# Wells National Estuarine Research Reserve

# MANAGEMENT PLAN
# 2019–2024

# Acknowledgments

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The Wells National Estuarine Research Reserve (Wells Reserve) Management Plan was prepared by the staff of the Wells Reserve with input from advisory committees and members of the Reserve Management Authority Board of Directors. Guidance and further input was provided by OCM Program Officer Adrianne Harrison and OCM staff. Principal contributors include Christine Feurt, Coastal Program Director; Anne Cox, Coastal Program Coordinator; Suzanne Kahn, Education Director; Caryn Beiter, Education Program Coordinator; Linda Littlefield Grenfell, Environmental Educator; Sue Bickford, Stewardship Director; Lynne Vachon, Volunteer and Visitor Services Program Director; Jason Goldstein, Research Director; Jacob Aman, Project Manager; Jeremy Miller, Research Associate and Monitoring Coordinator; Scott Richardson, Communications Director (copy editor and graphic designer); and Paul Dest, Executive Director (editor).

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Wells National Estuarine
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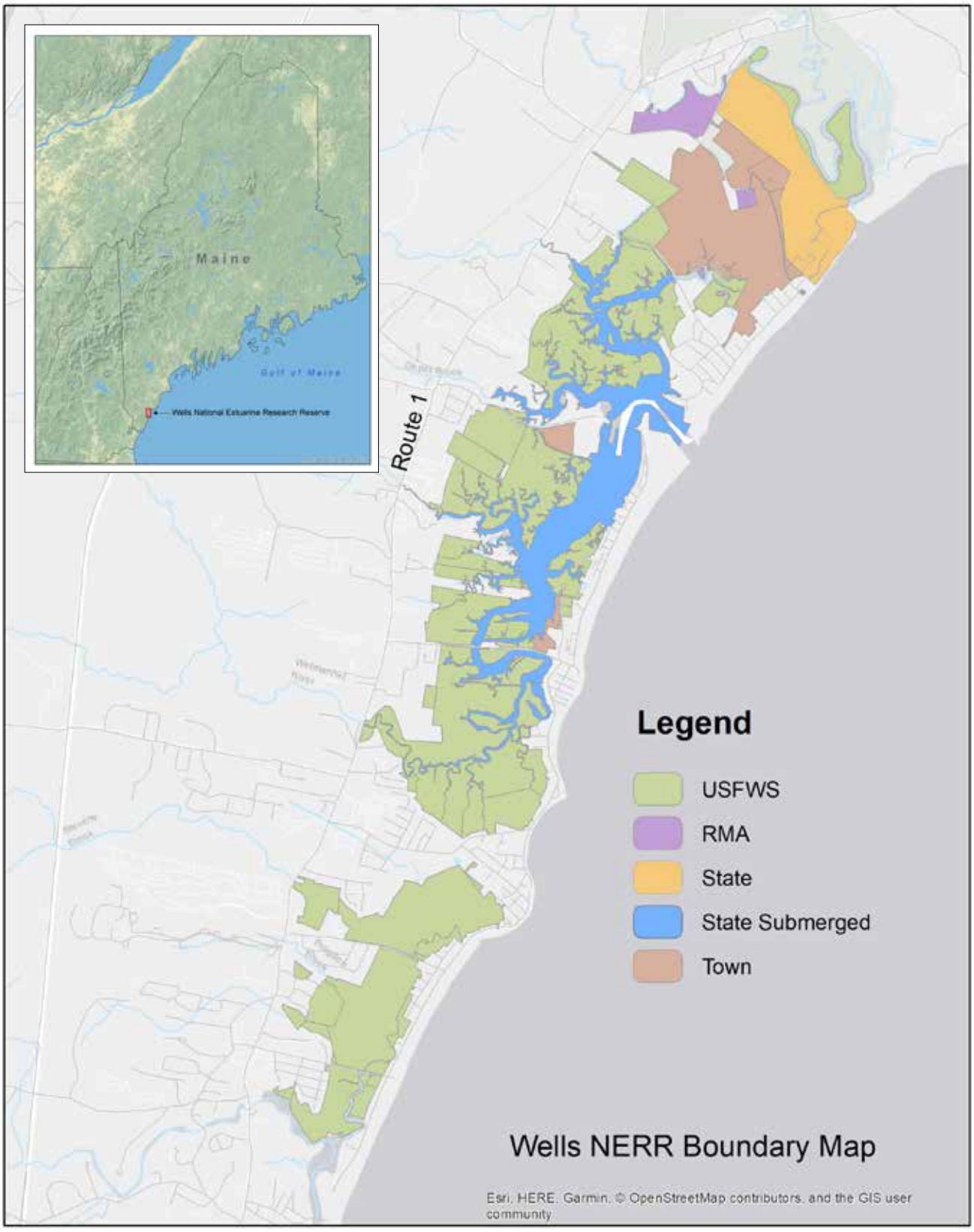
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# Executive Summary

## The Wells Reserve

The Wells National Estuarine Research Reserve (Wells Reserve) was designated a National Estuarine Research Reserve (NERR) 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. One is the Laudholm campus, a cluster of farm buildings on the National Register of Historic Places, which includes all the buildings once owned by the Lord family. This campus serves as the center for visitors and for the research, education, and stewardship programs. The other is the Alheim Commons, a property that includes a small office building and two housing facilities for visiting scientists, educators, and resource managers.

## Part of a National System

The Wells Reserve is part of the National Estuarine Research Reserve System. Created by the Coastal Zone Management Act of 1972, the NERR System 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 29 federally designated reserves. The NERR System is a federal-state partnership administered by NOAA's Office for Coastal Management. 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 their service areas, and provide day-to-day management of resources and programs.

Individual reserves represent specific biogeographic regions of the United States, areas where climate and plant and animal communities are similar. Eleven regions and 29 sub-regions have been described along U.S. coasts. The NERR System is designed to include representative sites from all sub-regions and additional sites to represent specific types of estuaries. Each reserve implements education, research, and stewardship programs relevant to its bioregion and to the state in which it is located. The Wells Reserve is within the southern Acadian biogeographic sub-region.

## Purpose and Scope of the Plan

This Management Plan describes major programs of the Wells Reserve and their objectives and strategies for the next 5 years. The Reserve seeks to address pressing local and regional management issues, which closely mirror the priorities of the NERR System. These include climate change and its impacts on coastal ecosystems and communities, development pressures,

land use change impacts on coastal habitats, and water quality degradation.

This is the fifth edition of the Wells National Estuarine Research Reserve Management Plan. Previous editions were approved by NOAA in 1985, 1996, 2007, and 2013. This document is an update of the 2013-2018 plan.

Since the adoption of the last management plan, the Wells Reserve has implemented all of its core and system-wide programs. It has also secured many science, education, and conservation grants that greatly expanded the Reserve's value to southern Maine communities. The Reserve made significant repairs to all of its buildings, installed solar arrays that supply all electricity needs, upgraded buildings and heating systems for energy efficiency, and incorporated energy conservation into operations. Program accomplishments include restoring riverine and fisheries habitats in southern Maine watersheds, renovating the water tower, adding an accessible trail at Wells Harbor, installing climate change exhibits in the Visitor Center and along trails, and helping partners acquire priority conservation lands. The Reserve established many new partnerships with communities and organizations and began new education, training, and research projects in numerous communities in York and Cumberland counties. Wells continued its close collaborations with the three other research reserves in the New England region and with other partners.

This 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 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 its setting, history, rules and regulations, cooperative agreements, governing laws, and key natural resource laws.

# Chapters

## 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 sustainably. Education programs translate research into readily available information, promote stewardship of coastal resources, and provide a conduit for research findings to reach coastal decision-makers and communities. The Education Program's goal is to provide high quality, science-based programs for people of all ages. Current and future education focus areas include engaging docent program and interpretive walks; thought-provoking events and lectures; quality children's and school programs based on Maine standards; stimulating internships and field studies; updated interpretive trails; and publications, teacher trainings, and outreach to community groups.

## 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 community partnerships, as well as the development and distribution of information on appropriate topics. This program is also the major science-translation venue of the Reserve, so its staff collaborate closely with the Research Program. The Coastal Training Program's goal is to be one of the most effective programs of its kind in the State of Maine and throughout the NERR System.

## Research and Monitoring

The 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. Focus areas include estuarine water quality, salt marsh habitats and natural communities, distribution and abundance of fish and shellfish, salt marsh degradation and restoration science, and climate change and its effects on ecosystems and individual species.

The Research Program participates in the System-wide Monitoring Program and maintains links to other regional and national ocean-and coastal-observing systems. This program monitors water quality, weather, biological change, landscape change, and surface elevations in estuaries. The next step for the program is to progress toward becoming a NOAA Sentinel Site.

## Resource Management and Stewardship

The Wells Reserve strives to exemplify wise coastal stewardship through sound natural resource management within its boundaries and through its partnerships in the communities of southern Maine. The diverse habitats encompassed by the Reserve support distinct plant and animal communities that require specific stewardship approaches. Some Reserve habitats are relatively pristine, while others are under ecological stress associated with past land-use practices and the spread of invasive species.

Because of its habitat diversity and management challenges, the Wells Reserve serves as an excellent location to experiment with innovative resource management activities, to conduct research, and to offer education programs.

Through community-based stewardship 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. The Reserve assists communities with watershed management, land conservation planning, and habitat restoration.

## Public Access and Visitors

The Wells Reserve allows 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 30,000 visitors annually.

The Reserve must continually improve the condition of its facilities. High-priority projects in coming years include improving campus lighting, improving paved surfaces and stone-dust pathways, adding accessible trails, and searching for ways to make the visitor experience to the Reserve one of the best in the NERR System and throughout Maine.

## 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. More than 400 people contribute over 15,000 hours annually to advancing the Reserve's mission. Volunteer programs are directed through a close collaboration with Laudholm Trust. The Reserve will continue to place a strong emphasis on volunteer recruitment, training, and retention, as they are so vital to everything we do.

## Boundary and Acquisition

The Reserve strives to conserve lands necessary for protecting its resources, thereby ensuring a stable environment for research, education, and public enjoyment. The Reserve will focus on protecting a high-priority upland "buffer" parcel while identifying opportunities to protect parcels that adjoin existing protected salt marshes and will allow for saltmarsh migration.

## Facilities Development and Improvement

The Reserve provides safe, comfortable buildings and equipment needed by staff and volunteers to accomplish program strategies; to provide visitors with a place to learn about coastal ecosystems; and to preserve the historic site's architectural heritage. Reserve facilities are centered in two locations, the Laudholm campus and the Alheim Commons property.

In coming years, the Reserve will upgrade facilities and infrastructure to conserve energy, convert to renewable energy sources, adapt the Barn Complex and other buildings to current safety codes, and improve access and safety through better lighting and paving.

## Administrative

The Reserve is the only NERR unaffiliated with a state natural resource agency or university; the public-private partnership's oversight is vested in the Reserve Management Authority, an independent state agency established in 1990. The RMA Board of Directors have a property, management, or program interest in the Reserve. They represent the U.S. Fish and Wildlife Service; Town of Wells; Laudholm Trust; Bureau of Parks and Lands (Maine Department of Agriculture, Conservation and Forestry); the Maine Coastal Program (Maine Department of Marine Resources); and the National Oceanic and Atmospheric Administration. A governor-appointed scientist also serves on the Board. The Reserve Director reports to the RMA at quarterly meetings. As an independent state agency, the Reserve is administratively flexible and nimble, with the ability to develop and implement a range of programs and projects in a timely manner.

# Introduction to the National Estuarine Research Reserve System

## 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 water as it passes 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.

## The NERR System

The National Estuarine Research Reserve System was created by the Coastal Zone Management Act of 1972, as amended, to augment the National Coastal Zone Management Program, which is dedicated to comprehensive, sustainable management of the nation's coasts.

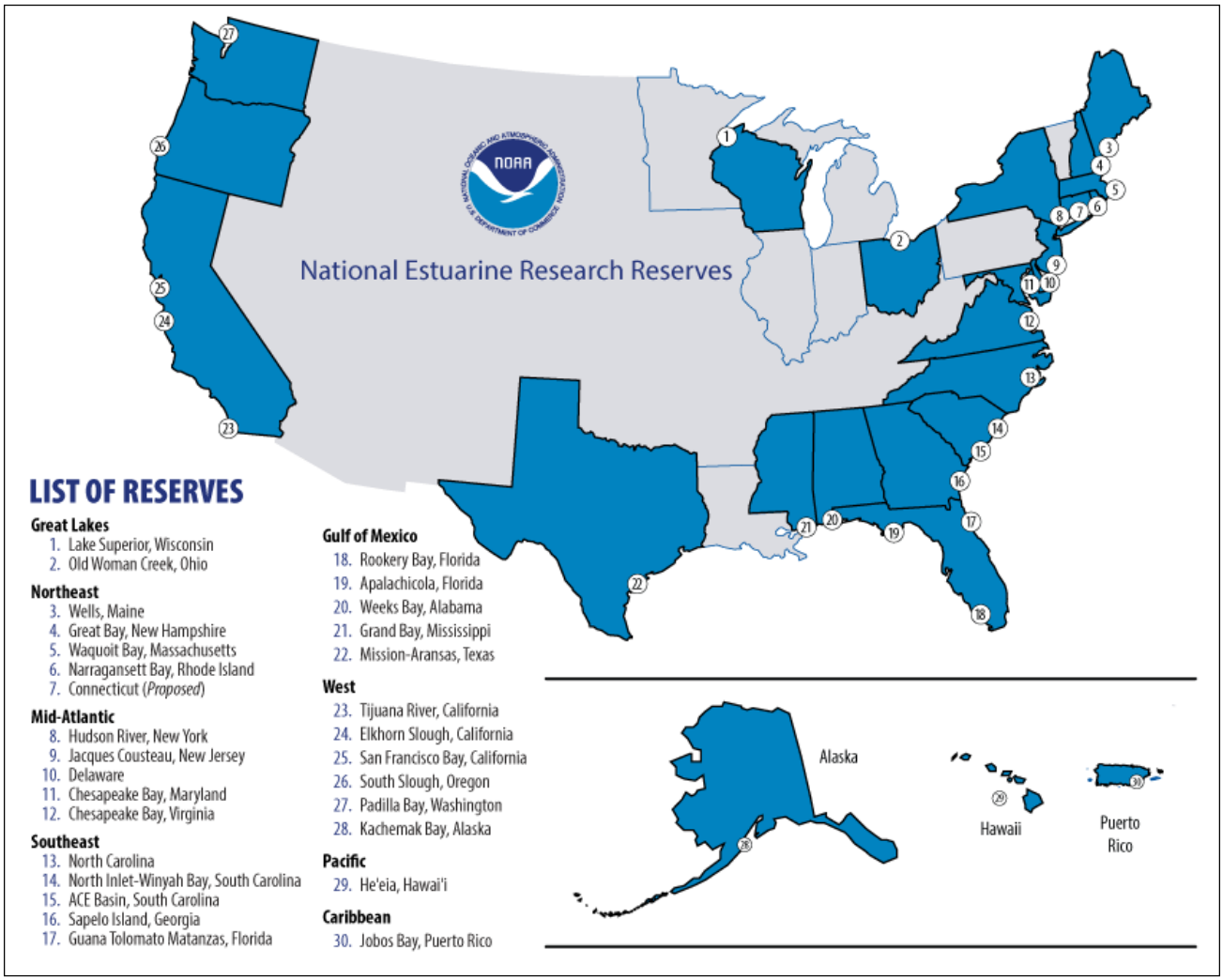
The reserve system is a network of protected areas representative of the various biogeographic regions and estuarine types in the United States. Reserves are established for long-term research, education, and interpretation to promote informed management of the nation's estuaries and coastal habitats (15 C.F.R. Part 921.1(a)). The system currently consists of 29 reserves in 24 states and territories, protecting over one million acres of estuarine lands and waters.

