand-ppt.)

1. Positive estuary: This is an estuary in which the freshwater influx is sufficient to maintain mixing, resulting in a pattern of increasing salinity toward the estuary mouth. It is characterized by low oxygen concentration in the deeper waters and considerable organic content in bottom sediments.

2. Negative estuary: This is found in particularly arid regions, where estuary evaporation may exceed freshwater inflow, resulting in increased salinity in the upper part of the basin, especially if the estuary mouth is restricted so that tidal flow is inhibited. These are typically very salty (hyperhaline), moderately oxygenated at depth, and possess bottom sediments that are poor in organic content.

3. Salinity zones (expressed in ppt):

a. Hyperhaline—greater than 40 ppt.

b. Euhaline—40 ppt to 30 ppt.

c. Mixhaline—30 ppt to 0.5 ppt.

(1) Mixoeuhaline—greater than 30 ppt but less than the adjacent euhaline sea.

(2) Polyhaline—30 ppt to 18 ppt.

(3) Mesohaline—18 ppt to 5 ppt.

(4) Oligohaline—5 ppt to 0.5 ppt.

d. Limnetic: Less than 0.5 ppt.

B. pH Regime: This is indicative of the mineral richness of estuarine waters and falls into three main categories:

1. Acid: Waters with a pH of less than 5.5.

2. Circumneutral: A condition where the pH ranges from 5.5 to 7.4.

3. Alkaline: Waters with a pH greater than 7.4.

APPENDICES

A. Memoranda of Understanding

NOAA AND RMA

USFWS AND RMA

MDPL AND RMA — BEACH AND UPLANDS

MDPL AND RMA — SUBMERGED LANDS

TOWN OF WELLS AND RMA

LAUDHOLM TRUST AND RMA

B. Conservation Easements

DEED ON LAUDHOLM FARM

DEED AT WELLS HARBOR

C. State of Maine Legislation

ACT TO ESTABLISH WELLS NERR

ACT TO AMEND THE LAWS REGARDING THE LOCATION OF WELLS NERR

D. Rules for Public Use

E. Natural Resource Laws

F. Federal Regulations

G. Coastal Zone Management Act, sec. 315

Appendix G: Coastal Zone Management Act

The Coastal Zone Management Act of 1972, as Amended

§ 1461. National Estuarine Research Reserve System (Section 315)

(a) Establishment of the System. There is established the National Estuarine Research Reserve System (hereinafter referred to in this section as the “System”) that consists of—

(1) each estuarine sanctuary designated under this section as in effect before the date of the enactment of the Coastal Zone Management Reauthorization Act of 1985 [enacted Apr. 7, 1986]; and

(2) each estuarine area designated as a national estuarine reserve under subsection (b).

Each estuarine sanctuary referred to in paragraph (1) is hereby designated as a national estuarine reserve.

(b) Designation of national estuarine reserves. After the date of the enactment of the Coastal Zone Management Reauthorization Act of 1985 [enacted Apr. 7, 1986], the Secretary may designate an estuarine area as a national estuarine reserve if—

(1) the Governor of the coastal state in which the area is located nominates the area for that designation; and
(2) the Secretary finds that—

(A) 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;

(B) the law of the coastal state provides long-term protection for reserve resources to ensure a stable environment for research;

(C) designation of the area as a reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation; and

(D) the coastal state in which the area is located has complied with the requirements of any regulations issued by the Secretary to implement this section.

(c) Estuarine research guidelines. 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;

(2) the establishment of common research principles and objectives to guide the development of research programs within the System;

(3) the identification of uniform research methodologies which will ensure comparability of data, the broadest application of research results, and the maximum use of the System for research purposes;

(4) the establishment of performance standards upon which the effectiveness of the research efforts and the value of reserves within the System in addressing the coastal management issues identified in paragraph (1) may be measured; and

(5) the consideration of additional sources of funds for estuarine research than the funds authorized under this Act, and strategies for encouraging the use of such funds within the System, with particular emphasis on mechanisms established under subsection (d).

In developing the guidelines under this section, the Secretary shall consult with prominent members of the estuarine research community.

(d) Promotion and coordination of estuarine research. The Secretary shall take such action as is necessary to promote and coordinate the use of the System for research purposes including—

(1) requiring that the National Oceanic and Atmospheric Administration, in conducting or supporting estuarine research, give priority consideration to research that uses the System; and

(2) consulting with other Federal and State agencies to promote use of one or more reserves within the System by such agencies when conducting estuarine research.

(e) Financial assistance.

(1) The Secretary may, in accordance with such rules and regulations as the Secretary shall promulgate, make grants—

(A) to a coastal state—

(i) for purposes of acquiring such lands and waters, and any property interests therein, as are necessary to

ensure the appropriate long-term management of an area as a national estuarine reserve,
(ii) for purposes of operating or managing a national estuarine reserve and constructing appropriate reserve facilities, or
(iii) for purposes of conducting educational or interpretive activities; and

(B) to any coastal state or public or private person for purposes of supporting research and monitoring within a national estuarine reserve that are consistent with the research guidelines developed under subsection (c).

(2) Financial assistance provided under paragraph (1) shall be subject to such terms and conditions as the Secretary considers necessary or appropriate to protect the interests of the United States, including requiring coastal states to execute suitable title documents setting forth the property interest or interests of the United States in any lands and waters acquired in whole or part with such financial assistance.

(3) (A) The amount of the financial assistance provided under paragraph (1)(A)(i) with respect to the acquisition of lands and waters, or interests therein, for any one national estuarine reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein or \$5,000,000, whichever amount is less.

(B) The amount of the financial assistance provided under paragraph (1)(A) (ii) and (iii) and paragraph (1) (B) may not exceed 70 percent of the costs incurred to achieve the purposes described in those paragraphs with respect to a reserve; except that the amount of the financial assistance provided under paragraph (1)(A)(iii) may be up to 100 percent of any costs for activities that benefit the entire System.

(C) Notwithstanding subparagraphs (A) and (B), financial assistance under this subsection provided from amounts recovered as a result of damage to natural resources located in the coastal zone may be used to pay 100 percent of the costs of activities carried out with the assistance.

(f) Evaluation of system performance.

(1) The Secretary shall periodically evaluate the operation and management of each national estuarine reserve, including education and interpretive activities, and the research being conducted within the reserve.

(2) If evaluation under paragraph (1) reveals that the operation and management of the reserve is deficient,

or that the research being conducted within the reserve is not consistent with the research guidelines developed under subsection (c), the Secretary may suspend the eligibility of that reserve for financial assistance under subsection (e) until the deficiency or inconsistency is remedied.

(3) The Secretary may withdraw the designation of an estuarine area as a national estuarine reserve if evaluation under paragraph (1) reveals that—

(A) the basis for any one or more of the findings made under subsection (b)(2) regarding that area no longer exists; or

(B) a substantial portion of the research conducted within the area, over a period of years, has not been consistent with the research guidelines developed under subsection (c).

(g) Report. The Secretary shall include in the report required under section 316 [16 USC § 1462] information regarding—

- (1) new designations of national estuarine reserves;
- (2) any expansion of existing national estuarine reserves;
- (3) the status of the research program being conducted within the System; and
- (4) a summary of the evaluations made under subsection (f).