The National Estuarine Research Reserve System is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. NOAA provides funding, national guidance, and technical assistance. The state partner manages reserve resources on a daily basis and works collaboratively with local and regional partners.

Estuaries are biologically rich, economically valuable, and highly vulnerable ecosystems. The vision and mission of the reserve system reflect the importance of these systems within our communities.

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

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




The National Estuarine Research Reserve System program goals, from federal regulations 15 C.F.R. Part 921.1(b), include the following:

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.

NOAA and the states work together to create a dynamic five-year reserve system strategic plan to meet these program goals and NOAA's mission of science, service, and stewardship. The 2017-2022 Reserve System Strategic Plan focuses reserve core strengths of research, education, and training on three core issues: environmental change, water quality and quantity, and habitat protection and restoration. The reserve system's strategic plan goals are as follows:

1. Protecting Places: Enhance and inspire stewardship, protection, and management of estuaries and their watersheds in coastal communities through place-based approaches.
2. Applying Science: Improve the scientific understanding of estuaries and their watersheds through the development and application of reserve research, data, and tools.
3. Educating Communities: Advance environmental appreciation and scientific literacy, allowing for

science-based decisions that positively affect estuaries, watersheds, and coastal communities.

## Biogeographic Regions and Boundaries of the NERR System

NOAA has identified 11 distinct biogeographic regions and 29 subregions in the United States, each of which contains several types of estuarine ecosystems (15 C.F.R. Part 921, Appendix I and II). When complete, the system will contain examples of estuarine hydrologic and biological types characteristic of each biogeographic region. As of February 2019, the system includes 29 reserves and one state in the process of designating a reserve.

Each reserve boundary will vary depending on the nature of the ecosystem. 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. Reserve boundaries encompass areas for which adequate state control has been or will be established by the managing entity over human activities occurring within the reserve. Reserve boundaries include a "core" area of key land and water encompassing resources representative of the total ecosystem, which if compromised could endanger the research objectives of the reserve, as well as a "buffer" area designed to protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. Buffer areas may also include areas necessary for facilities required for research and interpretation. Additionally, buffer areas are identified to accommodate a shift of the core area as a result of biological, ecological, or geomorphological change that could be reasonably expected to occur. (15 C.F.R. Part 921.11 (c)(3))

## NERR Administrative Framework

The process for federal designation of a national estuarine research reserve has many steps and involves many individuals and organizations. While each reserve is a partnership program between NOAA and a coastal state, many entities collaborate to support the designation of a reserve. Other partners include federal and state agencies, nonprofit groups, universities, and members of the local community. For more information on the designation process, see coast.noaa.gov/nerrs.

Upon designation, the reserve implements the approved management plan and is eligible for NOAA financial assistance on a cost-share basis with the state. Management plans provide a vision and framework to guide reserve activities during a five-year period and enable the reserves and NOAA to track progress and realize opportunities for growth. Each management plan contains the reserve goals, objectives, and strategies supported by programs focused on research and monitoring, education and outreach, training, and stewardship. They also outline administration, public access, land acquisition, and facility plans and needs, as well as restoration and resource manipulation plans, if applicable.

Reserves are increasingly confronted with complex questions regarding new uses in or near reserves that may or may not be compatible with the reserve system's mission. A thoughtful and comprehensive management plan provides a foundation for addressing these challenges to protect and manage reserve resources wisely and ensure that the public and coastal decision makers value and protect coastal resources.

NOAA administers the reserve system and establishes standards for designating and operating reserves, provides support for reserve operations and system-wide programming, undertakes projects that benefit the reserve system, and integrates information from individual reserves and programs to support decision-making at the national level. Additionally, NOAA periodically evaluates reserves for compliance with federal requirements and with the individual reserve's federally approved management plan, as mandated under Section 312 of the Coastal Zone Management Act (15 C.F.R. Part 921.40).

NOAA currently provides leadership and support for three system-wide programs, including the System-Wide Monitoring Program, the K-12 Estuarine Education Program, and the Coastal Training Program, as well as a national program to support collaborative research in the reserve system. NOAA also provides support for initiatives focused on the reserve system's priorities.

## Research and Monitoring

The National Estuarine Research Reserve System's mission provides that reserves are protected and managed to afford opportunities for long-term

research. Research at each reserve is designed to fulfill the reserve system goals as defined in the regulations (15 C.F.R Part 921(b).

To sustain these system goals, the 2017-2022 Reserve System Strategic Plan outlines research objectives to maintain and expand biophysical and socio-economic monitoring to track environmental change, increase the use of collaborative research to address decision-maker needs, and ensure that scientific, education, and management audiences can use the data and tools developed by the system.

Research is supported through the National Estuarine Research Reserve System Science Collaborative, 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, 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 changing environment. The program is designed to enhance the reserve system's ability to support decisions related to coastal resources through collaborative approaches that engage 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.

Environmental monitoring is supported through the System-wide Monitoring Program (SWMP), which provides standardized data on national estuarine environmental trends while allowing the flexibility to assess coastal management issues of regional or local concern. The System-wide Monitoring Program Plan describes SWMP and its role in supporting the National Estuarine Research Reserve System's mission and strategic goals, details the existing capacity, and outlines an implementation and development plan for the program. SWMP monitors short-term variability and long-term changes in water quality, biological systems, sea level and lake level change impacts on coastal habitats, and land use and land cover characteristics of estuaries and estuarine ecosystems for the purpose of informing effective coastal zone management. The program is designed to enhance the value and support the vision of the reserves as a system of national reference sites and focuses on three ecosystem characteristics:

1. Abiotic Characteristics: Abiotic measurements are taken using standard protocols, parameters, and approaches that describe the physical environment, including weather, water quality, and hydrological conditions. The monitoring program currently provides data on water temperature, specific conductivity, pH, turbidity, salinity, concentration of dissolved oxygen, and water depth. Meteorological data include air temperature, relative humidity, barometric pressure, wind speed, wind direction, rainfall, and photosynthetically active radiation (PAR). In addition, the program collects monthly nutrient and chlorophyll a samples at all stations and monthly diel samples at one SWMP data logger station. Data are Federal Geographic Data Committee compliant and available via the Reserve System Centralized Data Management Office.
2. Biotic Characteristics: 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 and land cover. This element is guided by the Reserve System Habitat Mapping and Change Plan.

## Education

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

To sustain these system goals, the 2017-2022 Reserve System Strategic Plan outlines education objectives to increase coastal residents' and visitors' awareness and ability to improve stewardship of estuaries, coastal watersheds, and their communities; improve educators' and students' understanding and use of the reserve system and NOAA resources for place-based and inquiry-based learning; and grow and motivate the next generation of coastal professionals through access to programs and facilities that facilitate

research, resource management, and educational opportunities.

Reserves conduct formal and informal education activities, as well as outreach activities that target culturally diverse audiences of educators and students, environmental professionals, resource users, and the public. Education and public programs, interpretive exhibits, and community outreach programs integrate elements of reserve system science, research, and monitoring activities and ensure a systematic, multi-faceted, and locally focused approach to fostering stewardship.

The reserve system is committed to providing tomorrow's leaders with the knowledge and understanding of our nation's oceans and coasts to be responsible stewards. To fulfill this commitment, the reserve system has created the K-12 Estuarine Education Program (KEEP) to increase the estuary literacy of students, teachers, and the public. KEEP helps students and teachers learn about essential coastal and estuarine concepts, develop data literacy skills, and strengthen their critical-thinking, team-building, and problem-solving skills. 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 activities. Community education and outreach is another priority for the reserve system. Community education programs foster behavioral change to promote resource conservation. These programs work with audiences whose choices directly impact the integrity of our estuaries and their associated watersheds.

## Training

The reserve system has a responsibility to educate coastal decision makers and supports the reserve system goals, as defined in the regulations (15 C.F.R. Part 921(b)).

To sustain these system goals, the 2017-2022 Reserve System Strategic Plan outlines coastal training objectives to ensure that coastal decision-makers and environmental professionals understand and effectively apply science-based tools, information, and planning approaches that support resilient estuaries and coastal communities.

The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to coastal decision-makers responsible for making decisions affecting coastal resources. The target decision-maker groups vary according to reserve priorities, but generally include groups such as local elected or appointed officials, managers of both public and private lands, natural resource managers, coastal and community planners, and coastal business owners and operators. They may also include groups such as farmers, watershed councils, professional associations, recreation enthusiasts, researchers, and more.

Reserves are uniquely positioned to deliver pertinent information to local and regional decision-makers given their place-based nature. Coastal Training Program coordinators know the local people, places, and science and are able to skillfully convene training participants and experts to address coastal management issues. Training programs are built upon solid and strategic program documents, including an analysis of the training market and assessment of audience needs. Coordinators then work with the results to identify how their program can best address local and reserve system priority issues.

Partnerships are integral to the success of the program. Reserves work closely with state coastal management programs, Sea Grant Programs, and a host of local partners in determining key coastal resource issues, target audiences, and expertise to deliver relevant and accessible programs.

# Introduction to the Wells Reserve

## Physical Setting—Overview

### Geography

The Wells National Estuarine Research Reserve is located in the Town of Wells in southern York County, Maine. It encompasses 2,250 acres: 1,864 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. The Gulf of Maine incorporates diverse interconnected coastal habitats that all contribute ecosystem functions.

The Reserve includes estuaries found at the mouths of the Webhannet River, Little River, 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 southeast by underwater banks and to the west, north and east by Massachusetts, New Hampshire, Maine, New Brunswick and Nova Scotia. 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 identified by the U.S. Forest Service, The Nature Conservancy, and the Maine Natural Areas Program. This subsection is a 20-plus mile-wide band that extends from the Piscataqua River (between Maine and New Hampshire) to Casco Bay. It 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.

### 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 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 fell. 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.

## 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. Extensive wetlands and salt marshes near the Webhannet River mouth empty into Wells Harbor, which flows to the Wells embayment 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 the Wells embayment via a salt marsh protected by an unarmored double-spit barrier beach.

The Ogunquit River watershed covers approximately 13,300 acres (or 24 square miles) in the towns of Wells, York, Ogunquit, and South Berwick. Green Brook is a major tributary, with Tatnic Brook and several smaller tributaries also 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 2-mile-long barrier beach and dune system. The Ogunquit River empties into the Gulf of Maine in the Town of Ogunquit.

## Gulf of Maine

The Wells Reserve is situated in the geographic center of the Gulf of Maine's shoreline in a transition area where the sandy beaches of southern New England are interspersed with the dominant rocky shoreline found in mid-coast and eastern Maine. The Gulf of Maine is a dynamic system with cold ocean waters, deep basins, shallow banks, and dramatic tidal ranges in places. Its waters span 36,000 square miles (93,240 sq km) and 60 major rivers flow into it. The shoreline includes the Canadian provinces of Nova Scotia and New Brunswick and the states of Maine, New Hampshire, and Massachusetts.

Water in the Gulf generally flows counterclockwise, traveling southwestward from New Brunswick and Nova Scotia. Its cold waters enter the Gulf through the Northeast Channel south of Nova Scotia, with an occasional influx of warmer water from the Gulf Stream. The tidal range in the Gulf of Maine is large, with the highest tides in the world occurring in the Bay of Fundy. Semi-diurnal tides have a typical range of 8.5 to 9.8 feet in the Wells embayment. Strong tidal currents keep the waters of the Gulf of Maine well mixed, which increases the availability of nutrients to zooplankton and higher-trophic animals. The monthly mean wave height in south coastal Maine is greatest from November to March and is lowest in July and August. Annual mean wave height is almost 20 inches.

Maine is planning for a 2-foot rise in sea level by 2100. Sea level rise is expected to continue the erosion of beaches and dunes in southern Maine and, with more upland areas inundated by spring tides, salt marshes will migrate landward. River banks and saltmarsh channels will also erode.

The Gulf of Maine is among the fastest-warming bodies of water on the planet. Seawater temperatures have risen 2°F since 1970 and could rise another 6–8°F in the coming decades. As seawater chemistry changes, acidification is increasing, which will affect the health, abundance, and composition of plant and animal communities.

## Climate

The climate of south coastal Maine is the mildest in the State of Maine. As a rule, south coastal Maine has 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).

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 surface. Winters can be severe, but begin late and often extend into the springtime. Heavy seasonal snowfalls of over 100 inches (254 cm) occur about every 10 years. True blizzards are rare, but strong coastal storms referred to as nor'easters (due to prevalent wind directions) are fairly common and can cause serious coastal flooding and damage. The White Mountains, to the northwest, keep considerable snow from reaching the area and help moderate temperatures.

Normal monthly precipitation is remarkably uniform throughout the year. Winds are generally light, with the highest velocities being confined mostly to March and November. Temperatures well below 0°F 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

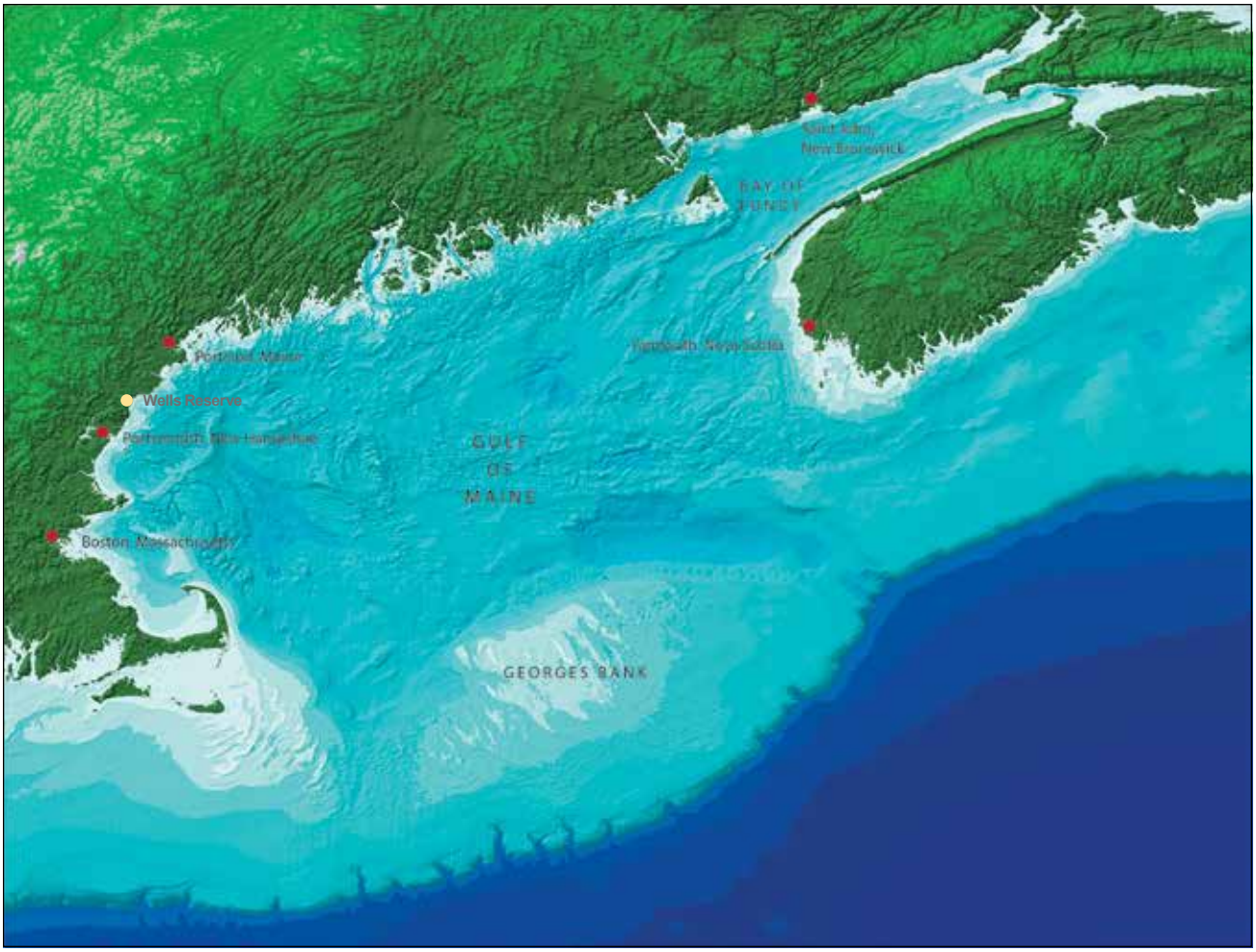
## Vegetation and Habitats

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 west 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 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.




The Gulf of Maine is enclosed by an imaginary line between Cape Cod and Nova Scotia.

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 Reserve displays this land-use evolution with five upland habitats: mowed fields, old fields, shrubland/ early successional forest, 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 grasslands (ground-nesting birds such as bobolinks and meadowlarks), 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 retain various herbs and grasses as undergrowth.

*Shrublands / Early Successional Forest*

In unmowed areas along field borders, and in the understory of forest patches, native shrubs such as blueberry, Virginia rose, and alder grow alongside non-native species. As succession proceeds, these areas provide cover, nesting habitat, and forage for a number of specialists dependent on such habitat. These shrubby areas are managed to maintain sufficient coverage to benefit those species.

*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*

Five types of major wetlands have been identified on the Wells Reserve: red maple swamp and floodplain, shrub swamp, vernal pool and wet meadow, 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

This mossy bog is a wet meadow habitat that supports flora and fauna not found elsewhere on the reserve.

to 4,000 years. The marshes 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. The dominant plants are Spartina patens and Spartina alterniflora.

*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 Reserve campus and adjacent salt marshes. Red maple is the dominant overstory tree, and alder and winterberry 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*

Upriver from the estuaries, 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 north of Drakes Island Road. Tidal flow was once restricted to this marsh, but an improved culvert and self-regulating tide gate were installed in 2005, increasing tidal flow.

*Vernal Pools and Wet Meadow*

Small areas of freshwater wetlands dot the upland landscape. Several vernal pools are critical habitat for obligate species such as yellow- and blue-spotted salamanders, fairy shrimp, and wood frogs. A single wet meadow, or mossy bog, holds cranberry bushes, cottongrass, and three species of wild orchid.

### *Intertidal Wetlands*

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.

### *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.

The shoreline between Laudholm Beach and the mouth of the Webhannet River is known as Drakes Island Beach. A seawall extends along this beach, behind which lies single-family residential development with few undeveloped lots.

## 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 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 include 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 mollusks 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, lobster, grass shrimp, sand shrimp, and a range of gastropods and amphipods.

## Vertebrate Fauna

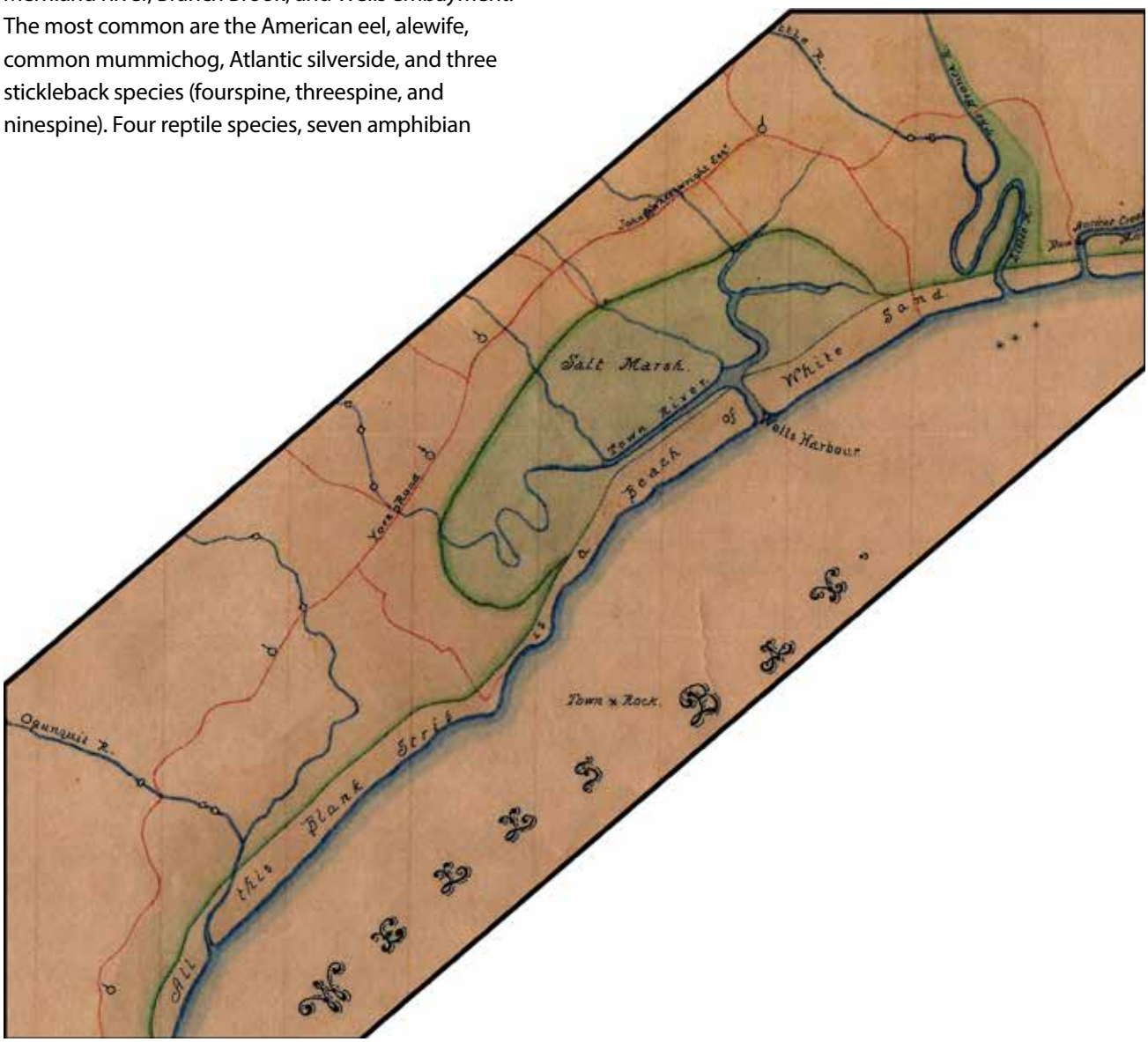
The Reserve's various habitats support diverse animal communities. Vertebrate communities include resident and migrant species of fish, amphibian, reptile, bird, and mammal.

Fifty-five fish species from 30 families have been documented in the Little River, Webhannet River, Merriland River, Branch Brook, and Wells embayment. The most common are 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 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 lists the common and scientific names of flora and fauna found at the Reserve.

## Cultural History

The southwest coast of Maine was occupied by Native Americans for thousands of years before European settlement in the 1640s. Although no




A 1794 map captures the vicinity of modern-day Wells Reserve.

formal archaeological surveys have been completed at the Wells Reserve site, the Abenaki tribes 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, the Reserve has no prominent shell middens.

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 1600s 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, over the next 350 years, it was occupied by four families the Boades, the Symonds, the Clarks, and the Lords. The site and its residents played prominent roles in the history of Wells.

Henry Boade first appeared in Maine in 1636. 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. Mr. Boade was appointed chairman of the Town's first board of selectman and served as town commissioner.

Boade sold to the property to William Symonds, a selectman, frequent member of the annual grand jury, and the overseer of wills. His occupation of the site ended with King Philips War.

The Clark family acquired the farm in 1717 and retained ownership while farming the property for more than 150 years.

Throughout these 250 years, the landscape changed dramatically. A patchwork of habitats, both wild and manipulated by Native Americans, became mostly agricultural. Fields for crops and livestock replaced forests and shrublands. A regular, predictable pattern was imposed on the landscape.

In 1881, George Clement Lord, president of the Boston and Maine Railroad, purchased the property from the Clark family. His purchase coincided with the progressive farm era of the late 19th century, when well-to-do individuals and families purchased New England farms and applied the latest technological advances (both in equipment and buildings) to farming. His sons, and later his grandson, managed the farm.

George Clement Lord II began his role in 1914. He was a town selectman, a state representative, a state senator, and served on the Maine Governor's Council. He was active in many farming organizations and was president of the York County Breeder's Association. The heyday of the farm ended in 1952 when the Laudholm Guernsey dairy cow herd was dispersed at auction. Increasingly, the farm buildings fell into disrepair.

In 1978, the people of Wells and neighboring communities banded together to save the derelict Laudholm Farm. They created Laudholm Trust to prevent the property from being developed. Laudholm Trust, in partnership with NOAA, successfully purchased and protected 240 acres, which included the historic buildings.

This acquisition was combined with the conservation holdings of other entities to form the Wells Reserve. It included over 1,000 acres of adjacent marsh and coastline within Rachel Carson National Wildlife Refuge and 147 acres managed for conservation and recreation by the Maine Bureau of Parks and Lands. Since that time, the Reserve and its partners have protected and incorporated additional significant lands and buildings into the Reserve.

The Laudholm Farm complex was entered upon the National Register of Historic Places on October 20, 1983, based upon its local significance. Two properties with a farmhouse, attached barn, and outbuilding purchased in 2008 are now also on the National Register. Many of the buildings have been renovated and adapted to serve the core program functions of the Wells Reserve. 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, Kennebunkport, and most other coastal towns in York County. 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.

While year-round residency is relatively small, populations of coastal towns swell in the summer. In 2017, Wells had a year-round population of 9,869, but its peak summer population was 38,330. Ogunquit had a year-round population of 1,337 and a peak population of 10,207 people.

## Population Growth

York County's population grew from about 197,000 in 2010 to 204,000 in 2017. This 3.6-percent increase is lower than the 5.6% change seen between 2000 and 2010, but above average for the state during the time period. York County continues to be the second fastest growing region in the state for new year-round and seasonal residents. While growth rates leveled off after the 2010 census, York County is projected to continue to grow and add population over the next decade (2018 to 2028) 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 and Greater Portland.

Considered rural five decades ago, the towns in south coastal Maine have evolved into commuter communities, with many residents living in Wells, Kennebunk, Kennebunkport, Ogunquit, York, 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, as Wells and nearby communities have become popular places for second homes.

## Land-Use Planning

Over the past decade, Wells, Ogunquit, Kennebunk, and Kennebunkport 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, Kennebunk Land Trust, York Land Trust, Kittery Land Trust, and Kennebunkport Conservation Trust), as well as statewide conservation groups (Maine Coast Heritage Trust and The Nature Conservancy), 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 public boat launch that is used by an estimated 3,000 boaters each year. While the harbor is designed for 150 commercial fishing and recreational vessels, it currently can accommodate 105 due to sand accretion. The harbor and its navigation channel are routinely dredged to remove sand, with the last dredge taking place in spring 2018. Dredged sand was deposited on Drakes Island Beach.

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

## Tourism and Travel

In 2016, 35.8 million people visited Maine, according to the Maine Office of Tourism. About 25% of these visitors came to the south coastal region of Maine, which includes the coastal towns of York County and southwestern Cumberland County. Local chambers of commerce strongly promote tourism seasons that run from mid-May to mid-October. The towns of Wells, Ogunquit, Kennebunk, Kennebunkport, and York are popular tourist destinations, with many hotels and restaurants filling to capacity between late June and mid-September.

## Water Quality

The Reserve's three river systems have good water quality, based on the state's 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.

# Key Issues 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, landscape maintenance, and waste treatment.
- Increased contamination of coastal food webs through non-point-source pollution associated with urban and suburban development and with transportation, industry, and energy facilities "up wind."
- Hydrological modifications associated with dams, roads, causeways, tide gates, dikes, and drained wetlands.

# Strategic Plan 2019–2024

The Wells National Estuarine Research Reserve developed and adopted a revised strategic plan in conjunction with the development of this Management Plan. Below are the Vision, Mission, five core goals, three supporting principles, and strategic objectives of the Reserve's 2019–2024 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 understand, protect, and restore coastal ecosystems of the Gulf of Maine through integrated research, stewardship, environmental learning, and community partnerships.

## Core Goals

I — Goal I: People appreciate and understand natural environments, make informed decisions, and take responsible actions to sustain coastal communities and ecosystems.

II — Goal II: Reserve research and monitoring promote better understanding of coastal ecosystems and this science is conveyed to decision-makers to meet coastal management.

III — Goal III: Coastal communities have the capacity to better protect, manage, and restore coastal habitats.

IV — Goal IV: People understand the causes and effects of climate change and have the knowledge and tools needed to make informed decisions and adapt.

V — 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, climate, and people.

## Supporting Principles

1. Staff and volunteers maintain a collaborative and collegial environment. The values and contributions of each individual are recognized as enriching the organization.
2. The organization has a strong financial foundation that builds capacity and enriches programs.
3. People understand, 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.

### Interpretive Education

I IV V Objective 1: Field-based science education programs are designed and delivered to promote stewardship of the Gulf of Maine watershed and coastal environments through understanding and appreciation of ecosystems.

I V Objective 2: Educational use of the site is optimized and public awareness of its ecological and cultural significance is increased.

### Coastal Training Program

II IV Objective 1: Training participants will indicate intent to apply natural- and social-science-based information in coastal decision-making.

II III IV Objective 2: An annual forum will be provided for elected and appointed decision-makers to share coastal resilience strategies to advance the region's resilience in a changing climate.

I III V Objective 3: Collaborative watershed efforts are supported in the region to sustain watershed ecosystem services including safe drinking water, flood protection, and pollution filtration.

I III V Objective 4: Trainings, workshops, and technical assistance are designed to address partner and stakeholder needs identified each year through needs assessments, evaluations, and consultations with the CTP Advisory Committee.

## Research and Monitoring

☐ II ☐ IV ☐ Objective 1: Coastal food webs and habitats are investigated to gain a better understanding of their underlying physical and biological processes and their response to natural changes, climate-driven changes, and human activities.

☐ II ☐ ☐ V Objective 2: Visiting investigators and staff are provided with opportunities and resources to conduct independent or collaborative research at the Reserve and in the Gulf of Maine region.

☐ II ☐ IV ☐ Objective 3: The development and implementation of regionally coordinated ecological monitoring of coastal habitats is promoted, and staff continue to maintain and expand upon the System-wide Monitoring Program.

## Resource Management and Stewardship

I II ☐ ☐ V Objective 1: Habitats within the Reserve are managed to sustain biodiversity and ecosystem functions while providing opportunities for research, education, and public enjoyment.

☐ ☐ III ☐ ☐ Objective 2: A watershed approach to stewardship and land use planning enhances the quality of water resources in south coastal Maine.

I ☐ III ☐ ☐ Objective 3: Assistance and expertise are provided to communities and organizations to conserve, restore, and manage coastal habitats.

## Public Access

I II ☐ ☐ V Objective: Access for scientific research, environmental education, appropriate outdoor recreation, nature appreciation, and public events is provided while ensuring the protection of the Reserve's natural resources and its historic buildings and grounds.

## Volunteers

I ☐ ☐ ☐ V Objective: A dedicated and productive volunteer corps is recruited, supported, and retained, thus augmenting all aspects of Reserve programs.

## Administration

I II III IV V Objective: An administrative structure is in place so the Reserve's mission is fulfilled and it conforms to federal and state law and agency agreements.

## Boundary and Acquisition

☐ ☐ ☐ ☐ V Objective: Lands are conserved to protect diverse natural resources and to ensure a stable environment for research, education, and nature appreciation.

## Facility Development and Improvement

☐ ☐ ☐ ☐ V Objective 1: Ongoing and evolving program needs of research, education, stewardship, and assembly activities are maintained and improved; safe and comfortable buildings for staff and partners are provided; and visitors are provided with facilities in which to learn about coastal ecosystems and the landscape history of the site.

☐ ☐ ☐ ☐ V Objective 2: Carbon emissions and resource consumption are reduced through conservation measures and the use of renewable energy.

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

# Powered by the **Sun**

**By switching to solar energy, we are helping to protect the environment.**

### A Changing Climate

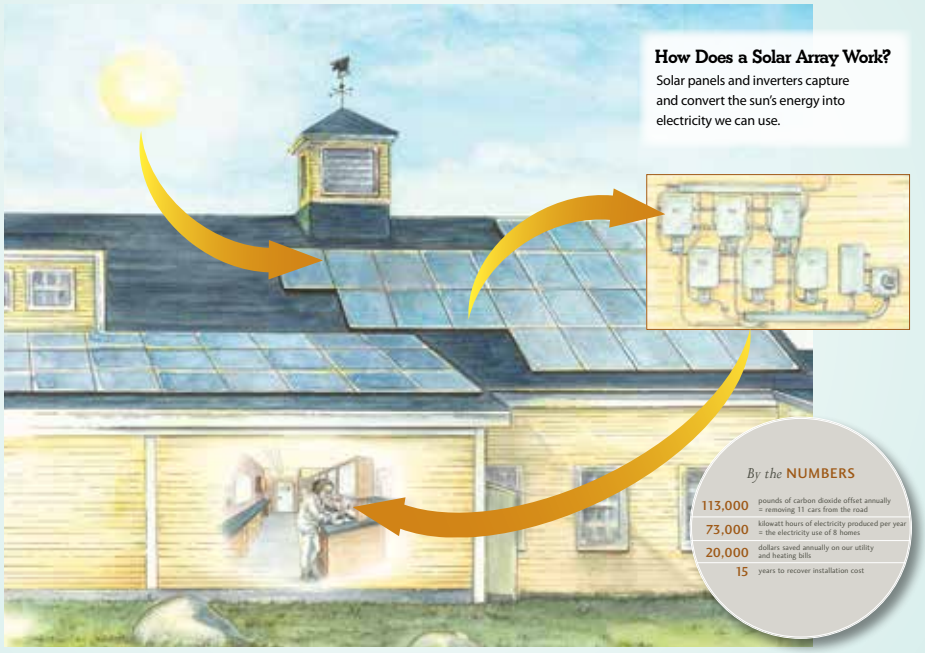
Our atmosphere contains gases that form an insulating blanket around the Earth, holding in some heat from the sun and releasing the rest. When people burn fossil fuels, such as oil, coal, and gas, more heat-trapping gases are added to our atmosphere. Earth's insulating blanket becomes thicker, so it holds in more heat. Our lands and oceans warm up, making our future more uncertain.

### What Can We Do?

When we cut fossil fuel use and switch to clean, renewable energy sources like solar and wind, we decrease the amount of heat-trapping gases going into the atmosphere. If enough people and their communities make this switch, the impacts from climate change will be reduced.

### Going Solar at Wells Reserve

We were the first nonprofit in Maine to go 100% solar. Our solar arrays generate enough energy to meet all our electricity needs. We are reducing our carbon footprint while using resources responsibly, because future generations depend on the actions we take today.




Solar arrays supply 73,000 kilowatt-hours of energy annually, meeting all the Reserve's electricity needs. A trail sign explains how and why.

# Accomplishments 2013–2018

## Facilities and Property

100% Solar & Energy Efficiency: Initiated and completed a 5-year energy conservation and alternative energy initiative (called "Conserve and Convert") that resulted in Reserve being the first non-profit/government agency in the state to switch to solar energy for all of its electricity. On two campuses, engineered, purchased and installed four large solar arrays, made building envelope improvements, and switched to energy-efficient equipment to reduce our use of electricity and fossil fuels in our operations.

New Float and Launch Site: Installed a new floating dock and boardwalk between the Little River Overlook and salt marsh. This dock system is used for launching kayaks during public programs, and also as an interactive teaching station during spring and fall school programs and summer camps. The dock system also used for environmental monitoring activities.

New Accessible Trail: Created a handicapped-accessible 1/8-mile-long trail adjacent to Wells Harbor with an expansive overlook on the Webhannet River salt marsh. This is the Reserve's first universally accessible trail.

Climate Change Exhibits: Installed new Visitor Center exhibit components, including an interpretive panel explaining the causes and effects of climate change and two interpretive graphic rails that explain solutions for climate change and what actions the Reserve is taking. Custom switch plates were also placed in public spaces around campus to convey the solar-power message. A trailside sign about solar power was placed in view of the Maine Coastal Ecology Center photovoltaic array. Three signs were installed along the trail to the beach to educate visitors about sea level rise at different elevations.

Property Transferred: With the passing of life tenants on two properties purchased over the years, the Reserve worked with attorney and family heirs to move material possessions out and fully transfer properties for use by the Reserve. The buildings on the "North Estate" and "South Estate," as the two properties are now called, were cleaned out for Reserve use, with substantial interior work done on the South Estate building that now houses the on-site caretaker.

## Interpretive Education

Head Start Story Hours: After securing funding, offered two years of preschool story hour programs for thirteen Head Start centers in the community. Each center visited the Reserve in the fall, winter, and spring for a story reading, related nature craft, and a short trail walk. Each child received a copy of the featured storybook and a finger puppet, each parent received a copy of Rachel Carson's Sense of Wonder, and each family was given a gas card to help with their transportation costs to the Reserve.

Deaf-Education Teacher Workshops: Collaborated with Waquoit Bay Reserve, Narragansett Bay Reserve, Boston University, and The Learning Center for the Deaf to facilitate three deaf-education Teachers on the Estuary workshops at Waquoit Bay. Two of the workshops were offered for Boston University deaf-education graduate students and the third was offered for teachers and interpreters from deaf-education schools in Maine, Massachusetts, and Rhode Island. Deaf-education videos were created to introduce concepts like estuaries, watersheds, and water quality.

Wells Harbor Interpretive Trail Signs: Developed two interpretive signs for the Reserve's new Webhannet Marsh Trail, a trail map sign for the trailhead kiosk, and an interpretive sign installed at the Wells Harbor dock. The interpretive signs focus on the site's dredging and marsh degradation history, the beneficial services that estuaries provide for wildlife and people, and the System-wide Monitoring Program.

Solar Energy Interpretive Trail Sign: Developed a solar energy interpretive trail sign installed outside of the Reserve's Coastal Ecology Center, where the roof's solar panels are within view.

Climate Change Lecture Series: Implemented a new Climate Stewards evening lecture series, featuring prominent speakers delivering seasonal presentations on climate change research, alternative energy solutions, effects of sea level rise, and more.

Bird-Themed Education Kit: Created a new Feathered Friends Traveling Trunk, complete with educational materials and activities for teachers to use in their classrooms for multi-week rental periods.

Yankee Woodlot Interpretive Trail Signs: Developed four new sustainable-forestry interpretive signs for the Yankee Woodlot, a 34–acre parcel being managed for the production of timber while protecting water quality, enhancing wildlife, and accommodating recreation. Each sign has a QR code that links to short videos related to the sign content. A self-guided educational booklet was also created, allowing visitors to learn more at seven marked posts along the trail.

Picture Post: Installed a new Picture Post on the Yankee Woodlot Trail to measure seasonal change through digital photography, leading to a greater understanding of how landscapes change over time.

Farm History Interpretive Trail Signs: Created seven new interpretive signs focusing on the history of Laudholm Farm and the significance of its historic buildings.

Silent Spring Essay Contest: Completed the coordination of a statewide Rachel Carson Silent Spring environmental essay contest for seventh graders in partnership with Rachel Carson National Wildlife Refuge.

National Association of Interpretation Certifications & Trainings: Education staff received the National Association of Interpretation's (NAI) Certified Interpretive Trainer certification. They then hosted and facilitated two four-day NAI Certified Interpretive Guide trainings for New England interpreters.

Kayak Guide Certifications: Education staff received Registered Maine Guide kayak certifications, enabling them to lead public kayaking programs on the Reserve's estuary.

Forestry Teacher Workshop: Collaborated with Project Learning Tree to host a teacher training where educators learned how to set up their own forest plots to study invasive species, soundscape ecology, and other forestry topics.

Underserved Classroom Nature Stations: Provided free Traveling Trunk education kits to an underserved Portland elementary school, along with nature-related equipment (binoculars, magnifying glasses, and field guides) so teachers could set up permanent Sense of Wonder Nature Stations in their classrooms.

Reading the Landscape Trail Guide: Created a self-guided Reading the Landscape trail activity, linking the indoor Visitor Center exhibits with the outdoor trail system.

Art & Nature Veterans' Workshops: In partnership with Art Hope, a nonprofit dedicated to the promotion of creative wellness, offered three seasonal art and nature workshops for Veterans.

Climate Change Lesson Plan & Teacher Workshops: Created a Sentinel Site Lesson Plan in collaboration with the three other New England Reserves, with the objective of helping teachers and students understand the impacts of sea level rise on salt marshes and the significance of blue carbon. The activities in the Plan were shared with TOTE workshop participants at each New England Reserve.

Phenology Certification: Education staff completed the USA-National Phenology Network's Local Phenology Leader Certification course, providing training in the creation and implementation of a long-term phenology monitoring program.

Pollinator Garden: Coordinated the establishment and planting of a pollinator garden in partnership with the Reserve's Master Gardeners and Pollinate New England. The garden has seventeen different native pollinator-friendly plant species and over 150 individual plants, and will serve as a platform for future educational programs.

## Training and Community Engagement

Coastal Training Program trainings: 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 was reflected in the range, scope, and diversity of 135 evaluated workshops to nearly 5,000 people.

Cape Neddick River Watershed Restoration Project: Coordinated the Non-Point Source project to reduce bacteria inputs, decrease the number of annual beach postings, and garner support for the future implementation of more bacteria reduction efforts in the watershed through an active outreach campaign. Used native plants along the river to deter Canada Geese congregating.

Creating a buffer of native plants along the Cape Neddick River.

Decreasing Vulnerability for Beach-based Businesses: Engaged coastal business owners in the Kennebunks to increase awareness of their risk to natural disasters by facilitating a Tourism Resilience Index self-assessment. The index was adapted for New England businesses from a Mississippi-Alabama Sea Grant publication. Lessons learned were shared with businesses, municipalities, local and national climate adaptation professionals, and the Reserve System.

Sustaining Coastal Landscapes and Community Benefits: Collaborated with Clark University, Franklin Pierce University, and NOAA to develop and test an interdisciplinary ecosystem services approach to improve the impact of NERRS science on riparian buffer management. The project integrated ecological science, economics, and communications research with a Collaborative Learning stakeholder engagement process.

Qualitative Research for Sustaining Coastal Communities: Collaborated with Dr. Verna DeLauer of Franklin Pierce University to develop and present three online training models to the NERRS CTP Coordinators to build competencies in social science.

Climate Change Vulnerability Assessment Tool for Coastal Habitats: This process facilitates development of management strategies for Reserve habitats using climate change scenarios. The Wells and Great Bay reserves engaged habitat experts to assess current knowledge and design actions to minimize climate impacts to salt marsh sparrow habitat in Maine and New Hampshire.

Northeast Regional Resiliency Project: In an effort to increase coastal resilience in the Northeast, partnered with NOAA, northeast Reserves, and Maine Coastal Program to develop tools, information, and approaches to support the expanded implementation of green infrastructure, or living shorelines.

NOAA Digital Coast Fellow: Identified local coastal-wetland decision-makers and determined their needs for ecosystem-service valuation information. Evaluated NERRS and local coastal managers' use of NOAA's Digital Coast resources and provided recommendations for ways the Digital Coast can improve tools, data, or products related to coastal wetland change and ecosystem-service valuation.

Successful Adaptation and Indicator Metrics: As part of a national NSC climate adaptation project with Susanne Moser, launched the Better Safe Than Sorry collaborative partnership. Decision-makers from the ten coastal southern Maine communities come together annually to share and learn the latest climate change adaptation strategies.

The New England Climate Adaptation Project: Engaged local communities with the Massachusetts Institute of Technology, The Consensus Building Institute, and the University of New Hampshire. The project developed a stakeholder assessment and downscaled climate predictions for each of the participating communities. Scenario-based role-play simulation games about climate adaptation were deployed and evaluated in each community to test people's attitudes and willingness to take adaptation action.

Bridging the Gulfs—Interdisciplinary Methods for Stakeholder Engagement: Wells and Mission-Aransas reserves collaborated to offer two system-wide

trainings in the Gulf of Mexico and Gulf of Maine to share lessons learned from collaborative research projects in each region. Training built competencies in the NERRS for using social science methods in collaborative research projects.

The Sandy Dialogues: Partnered with Jacques Cousteau Reserve to bring disaster response experiences of New Jersey coastal communities impacted by Superstorm Sandy to Maine. Local decision-makers from Maine visited Sandy-impacted areas. A follow up series of Maine workshops enabled representatives from New Jersey to share storm-related experiences with southern Maine communities.

The Saco Estuary Project: This 5-year NSF-funded Sustainability Solutions Initiative project used sustainability science to engage researchers at the Reserve and the University of New England with local stakeholders in baseline ecosystem research. The project was designed to develop locally relevant indicators of ecosystem health in the Saco estuary.

Regional Blue Carbon Workshop: This northeastern regional state-of-the-science workshop advanced blue carbon research. The workshop was attended by over 30 scientists working on the topic in Canada and New England.

Salmon Falls Watershed Collaborative: Coordinated a partnership of more than 20 federal, state, and local governments, water districts, land trusts, and regional-planning entities working across state boundaries on source water protection on the Salmon Falls River.

Saco Watershed Collaborative: Provided facilitation and workshop development for the Saco Watershed Collaborative. This 1700-square-mile watershed in Maine and New Hampshire is a drinking-water source. The University of New England leads the collaborative with funding support from Poland Spring and Maine Water. Members include representatives of local, state, and federal government, non-governmental organizations, and land conservation organizations.

State and Regional Conference Support: Provided design and facilitation support for regional biannual Beaches Conference, annual Maine Land Trust Network Conference, and Maine Water and Sustainability Conference.

Coastal Access Legal Issues: Organized and hosted a series of six presentations over 2 years featuring legal and policy experts on private ownership and public access rights to the coast. Led in partnership with Maine Sea Grant, the series featured discussions and perspectives among experts.

Unmanned Aerial Systems (UAS) in Coastal Stewardship: With the Alliance for Coastal Technologies and the Northeast Regional Association of Coastal and Ocean Observing Systems, offered a UAS workshop on "Practical Uses for Drones to Address Management Problems in the Coastal Zone."

## Research and Monitoring

Habitat Mapping and Change: Produced and delivered the Habitat Monitoring and Change base map products to NOAA's Office for Coastal Management for quality control review and acceptance.

MIMIC (Marine Invasive Monitoring and Information Collaborative): In collaboration with the Massachusetts Office of Coastal Zone Management and the Casco Bay Estuary Partnership, established and maintained 17 sites in coastal Maine as long term monitoring sites for marine invasive species.

Soundscape Ecology: With Purdue University's Human-Environment Modeling and Analysis Laboratory and the University of New Hampshire Environmental Acoustics Laboratory, initiated a soundscape ecology program to record and analyze the soundscape of representative habitats within the Reserve.

UAS: The Way Forward: Developed "The Way Forward: Unmanned Aerial Systems for the National Estuarine Research Reserves," a roadmap for the adoption of unmanned aerial system (drone) technology into estuarine and upland habitat restoration and management.

Sentinel Sites: Collected data on vegetation transects, sediment elevation tables, and made considerable progress on vertical control methodology and implementation in accordance with SSAM-1 protocols and guidance. This includes a cooperative agreement with NOAA CO-OPS to manage a water-level station in Webhannet River Harbor to collect accurate and local water levels as part of our Sentinel Site initiative.

eDNA: Collaborated with University of Maine and University of New Hampshire to design and implement pilot environmental DNA (eDNA) monitoring programs in Casco Bay and at several Reserve sites with the aim of developing eDNA sample collection and analysis protocols, along with training materials and

recommendations for the appropriate use of eDNA in estuarine bio-monitoring.

Blue Carbon: Investigated the accounting of carbon storage in estuarine systems through collaborative research that directly measured sediment organic carbon. Assessed a common approach for indirectly estimating sediment organic carbon at eight National Estuarine Research Reserves.

Sea-Run Fishes: Partnered with Saint Joseph's College to investigate physiological impacts of restocking efforts of brown trout in the Mousam River.

Coastal Fisheries: Collaborated with the Massachusetts Division of Marine Fisheries and the University of New Hampshire to assess lobster shell disease through reproductive quality and output in southern New England and coastal Gulf of Maine waters.

Larval Fishes: Maintained and expanded a decade-long time series on the abundance and population structure of the larval fish assemblage within the Webhannet River estuary. Over 400 sampling events have collected 32 species at the larval stage.

CO-OPS Agreement and Equipment: Established a cooperative agreement with the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) to maintain, service, and manage the tide gauge at Wells Harbor. The gauge permits the Reserve to maintain local, accurate, and vertically controlled water level data for research and management.

*Southern Maine Fish Species of Greatest Conservation Need:* Completed a regional assessment of diadromous fish populations under a statewide grant meant to improve resource conservation and planning efforts. Efforts were targeted at streams where diadromous species population status was unknown. Several rivers were found to support previously undocumented populations of diadromous species.

*York River Fisheries Survey:* Diadromous fish species and habitat in the York River were assessed through conventional sampling, environmental DNA sampling, and GIS analysis as part of the Wild and Scenic River Program Study. Products included a regional analysis of the significance of the York River rainbow smelt population, mapped spawning habitat, and riparian land use assessment, as well as several online ESRI Story Maps.

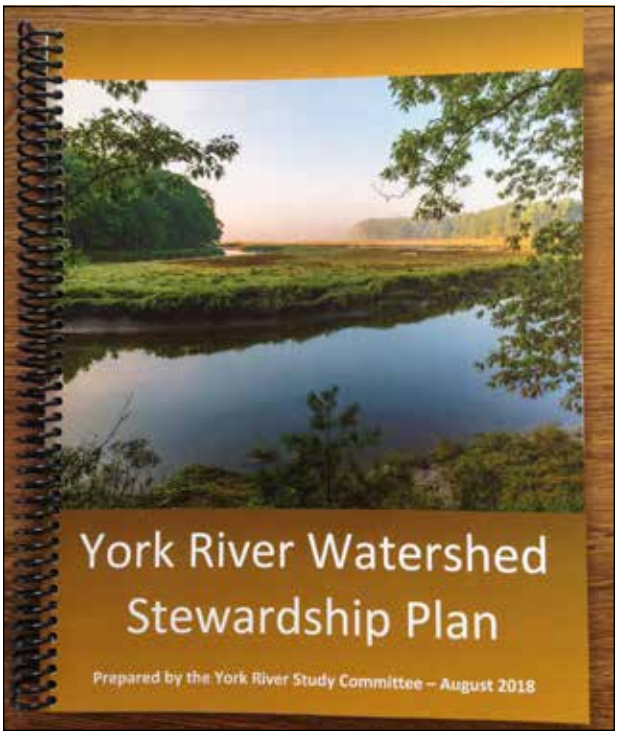
*Green Crab Impacts on the Marsh:* Joined a multi-year, multi-partner study to assess sub-tidal green crab populations along the southern coast of Maine and to identify burrowing activity in adjacent tidal marshes. This project piloted the use of computed tomography (CT scan) to analyze sub-surface root density and showed evidence of crab burrowing and a correlated impact on below-ground biomass.

*Southern Maine Beach Profile Monitoring Program*: Coordinated local volunteers, participating municipalities, and scientists to continue 20 years of critical data on the status of one of southern Maine's most vital and valuable natural resources.

*Volunteer River Monitoring Program:* Collected annual water quality data in the Mousam and Kennebunk rivers as part of the state's Volunteer River Monitoring Program.

## Stewardship, Conservation, Restoration

Wild and Scenic Stewardship Plan: As part of the York River Study Committee, developed, completed, and distributed the 150-page Stewardship Plan that contains information and recommendations on how to best manage and care for the river. After significant



Removing a derelict dam reconnected the Kennebunk River with 7 miles of brook habitat for the first time in at least six decades.

outreach, the plan was accepted by residents and elected leaders of the four towns in the watershed, with votes to have the Congressional delegation proceed with national legislation to designate the river a Partnership Wild and Scenic River by the National Park Service.

*Goff Mill Brook Dam Removal:* A dam was removed at the head of tide in Goff Mill Brook, restoring fish passage for resident and diadromous species. The restoration was carried out through a collaborative process involving state and federal agency, non-governmental organizations, and community partners, and required significant public engagement.

*Branch Brook Fishway Restoration:* A non-functioning fish ladder in Branch Brook was restored and improved to allow year-round upstream passage for diadromous and resident fish. The project created a unique partnership between the Reserve and the Kennebunk-Kennebunkport-Wells Water District, which operates the associated dam, resulting in a 10-year memorandum of understanding to collaboratively operate and maintain the structure.

*York River Salt Marsh Restoration:* Tidal flow was restored to a previously impounded 5.5-acre pond maintained by a private golf course. The Reserve facilitated resolution of unforeseen impacts to the golf course through collaborative planning and engagement of project partners and regulators.

*Barrier Removal in Branch Brook:* A stream barrier at a collapsed trail crossing on Branch Brook was removed as part of a professional training offered to regional restoration practitioners. The project built on an existing partnership with the local water utility and engaged more than 10 agency and non-governmental partners.

*TNC Stream Habitat Restoration Partnership:* The Reserve entered a 3-year partnership with The Nature Conservancy to plan and carry out restoration of riverine and estuarine habitat connectivity through collaborative partnerships with road managers, natural resource agencies, non-governmental organizations, and community members. An inventory of prioritized projects was developed and stakeholders were

engaged in the development of six restoration projects.

*Mousam River Habitat Assessment*: Studied stream temperature in the lower Mousam River, determining that conditions are poor for native cold-water fish species. Provided findings to stakeholders in the Mousam hydropower relicensing process including the Federal Energy Regulatory Commission.

*Landscape Conservation:* Continued active participation in the Mount Agamenticus to the Sea Conservation Initiative, a 10-member coalition that has conserved land and water across the southern Maine landscape. Initiated with the Kennebunk-Kennebunkport-Wells Water District a coalition examining permanent protection of land within Little River / Branch Brook, one of the Reserve's targeted watersheds.

*Model Timber Harvest:* In accordance with the Integrated Natural Resource Plan, the 30-acre Yankee Woodlot Demonstration Forest underwent a significant tree harvest. Through a series of public workshops during and after the harvest, the project served as a model for landowners on how to cut trees while protecting wildlife habitat and water and enhancing recreational opportunities.

*Upland Habitat Restored:* With Rachel Carson National Wildlife Refuge and the Natural Resource Conservation Service, continued long-range efforts to maintain, enhance, and expand early successional habitat for the New England cottontail and other species dependent on scrub-shrub and young forest habitat.

*Deer Numbers Controlled:* With Maine Department of Inland Fisheries and Wildlife, continued the deer management plan at the Reserve, which calls for reducing deer numbers and revitalizing native plants, shrubs, and trees.

*Restoring the Chestnut:* With the American Chestnut Foundation, established a small grove of disease resistant American Chestnut trees in the Yankee Woodlot Demonstration Forest.

*Tree Buffer:* With Maine Forest Service and Project Canopy Program, planted 30 trees between abutters and the Reserve's entrance road to create a visual buffer and wildlife corridor between the properties.

*Orchid Study:* With the Smithsonian Institution and North American Orchid Conservation Center, participated in orchid mapping and harvesting of seeds and roots for research on orchid species and bacterial associations.

*Disaster Response Plan:* Developed the Reserve's first Disaster Response Plan focusing on preservation, protection, and recovery of natural landscapes and water resources in the case of severe storms, wildfires, hazardous material spills, and nuclear accidents. With the Town of Wells Emergency Management Agency, established an ongoing relationship to provide input into the town's Emergency Management Plan and also provide weather, tide, GIS, and drone-captured information during severe weather and other emergency incidents.

*Vernal Pool Study:* With the Maine Department of Environmental Protection and the Mount Agamenticus to the Sea Coalition, provided resources for training vernal pool survey volunteers and offered the general public vernal pool walks.

## Public Information and Publications

*Coastal Access Law Guide:* In an effort to educate and inform residents and visitors of coastal ownership and access, teamed up with Maine Sea Grant and the Coastal Program to write, edit, design, print, and distribute the publication *Public Shoreline Access in Maine: A Citizen's Guide to Ocean and Coastal Law*.

*Coastal Access Guides:* Co-edited and partnered with the Maine Coastal Program to produce the Maine Coastal Public Access Guide, a three-volume set of publications with information on public and non-profit association properties where the public can access the coast for boating, walking, fishing, and other recreational pursuits.

*New Website:* Contracted a web design firm to build and launch a new website, incorporating legacy and fresh content, in a responsive format for improved user experience and search-engine ranking.

*New Trail Map:* A pocket-size trail map, the Reserve's longest-running publication, was revised and updated to include the Webhannet Marsh Trail and trails at the Rachel Carson NWR.

*Butterfly Brochure:* In cooperation with expert volunteers, developed and distributed a color brochure: "Common Butterflies of the Wells Reserve at Laudholm."

## Volunteers

Volunteer Advisory Committee: Established a Volunteer Advisory Committee of combined staff and volunteers, meeting periodically to discuss the recruitment, training, support, and recognition of volunteers.

Team LORAX: Established and trained a cadre of 12 volunteers who are dedicated to forest management tasks, including freeing apple trees from invasive plants, managing Yankee Woodlot Demonstration Forest tasks, planting visual buffer trees, and managing invasive plants in other habitats.

Volunteer Program Hours and Value: Continued to foster a robust and tailored volunteer program that supports all aspects of the reserve, serving as a model for the NERR System for the way we engage and grow the volunteer force. Each year, on average, volunteers contributed over 14,000 hours, translating to over $300,000 in value.

Volunteer Recruitment Fair: Implemented new events to recruit and support volunteers, including recruitment fairs in 2015 and 2018, a targeted orientation to the research lab with time to meet staff and learn about projects, and a "potluck trivia" event that educates volunteers about Reserve history and mission through the use of games.

Volunteer participation in NOAA 312 review: For the first time, the Volunteer Program was incorporated into the NOAA 312 Review as a main theme alongside the core program themes of education, research, monitoring, stewardship, and facilities.

The Reserve hosts annual Volunteers for Peace work camps.

Youth Volunteers: Expanded the presence of youth volunteers performing community service at the reserve, through outreach to schools, continued relationships with school and faith youth groups, and new partnerships with Career Journeys (Maine Department of Vocational Rehabilitation) and Wells Middle School. Developed a youth volunteer registration form and distributed it to area schools.

Dorothy Fish Coastal Resource Library: The library is run exclusively by three volunteers. Because of their expertise and innovation, over 3,500 volumes can be viewed and requested through the Maine InfoNet Library System. This system serves coastal professionals and students in the region and the nation.

Annual Works Camps: Annually hosted between 5 and 10 international volunteers in a 3-week work camp through the Vermont-based Volunteers for Peace. Applied for and hosted AmeriCorps NCCC teams (National Civilian Conservation Corps), who work on major stewardship projects at the Reserve for a period of 4 to 8 weeks.

## Awards

The staff and a volunteer received the following awards:

- Coastal Training Program Director Dr. Christine Feurt – NERRS/NERRA Award for Outstanding Contributions to the NERR System
- CTP Coordinator Annie Cox – CTP Associate of the Year (2016)
- Education Director Suzanne Kahn – The Wildlife Society Conservation Education Award
- Stewardship Coordinator Tin Smith – U.S. Environmental Protection Agency Lifetime Environmental Merit Award
- Executive Director Paul Dest – NOAA Dr. Nancy Foster Habitat Conservation Award
- Volunteer Betsy Smith – Gulf of Maine Council on the Marine Environment Visionary Award (2017)

# Education

## Introduction

The Wells 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. Families and K-12 students are more of a year-round priority audience, whereas campers and teachers attend programs during specific seasons and targeted weeks. 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.

Many changes have been made to this chapter since the last management plan was published. Two new staff members brought with them their own interests, resulting in goals to provide new Native American and phenology programming. The addition of an accessible trail within the Reserve's trail system opens opportunities for providing interpretive programs specifically geared toward visitors with mobility issues. An increase in the size of school groups visiting the Reserve requires that we look for ways to expand our team of docent leaders seek ways to better accommodate larger groups. It is challenges and opportunities such as these that fostered changes within the Interpretive Education plan.

## Objectives and Strategies

### Objective 1

Field-based science education programs are designed and delivered to promote stewardship of the Gulf of Maine watershed and coastal environments through understanding and appreciation of ecosystems.

#### *Strategies*

- Expand Traveling Trunk offerings to include a broader array of themes, while maintaining and updating the current collection.
- Enhance the docent program by improving training resources, developing incentives, reviewing evaluation methods and recruiting more docents.
- Support citizen and student monitoring related to landscape change.
- Continue to develop and offer programs that incorporate literature and creative arts.
- 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, the integration of a climate focus for Teachers on the Estuary workshops, a citizen science phenology program, and climate walks.
- Enhance the capacity of Reserve staff to design and execute better evaluations of all education programs.
- Expand program evaluation, increase the return rate, and develop a system for capturing data.
- Develop learning objectives for regularly scheduled interpretive education programs.

- Continue to develop programs in collaboration with the Reserve's Research, Stewardship, and Coastal Training programs.
- Continue to enhance the educational content of the website, through blog posts, videos, testimonials, and an increased number of images.
- Work toward designing middle school ecology programs that can accommodate larger groups of students.
- Develop and facilitate interpretation workshops (National Association of Interpretation Certified Interpretive Guide) and field-based teacher trainings, including annual Teachers on the Estuary (TOTE) workshops.
- Research opportunities to lead community members, including volunteers, on estuary-based experiential education trips throughout the state, country, and abroad.
- Expand our program offerings and presenters to integrate more racial and ethnic diversity.
- Increase visitors' awareness of pre-colonial and modern indigenous people.

### Objective 2

Educational use of the site is optimized and public awareness of its ecological and cultural significance is increased.

#### *Strategies*

- Increase the marketing, visibility, and promotion of K-12 field trips, Traveling Trunk rentals, Discovery Program, exhibits, day camps, scholarship opportunities, and teacher trainings.
- Promote the Coastal Resource Library and expand its collection.
- Develop self-guided K-12 educational materials for the exhibits that promote quality interaction.
- Maintain the Discovery Program backpack contents.
- Develop a plan to make better use of the Forest Learning Shelter.
- Explore the possibilities of building a field ecology lab in close proximity to the salt marsh for use with school groups.
- Improve the video recording capacity in the Mather Auditorium, the largest indoor program space on campus.

## Guiding Principles

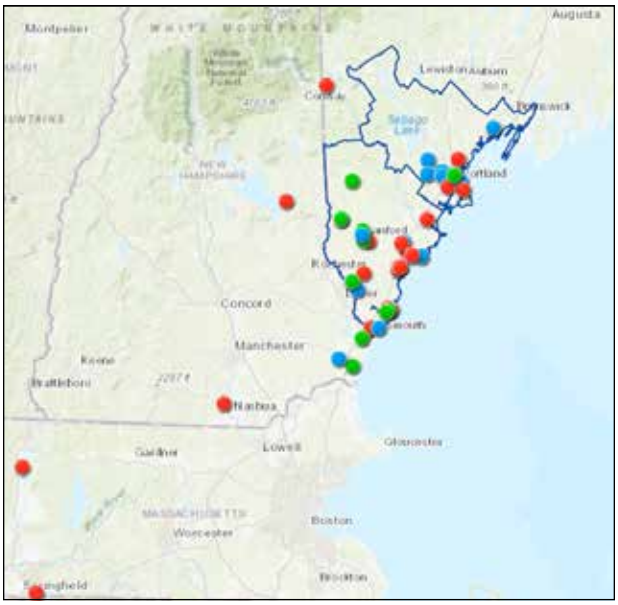
- Develop innovative, discovery-based, interactive field and laboratory experiences to further visitors' connection to place.
- Use interpretive techniques to create meaningful connections between the site and visitors, resulting in enhanced gratitude and respect, and thus inspiring future stewards.
- Use program evaluation results to help guide future programming needs.
- Collaborate with like-minded community organizations and visiting research scientists.
- 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.
- Maintain the existing suite of high quality coastal ecology programs for K-12 students in southern Maine and southeast New Hampshire.
- Promote cultural, racial, socio-economic, and gender equity and access in all Reserve education activities.
- Integrate into programs possible solutions to humans' effect on the environment.
- Foster increased investment in the Reserve from local year-round residents, through volunteer opportunities and program participation.

## Thematic Focus

All interpretive education programs focus on one or more themes: climate change, water quality, habitats, and land use change. Of the three primary K-12 field trip options, the grades K-2 program has stewardship of wildlife and habitats at its core; the grades 3-5 program takes students to the marsh for water quality testing and delves into the world of plankton; and the grades 6-12 program is centered on estuaries with the concepts of watersheds and water quality highlighted. The Reserve's public programs cover an array of topics, from a climate change evening lecture series to kayaking tours of the estuary. 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.

## Geographic Scope

Wells Reserve education programs mainly cover 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 tourists. The Reserve's target local audience lives in York and Cumberland counties. In the next 5 years, we will seek




Reserve field trip programs mainly draw schools from York and Cumberland counties, but their reach extends well outside the core area. Map shows Exploring Estuaries (blue), Microscopic Marvels (red), and Wild Friends in Wild Places (green).

funding to bring more underserved communities to the Reserve for both school and camp programs. Our recent work with the deaf education community through a Teachers on the Estuary grant opened our eyes to the need for additional programming for this population. In addition, there is a large immigrant population in the Portland area and we aim to provide opportunities for those students to experience nature at the Reserve.

## K–12 Education Standards

The Reserve's field-based school programs are aligned with the Next Generation Science Standards (NGSS). In the next 5 years, we plan to align the Traveling Trunks and Discovery Program. The NGSS express what students should know and be able to do at various checkpoints during their education. These standards challenge communities, schools, and teachers to work together in implementing effective instructional strategies to achieve high expectations for all students.

### Field-Based School Programs

#### *Guided Programs*

The Wells Reserve offers three field-based field trip programs for school groups. Each program provides students with the opportunity to understand, appreciate, and engage in hands-on science while exploring the marsh and trails. In the next 5 years, we will strive to make our programs even more interactive and student-focused. Our K-12 programs are led by a mix of Reserve staff and trained volunteer docents. The programs are divided by grade level.

Grades K-2: Wild Friends in Wild Places is facilitated in partnership with the Center for Wildlife located in nearby York, Maine. This program accommodates up to 70 students. During half of this 3-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 may include an opossum, bat, falcon, hawk, owl, or turtle. The other half of this program gets students on the Reserve trails searching for signs of wildlife and exploring habitats. Teachers are given comprehensive "nature journals" to use with students in the classroom before or after their visit. Each journal has activities that relate to the animal ambassadors and habitats that the students experience during their trip. The goal of this program is to enhance environmental stewardship among participating students and teachers.

Grades 3-5: Exploring Estuaries gives elementary school children the chance to spend 3 hours on the trails learning about coastal ecology. This hands-on program includes a comprehensive teacher packet that provides background information and activities for use before and after school field trips. During field trips, up to 72 students are divided into docent-led groups of 12 or fewer students. Each group visits several activity stations in four Reserve habitats, where students learn about 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 everyday actions and the health of our waterways and the ocean.

Grades 6-12: Microscopic Marvels allows students to investigate biotic and abiotic factors interacting within the estuary ecosystem. During this 3-hour program, groups of up to 36 students spend half of their time on the salt marsh collecting water quality data and the other half in the Teaching Lab observing and identifying live plankton. The lab portion culminates with a STEM-based activity called Plankton Olympics, where student teams build and test their phytoplankton prototypes with the goal of creating a neutrally buoyant

or slow-sinking design. Microscopic Marvels increases student knowledge of plankton and the biotic and abiotic factors affecting them, leading to a heightened appreciation for the intricate web of life in the estuary and ocean. In the next 5 years, the education team will explore the possibility of building a field ecology lab near the salt marsh. This would optimize teaching and learning time by eliminating the half-mile walk between the saltmarsh and Teaching Lab.

Between 2014 and 2018, education increased its number of programs delivered by 12 percent overall, with a 200 percent increase in Wild Friends in Wild Places, a 160 percent increase in Microscopic Marvels, and a 50 percent decrease in Exploring Estuaries. The number of participating students has grown 325 percent in Wild Friends and 815 percent in Microscopic Marvels, but declined by 39 percent in Exploring Estuaries. The shifting popularity between programs has increased demand on docent volunteers and education staff members. In addition, schools want to bring increasingly large groups for field trip programs and sometimes the Reserve does not have the capacity to accommodate them. In the next 5 years, we plan to create new self-guided school programs for larger groups that will not require a docent or staff member as a guide. To address the drop in Exploring Estuaries programs, we will reach out to schools that have not visited recently. Evaluations have been positive for this program over the years, so we don't know the reason for the decrease in visitation.

### *Self-guided Programs*

Through self-guided programs, teachers have the option of working with Reserve educators to access curriculum and rent equipment (soil corers, binoculars, refractometers, etc.) to meet specific program needs while exploring the trails with their students. In the

next 5 years, we aim to provide self-guided program offerings related to Native cultures and art in nature. We also plan to make our Traveling Trunks, especially the Tree Trunks, more user-friendly for on-site use.

The Reserve's Discovery Program provides an opportunity for participants to learn about several topics through interactive trail booklets and associated backpack materials. Water Wonders explores the water 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 full of educational materials 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. In the next 5 years, we will evaluate backpack contents and make replacements and upgrades as needed.

## Day Camps

There are full-day and full-week day camp offerings on a variety of topics for children ages 6 to 15 during the summer and school vacation weeks. Campers explore habitats, play games, do intriguing science experiments, and create crafts. Recent camps have explored the salt marsh, tide pools, birds, reptiles and amphibians, life under a log, plankton, fish, wildlife survival, insects, and more. All camps strive to have campers outdoors as much as possible, fully immersed in habitat discovery on the trail system. In the next 5 years, we will explore innovative and expanded uses of the Forest Learning Shelter, a seasonal, screened, one-room building in the woods, for camp activities. We will also explore new ways to promote day camps to a broader audience.

## Traveling Trunks

The Education Program offers several curriculum kits for teachers and other educators to use off-site. These Traveling Trunks 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 the program fees and transportation costs of field trip programs. Rental periods range from 1 to 3 weeks and fees vary. Topics currently include Maine wildlife, trees, birds, and estuaries. Each Traveling Trunk has a multitude of activities with corresponding materials. The Safari in a Box 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. In the next 5 years, we plan to make these two tree kits more of an on-site option for visiting school groups who explore forest ecology on our trails. The Estuaries Trunk has myriad materials to teach elementary students about the water cycle, watersheds, fish migration, sand, water quality, and other coastal topics. The Feathered Friends Trunk is all about birds and includes activities relating to migration, eggs, nesting, beaks, adaptations, and songs. In the next 5 years, the Reserve hopes to become a host site for the BatsLive Trunk, created by Project EduBat and focusing on the vital ecological and economic importance of bats as well as the threat of white-nose syndrome. In the next 5 years, the education team will align each of its trunks with Next Generation Science Standards, when applicable, and proactively work to get these resources known to educators and teachers within the local community. In addition, we will inventory each trunk and update materials as needed.

## Teacher/Educator Training

The Education Program offers annual Teachers on the Estuary (TOTE) workshops, geared toward science teachers, that are research- and field-based programs that improve teacher and student understanding of the environment using local examples. TOTE workshops provide resources and experience to support the incorporation of estuary and watershed topics into classroom teaching, while promoting estuary literacy and environmental stewardship. Topics exploring environmental change, such as sea-level rise and phenology, are explored in TOTE workshops as well. Each year, we enhance these workshops and

incorporate new topics and activities. In recent years, we have worked with the deaf education community in New England through Watershed Stewardship in Action workshops, conducted in partnership with other New England reserves. In the next 5 years, the education team will seek funding to continue working with this underserved population.

In addition to teacher trainings, the Reserve offers multi-day National Association of Interpretation Certified Guide and Certified Trainer workshops for informal educators, facilitated by the Reserve's certified education staff. In the next 5 years, citizen-science workshops will be offered for formal and informal educators, as well as workshops featuring the Reserve's suite of Traveling Trunks.

## Docent Naturalist Program

The Wells 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.

Docents come to the Reserve with a variety of backgrounds that enrich the volunteer community. 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, and specific program sessions (e.g., Microscopic Marvels, Secrets of the Salt Marsh). Docents also attend a staff-coordinated field trip, offered in an effort to celebrate docent contributions. This enjoyable outing strengthens docent relationships and provides professional development.

After they attend training sessions, docents shadow and co-lead programs with staff or experienced docents before leading tours on their own. Enrichment opportunities are available monthly through our lectures, walks, and other educational offerings. Docents continue to co-teach after the training phase is completed, which improves skills through collaboration, provides more leadership for large groups, and builds community within the docent corps.

To ensure the quality of the docents and their experiences, several types of evaluation are administered at the Reserve. These include evaluations of trainings by docents, evaluations of school programs by teachers, and evaluations of docent-led programs by Reserve educators.

Recognition is paramount to retaining quality volunteers. The Reserve aims to develop meaningful relationships with docents by acknowledging their impressive impact on program delivery and by providing rewards, such as end-of-season trips and saying "thank you" as often as possible. In the next 5 years, we aim to recruit more docents to fill our increasing school program needs. Our goal is to have and sustain a team of 20 docents by 2024. We also will aim to provide an expert-led docent training on equity and inclusion, as they relate to interacting with Reserve visitors.

## 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 May and September, monthly Climate Stewards lectures bring specialists on climate change issues to the Reserve. Lunch 'n' Learn talks are informal presentations between September and June that often highlight Reserve research, natural history, or staff and volunteer travels. Attendees are encouraged to bring a brown bag lunch to eat while they learn.

Docent-led interpretive walks are offered during the summer. Current walks include Secrets of the Salt Marsh, Life Between the Tides, Laudholm's Farming Past, and 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 ecology. These tours appeal to both residents and tourists.

Customized programs are offered to groups such as scouts, homeschoolers, and other community organizations upon request. These tend to focus on wildlife conservation, estuary ecology, and beach studies.

Special Programs are 2- to 3-hour sessions that families or adults can experience together. These programs

often explore specific topics related to plants and animals, Native American cultures, estuary ecology, and wellness. They typically occur on our seven miles of trails and while kayaking, and are led by staff or guest presenters.

Special events are offered onsite throughout the year. Winter Wildlife Day is facilitated in partnership with York County Audubon and Center for Wildlife during February school vacation week. This free event includes live animal ambassador programs, tracking walks along the trails, and wildlife activities and crafts. In April, the Reserve offers an Earth Day Celebration during school vacation week. A variety of community organizations join us for this event, offering bird walks, seed planting, wildlife crafts, and other nature-based activities. Reserve educators also facilitate a beach clean-up and nature walk. In September, the Reserve holds its annual Punkinfiddle festival on National Estuaries Day. There are estuary activities, traditional artisans demonstrating their crafts, outdoor games, pumpkin decorating, and fall harvest activities.

In the next 5 years, we plan to expand our literature and creative arts programming, add climate change walks to our offerings, and provide targeted programs for visitors with mobility issues. The latter will be facilitated on our main campus and at our new wheelchair-accessible trail at Wells Harbor. In general, we also hope to recruit a more ethnically diverse cadre of guest presenters and offer more programs that provide solutions to humans' effects on the environment. We will also explore the possibility of leading trips off-site locally with community members, and eventually trips to estuaries overseas.

## Exhibits

The 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 in the Visitor Center and the Maine Coastal Ecology Center (MCEC) exhibit wing. Exhibits in the Visitor Center, dedicated 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. Some 2017 additions explore climate change, renewable energy, and sea-level rise. Exhibits within the Ecology Center describe research at the Reserve and throughout the Gulf of Maine, while building awareness of how that research links to resource management and personal choices. Completed in 2002, these exhibits are at the end of their useful life. In the next 5 years, we will evaluate whether to install new exhibits in the MCEC, or make a different use of this space. In the coming years, we will also develop self-guided exhibit exploration options in the Visitor Center for visiting school and community groups. For example, a scavenger hunt for younger students might help them to focus and learn more effectively while exploring the exhibits.

## Trail/Site Interpretation

Interpretive signs along trails and on buildings give visitors an opportunity to learn informally about the site and its resources. The Education Program works with the Laudholm Trust Communications Director to revise existing signs and create new interpretive signage as funding is available. Current signs focus on solar energy, sustainable forestry, sea-level rise, forest succession, salt marsh communities, vernal pool inhabitants, salt marsh restoration, landscape change, historic building interpretation, and other pertinent topics. There are 37 signs along the trails of the Reserve, as well as tree identification signage.

The 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. This program is discussed in greater detail under Field-Based School Programs.

In the next 5 years, we hope to add a storybook trail (children's picture-book images and text, enlarged) for visitors with small children to enjoy as they walk. We will also explore building a Native American hunting hut with an accompanying interpretive sign. And we intend to review the condition of all of our signs to determine whether some need to be replaced.

## Information Dissemination

Beyond the onsite program offerings, exhibits, and trailside education, the Reserve's education messages are shared through event presentations, a newsletter, and social media. Laudholm Trust's Communication Director is the editor of *Watermark*, a newsletter filled with compelling stories about the Reserve's work. Education staff members submit articles for inclusion in this publication and also write blog posts for the website. The Communication Director promotes interpretive education program offerings year-round through communication channels. In the next 5 years, we plan to expand our dissemination efforts through increased blog posts, video clips, and flyer distribution. The education team will also continue to attend and exhibit at interpretation and environmental education events. In addition, we intend to provide more information on our website regarding the accessibility of our trails, programs, and exhibits. To broaden the reach of lectures, we will seek funding for a video recording system in the auditorium.

## Program Evaluation

The Reserve currently has an evaluation component in place for its school field trips, teacher workshops, select public programs, and camps. Participants complete a paper or online evaluation, providing valuable feedback and comments regarding the quality of the program, its leaders, and recommendations for improvement. In the next 5 years, we will continue to improve and refine our strategy to help guide the Reserve's interpretive education evaluation plan and outcomes. We will explore offering incentives to visitors who complete program evaluations in an effort to boost completion rates. We also plan to evaluate more programs and increase our observations of docent leaders. Over the next 5 years, we hope to develop a more comprehensive system for compiling our evaluation data in a digital format.

Written evaluations help the Reserve's education team to enhance and improve its programs and provide

direction regarding new programming. Our public program evaluations have been overwhelmingly positive. In the 2017 and 2018, for example, 94 percent of kayaking participants rated their experience a 5 on a 5-point scale and the remaining evaluators rated their experience a 4. Similarly, 94 percent of Climate Stewards lecture attendees rated their satisfaction at least 8 on a 10-point scale. Some school-program evaluations have included comments like these:

- The interactions with the animals gave the students a personal connection to the wildlife and helped them to have empathy for animals they would not normally have the chance to connect with.
- I honestly felt this was one of the best field trips I have ever been on as an educator. I really enjoyed the experience and hope that you continue to offer the same experience in future years!
- I really enjoyed watching the hands-on learning unfold. Students were given the freedom to learn in a truly remarkable outdoor classroom.
- The presenters were awesome. It was great that they gave the children wait time to answer the questions. I have a lot of children in my class that need this. They didn't try to rush them. They also were very flexible when the children saw something that was unexpected. They showed the children that they were excited too.

## Citizen Monitoring

The Reserve has Picture Posts that enable environmental monitoring by citizens, students, and community organizations through digital photography. Each wooden post is topped with an octagon that helps citizen scientists frame a series of photos of the surrounding landscape. Participants upload their images to a website managed by the University of New Hampshire, where changes at that post can be observed over time. In this way, citizens document landscape and seasonal change. The Reserve has four posts, two of them available to the public (Knight Trail and Yankee Woodlot). The Reserve plans to expand our citizen science network for this ongoing project.

In the next 5 years, the Education Program will introduce a phenology program to study the annual life cycles of selected plants and animals. Recording regular observations is meant to measure phenological trends over long time periods. Placing phenological data in the context of other environmental data, such as weather and water quality data already collected by the Reserve, will help us more effectively predict environmental responses to climate change and implement better management practices that adapt to these changes. As part of this effort, the Reserve will work toward becoming a long-term plant and animal monitoring site in connection with the University of Maine Cooperative Extension. This project will expand our citizen science and climate literacy learning opportunities to community members and visitors through regular volunteer monitoring and public programs. The information collected will be submitted to the National Phenology Network database and used to inform national, regional, and perhaps site-specific decision making.

## Coastal Resource Library

The Dorothy Fish Coastal Resource Library is a specialty library with a collection focused on water quality, coastal ecology, and aquatic ecology, among other topics. The library is staffed by volunteers one morning each week, and is opened by appointment any time during business hours. The library collection of over 2,400 volumes can be searched online and an interlibrary loan service enables statewide access to books, articles, and theses. We will continue to promote this valuable resource and increase our collection.

A puppet and storybook nook in the Maine Coastal Ecology Center exhibit area extends the library's reach across campus. In addition, many children's books are featured in the Visitor Center 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 conducted in the library. These free programs attract families that have often never before visited the Reserve. Books from the library's extensive children's collection are featured with a reading, related craft activity, and trail walk.

In the next 5 years, the Education Program plans to incorporate storybook trails (see Trail/Site Interpretation). The storybooks highlighted on the trails will be available in the library, thus helping to promote the library's offerings to the community.

# Coastal Training Program

## Introduction

The Coastal Training Program (CTP) acknowledges and respects the critical role that local and regional decision-makers, natural resource providers, 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 processes, scientific findings, and best management practices. Developing effective CTP activities requires awareness that underlying the seemingly pragmatic decision-making process is a complex system of human values, attitudes, and motivational forces. The path leading to the application of scientific findings must navigate through these aspects of decision making. The 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, to improving the application of science to coastal management.

To accomplish objectives of the NERRS Strategic Plan, the CTP is designed around social science based principles. These principles indicate 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. The CTP promotes protection, stewardship, and conservation of natural resources and ecosystem services in the Gulf of Maine by supporting coastal decision-makers in their work. The CTP supports coastal decision-makers by increasing their knowledge and competencies to protect coastal habitats and build community resilience. By facilitating the assessment and evaluation of the outcomes of decisions, actions, and policies, the CTP trainings, workshops, and technical assistance accomplish goals of the NERRS Strategic Plan and contribute to building community resilience. The CTP integrates interdisciplinary science-based approaches to achieve outcomes that sustain the social and ecological systems of the coastal zone.

## Program Context

The CTP focuses on communities and watersheds in southern Maine and coastal New Hampshire. However, it has been, and will continue to be, involved in select Maine coast-wide initiatives and projects. The original Market Analysis and Needs Assessment (2002) identified municipal officials as the target audience for the CTP and this remains the priority audience for this strategic planning period. This audience represents diverse roles and job descriptions, including elected officials, paid professionals, and professionals and community members serving on volunteer town boards. Paid professionals included in the municipal audience include Town Managers, Planners, Code Enforcement Officers, Public Works, Town Engineers, Water and Wastewater Managers, and Harbor Masters. Included in the municipal audience are those volunteers serving on Planning Boards, Site Plan Review Boards, Conservation Commissions, Town Councils or as Selectmen. Volunteer boards are in many cases the backbone of the decision making process at the local level. In addition to municipal audiences, the Market Analysis and Needs Assessment identified land trusts, watershed and river associations, open space planning committees, and state and federal employees as audiences for CTP, and they continue to be part of

the CTP target audience. Training development uses a systems approach to facilitate collaboration among these audiences as they tackle complex environmental issues from diverse organizational perspectives. The CTP provides technical assistance in the region for application of the Collaborative Learning approach developed and tested during the first fifteen years implementing the program. This adaptable approach facilitates the work of diverse stakeholder teams to accomplish regional goals for protection, stewardship, and conservation of natural resources and ecosystem services. Through NERRS Science Collaborative grants, the CTP develops trainings and technical assistance aimed at building the national capacity of the system to design, conduct, and evaluate collaborative science approaches to coastal management in alignment with system-wide plans.

Since the 2013-2018 Wells National Estuarine Research Reserve Management Plan, the following reflections have shaped this guidance document: 1)There are many organizations working up and down the Maine Coast with similar organizational or program missions as the CTP yet a conduit for knowledge exchange is lacking; therefore the CTP broadened its advisory committee to encompass most of these organizations to allow an exchange of ideas, identify respective niches and roles, and to support, transfer, and build upon each other's work; 2) Training on communication best practices tailored to audience needs' (e.g., how natural resource providers can communicate climate change impacts) is in constant demand and well attended; 3) Transfer of knowledge from practitioner to practitioner (e.g., decision-maker from one town to another) through training or facilitated workgroups catalyzes local and regional action. 4) Training needs and gaps for CTP priority audiences are identified through the program's iterative process: needs assessment for training; evaluation of projects, workshops, and trainings; listening and synthesizing partner and priority audience needs during workgroup sessions.

## Objectives and Strategies

CTP objectives are accomplished through technical assistance, formal workshops, trainings, and conferences. These events are collaboratively planned and implemented with partner groups and the CTP advisory committee members, including representative from the following: Bowdoin College, Casco Bay Estuary Partnership, Great Bay National Estuarine Research Reserve, Gulf of Maine Research Institute, Hancock County Soil and Water Conservation District, Island Institute, Maine Audubon, Maine Coastal Program, Maine Drinking Water Program, Maine Natural Areas Program, Maine Sea Grant, Schoodic Institute, Southern Maine Planning and Development Commission, and the Piscataqua Region Estuary Partnership.

The CTP provides technical assistance to audiences and partners including facilitation, stakeholder engagement, Collaborative Learning methodologies, project management, and event planning and management. The CTP contributes to regional coastal management through 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; membership on research teams, and attendance at municipal meetings to provide expert testimony on coastal management.

The CTP contributes to system-wide priorities through NERRS Science Collaborative Grants and participation on national project teams (e.g., the ongoing NERRS Science Collaborative Successful Adaptation Metrics and Indicators Project). Priority goals and objectives identified in the NERRS Strategic Plan (2017-2022) for protecting places, applying science and educating communities are tightly linked to the CTP program and are reflected in the objectives below.

### Objective 1

Training participants will 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 by decision-makers in support of coastal management.
- Share innovative communication strategies and methods to translate science effectively and support collaborative decision-making.

- Provide a minimum of 8 workshops and trainings annually for watershed management, climate adaptation planning, stakeholder engagement and/or habitat conservation and restoration.

### Objective 2

An annual forum will be provided for elected and appointed decision-makers to share coastal resilience strategies to advance the region's resilience in a changing climate.

### Strategies

- Host community decision-makers at the annual Better Safe than Sorry Fall workshop
- Provide a conduit to communicate funding and research opportunities throughout the year
- Highlight cutting edge climate science through workshops and engagement as stakeholders in projects
- Check in biannually with the NERRS Successful Adaptation Indicators and Metrics (SAIM) cohorts
- Collaborate with the CTP Advisory group and Maine and New Hampshire Climate Adaptation Professionals to exchange best practices with each networks' stakeholders

### Objective 3

Collaborative watershed efforts are supported in the region to sustain watershed ecosystem services including safe drinking water, flood protection and pollution filtration.

### Strategies

- Identify and engage diverse partners and stakeholders in appropriate and strategic approaches to sustaining watershed ecosystem services.
- Facilitate science translation and dialogue about the need for and application of scientific research to improve management and policy decisions to sustain ecosystem services.
- Maintain participation and workshop planning support for the Salmon Falls Watershed Collaborative, Saco Watershed Collaborative, and Mount Agamenticus to the Sea Conservation Initiative.

### Objective 4

Each year 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 of decision makers 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 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.
- Participate on local, regional, state and national committees to share work at different scales with partners and stakeholders.
- Outcomes
- Diverse stakeholder workgroups promote protection, stewardship, and conservation of natural resources and ecosystem services in the Gulf of Maine
- Improved ability of partners and stakeholder groups to collaboratively facilitate sustainable land use practices, habitat conservation and restoration and to build community resilience.
- Decision makers increase their knowledge of sustainable land use and conservation practices to maintain ecosystem services and build community resilience.

## Program Delivery

### Capacity

The CTP is managed internally by the CTP Coordinator and CTP Director who work collaboratively with the Stewardship Coordinator, other Reserve staff, and Laudholm Trust. This team communicates regularly to collectively develop and manage CTP events. The team collaborates to integrate research, monitoring, stewardship, and education activities into trainings that are relevant to coastal decision-makers and system-wide priorities. During the past 5 years, funding from the NERRS Science Collaborative has enabled the Wells Reserve CTP to increase outcomes and impact. Base

funding for CTP funds the CTP Coordinator and Director are 24 hours per week. Additional funding from grants supports an additional 8 hours per week for these two positions. In the absence of grant funding, the outcomes of the program would be reduced.

## Training Themes

The CTP is guided by priorities identified in the Wells Reserve's original market analysis and needs assessment, the current CTP Strategic Plan, and 15 years of evaluations of CTP activities. The Wells Reserve's CTP has benefited from a series of NERRS Science Collaborative funded research projects providing rigorous assessments of the partner and stakeholder audience served by the program. These sources support two priority training themes for the program: 1) Habitat, biodiversity, and ecosystem services conservation; and 2) watershed approaches to pollution prevention and mitigation. Climate change, with its associated impacts on habitat, biodiversity, storm intensity and frequency, sea-level rise, and community resiliency, is a nationally significant issue. Climate change adaptation and mitigation are integrated within the two priority training themes.

The two overarching training themes are addressed through the six priority training topics identified from stakeholder and target audience needs, 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 for sustaining water quality and quantity.
- Management strategies and policies that sustain ecosystem services and support community resilience in a changing climate.

## Evaluation

Evaluation of CTP is incorporated into the process of development, marketing, and delivery of training and technical assistance and is linked to the goals and objectives identified in the 2002 Market Analysis, past and current Strategic Plans, and systemwide CTP program goals connected to the NERRS Strategic Plan. CTP Performance Measures are used to evaluate programs and document progress of NERRS identified goals for CTP.

CTP evaluation methodologies fall under three general categories: needs assessments; performance evaluation monitoring; and outcome tracking. These methodologies are applied as appropriate to evaluate all CTP activities. Workgroups are measured against agreed upon outcomes, The Saco River Watershed Collaborative progress is evaluated against the group's action plan during conference calls and annual face-to-face meetings. For workshops and trainings needs assessments and performance evaluation monitoring questions are used. Evaluation data is processed, archived, and used in grant reporting, program design processes, and formal and informal internal organizational development.

Formative evaluations guide new directions for the CTP. Participation on regional work groups, NERRS Science Collaborative projects and collaboration with CTP Advisory Committee members and other partners provide ideas for new directions, emerging training topics and innovative approaches. Emerging ideas may begin as technical assistance and progress to formal workshops.

Twice a year, the CTP Coordinator submits all performance measure data to the Executive Director.

# Research and Monitoring

## Introduction

The 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, understand, 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 and lab research mainly along Maine's southwest coast from the Kennebec River to the Piscataqua River, including nearshore and offshore waters. Within this region, effort is focused on the coastal compartments from Great Bay, New Hampshire, to Casco Bay, Maine, which are characterized by numerous marsh-dominated estuaries, embayments, tidal creeks and rivers, and barrier beaches.

The Research Program focuses 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, the program actively promotes the development and implementation of regionally coordinated ecological monitoring of coastal habitats along a gradient from least disturbed to restored to most disturbed. These activities are accomplished through committee work, meetings, workshops, presentations, and reports. New efforts within the Research Program include the development of programmatic ties with more academic institutions and governmental agencies.

Climate-driven disturbance is an underlying force that needs to be measured and assessed in natural and altered habitats. The impacts of a changing climate on coastal areas will be expressed across ecosystem variables such as changes in air, water and soil temperature; water chemistry; quantity, timing, and intensity of precipitation; intensity of storm events; sea-level rise, and species distributions and movements.

The Reserve is committed to establishing and maintaining a NERRS Sentinel Site, as described in "Sentinel Sites Guidance for Climate Change Impacts," as part of its ongoing System-wide Monitoring Program. It has already incorporated many Application Module 1 protocols (SSAM-1) into its monitoring program (e.g., vegetation monitoring, vertical control of water quality stations, surface elevation tables).

The Research Program works across the reserves and with the Coastal Training, Education, and Stewardship programs to assess the needs of local communities relative to climate-driven changes in coastal habitats.

## NERR System Research Overview

The NERR 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 national plans that identify goals, priorities, and implementation strategies. This approach, when used

in combination with the education, training, and outreach programs, helps to 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 policy at the Wells Reserve is designed to fulfill the NERR System goals as defined in program regulations.

The three research themes are:

1. Addressing coastal management issues identified as significant through coordinated estuarine and coastal research within the NERR System;
2. Promoting federal, state, public, and private use of one or more reserves within the NERR System when such entities conduct estuarine research
3. Conducting and coordinating estuarine research within the NERR System, gathering and making available information necessary for improved understanding and management of estuarine areas.

The strategic science goal for the system strives for scientific investigations to improve understanding and inform decisions affecting estuaries and coastal watersheds. Objectives toward this science goal include to: (1) expand 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) utilize social science research to further stewardship.

## System-wide Research Programs

In addition to external grant opportunities through state, federal, and foundation-based sources, the NERR System has two system-wide research programs that provide funding support to all reserves.

### *NERRS Science Collaborative*

The Science Collaborative is a multifaceted 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 ecosystem dynamics and habitat degradation in a time of climate change. This program is designed to enhance the NERRS ability to support decisions related to coastal resources through collaborative approaches that engage the people who produce science and technology with those who need it (i.e., end-users). 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 to share best practices and examples for how this may be accomplished.

### *Davidson Graduate Research Fellowships*

The goal of the Margaret A. Davidson Fellowship is "to build the next generation of leaders in estuarine science and coastal management by affording graduate students the opportunity to conduct collaborative science that addresses key reserve management issues, partake in professional development opportunities, and receive quality mentoring to support their professional growth." Each 2-year fellowship will offer graduate students enrolled in a M.S. or Ph.D. program the opportunity to conduct estuarine research within a National Estuarine Research Reserve. A strong emphasis will be placed on mentoring the fellows at a local and national level, as well as providing professional development opportunities to build knowledge and skills to enter the workforce. The proposed outcomes of this fellowship program include (1) support the next generation of leaders in estuarine science and coastal management; (2) develop a strong network among fellows that remains post fellowship and into their careers; (3) build prestige and strong reputation for NERRS as developers of these leaders and; (4) address critical reserve management priorities through high quality research. Research conducted by fellows will support the 2017-2022 NERRS Strategic Plan and the focus areas of the Wells Reserve's Research and science objectives.

# Objectives and Strategies

## Objective 1

Coastal food webs and habitats are investigated to gain a better understanding of their underlying physical and biological processes and their response to natural changes and human activities.

## Strategies

- Examine the ecology of estuarine and coastal habitats and food webs in coastal Gulf of Maine waters.
- Evaluate the effectiveness of coastal habitat restoration in the Gulf of Maine, and the response of coastal habitats to changing patterns of coastal water inundation.
- Support investigations considering the quantity and quality of estuarine and watershed resources (e.g., viable migratory fish habitats).
- Promote the investigation of linkages (e.g., larval fish ingress) 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 shore-lands in watersheds.

## Objective 2

Visiting investigators and staff are provided with opportunities and resources to conduct independent or collaborative research at the Wells Reserve and in the Gulf of Maine region.

## Strategies

- Train, mentor, and provide guidance to undergraduates, graduate students, post-doctoral associates, and citizen scientists.
- Support visiting researchers by providing access to facilities, lab resources, field sites, staff, and interns.
- Participate in the NOAA Margaret A. Davidson Fellowship Program (formerly, the Graduate Research Fellowship Program) to offer opportunities for graduate research fellows to make contributions in the fields of aquatic, estuarine, and coastal science.
- Cultivate and promote programmatic affiliations with new and existing academic institutions, and collaborate with institutions on specific research projects.
- Share information, personnel, equipment, and facilities with partners to facilitate research.

## Objective 3

The development and implementation of regionally coordinated ecological monitoring of coastal habitats is promoted, and staff continue to maintain and expand upon the System-wide Monitoring Program (SWMP).

## Strategies

- Fully implement and expand SWMP, including bio-monitoring, land-use change analyses, and habitat mapping.
- Integrate core elements of SWMP into the SSAM-1 Initiative, with a focus on changes in marsh elevation, vegetation community structure, and inundation and sea-level rise.
- Collect, maintain, and QA/QC consistent SWMP data for weather, water quality, nutrients, vegetation and land-use change using standardized protocols and technologies set forth by the NERRS Data Management Committee and the Centralized Data Management Office (CDMO).
- Organize, review, document, and submit quality-controlled SWMP data to the CDMO on a quarterly basis as well as to manage real-time data available to end-users.
- Promote and increase awareness of SWMP data within the Gulf of Maine scientific community through attendance and participation in local and regional monitoring working groups, regional monitoring associations, conferences, workshops, symposia, and public speaking opportunities.
- Link SWMP and other monitoring efforts with the Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS) and the national Integrated Ocean Observing System (IOOS).
- Contribute to local, regional and national initiatives involving restoration science and coastal habitat monitoring.
- Subsidize system-wide telemetry efforts through the continued support and trouble-shooting of telemetry systems, and provide up-to-date technical telemetry training at the annual Technician Training Workshop (TTW), sponsored by CDMO.

# System-wide Monitoring Program

The System-wide Monitoring Program (SWMP) provides standardized, quality-controlled data on national estuarine environmental trends while allowing

the flexibility to assess coastal management issues of regional or local concern. SWMP is guided by a NERR System plan last updated in 2011. Its principal mission is to collect quantitative measurements of short-term variability and long-term changes in weather, water chemistry, 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 reference sites. SWMP focuses on three ecosystem characteristics:

1. Abiotic measurements describe the physical environment, including weather, water chemistry, and hydrological- and sediment-related parameters. Data follow standard parameters, protocols, and approaches that are compliant with Federal Geographical Data Committee standards and are shared through the Centralized Data Management Office.
2. Biotic measurements focus on habitats and biodiversity through habitat mapping and ichthyoplankton monitoring.
3. Watershed and land-use classification examines the link between watershed land use and coastal habitat quality. This element is guided by the NERR System Habitat Mapping and Change Plan.

## Abiotic Monitoring

### *Water Quality, Weather, and Hydrology.*

Water quality parameters are collected at 15-minute intervals by YSI 6600 EDS or EXO2 datasondes at four stations located at the heads-of-tide and mouths of the Webhannet and Little River estuaries. Parameters include water temperature, specific conductance, pH, turbidity, dissolved oxygen (in 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. One station also houses a sampling regime that samples every 135 minutes (to cover an entire tidal cycle) using an ISCO automated water sampler.

Weather data is also obtained in 15-minute intervals. A Campbell Scientific CR1000 weather station located on the Laudholm campus collects air temperature, relative humidity, wind speed and direction, barometric pressure, precipitation, and photosynthetically active radiation.

All abiotic data undergo quality control tests and are submittal to Centralized Data Management Office, where they are archived and made available for dissemination. Data from two water quality stations and the weather station are also delivered in "near-real-time" via the NOAA GOES satellite system and are available on the web at www.nerrsdata.org.

### *Coastal Ocean Acidification Monitoring (proposed, elective)*

In an effort to gain a better understanding of the role of estuaries in the larger context of coastal ocean acidification (COA), the Reserve continues to work with external partners as well as other reserves to acquire the funds, equipment, and technical skills to consistently monitor, and adequately address the increasing threats of COA. The Reserve will further leverage existing datasets and infrastructure from SWMP as well as existing relationships with regional monitoring associations (e.g., Northeast Coastal Acidification Network) and other agencies (NOAA Ocean Acidification Program) to build a robust and sustainable COA network. This provides an opportunity for cross-sector collaboration with end-users to address realistic needs.

## Biological Monitoring

### *Vegetation Monitoring*

We employ methodologies similar to those described in Roman and others (2001: 'Monitoring salt marsh vegetation: a protocol for the long-term Coastal Ecosystem Monitoring Program at Cape Cod National Seashore. Kingston: USGS Patuxent Wildlife Research Center, Coastal Research Field Station, University of Rhode Island) to assess the relationship between upland land use, elevation, and the abundance of common emergent marsh plants. These three land use classifications are used to stratify our marsh into discrete sampling transects. Our transect boundaries extend orthogonally from the upland border of the marsh vegetation to the seaward transition of vegetation to bare substrate. Within these long-term monitoring sites, a total of 5 permanent plots with associated groundwater monitoring wells have also been established along each transect, following NERRS standard protocols of Moore and Bulthuis (2003:

'Biomonitoring proposal: Mapping and monitoring of emergent and submerged aquatic vegetation in the Reserve System'. 17th Annual NERRS Meeting, Charleston, SC. 22 pp).

Plant communities within these established areas are surveyed using the point-intercept quadrat method and groundwater salinity data is also collected. The position and elevation of each quadrat are recorded using a total survey station. The Wells Reserve currently participates in a New England-wide NERR vegetation data synthesis collaborative (funded through the NERRS Science Collaborative, 2018) to provide tools and methods for comprehensive vegetation analysis to provide the first regional trend analyses of sentinel site vegetation and marsh surface elevation change in response to sea-level rise. We anticipate that our results will inform the improvement of sentinel site protocols but also establish a prototype methodology for the analysis of marsh condition. These efforts will build on existing collaborations in New England to supply larger geographic scale trend analyses of data from Reserves nationally, as well as other regional analyses for entities with similar data.

### *Soundscape Monitoring (elective)*

In tandem with our stewardship program, we have piloted a long-term soundscape monitoring program looking specifically at phenological changes in fauna within disparate habitats of our Reserve, as well as before-after comparisons of changing terrestrial landscapes. These efforts are being partially supported by the University of New Hampshire's acoustic studies program. This initiative will be further bolstered by NERRS Science Collaborative Capacity Funds (2018) aimed at providing technical training.

### *Larval Fish Monitoring (elective)*

The Reserve has monitored ichthyoplankton assemblages at Wells Harbor for more than 10 years to understand how a changing ocean environment is impacting the composition and timing of larval fish communities. To date, 32 species have been found. Some, such as the commercially important Atlantic herring (Clupea harengus), have been present in samples every year and show strong seasonal cycles. Species such as red hake (Urophysis chuss) and black sea bass (Centropristis striata) did not appear in samples until 2013, after an anomalous warming period in the Gulf of Maine. The ichthyoplankton assemblage shows strong seasonal structure dominated by several distinctly "spring" or "fall" species. Future analyses will couple fish assemblage data with SWMP parameters.

## Land Use and Habitat Change

This component examines the link between watershed land-use activities and coastal habitat quality and employs the NERR System's Habitat Classification Scheme and Coastal Change Analysis Program.

## Data Management

Data collected through SWMP are compiled electronically at the Centralized Data Management Office (CDMO), Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina. The CDMO provides automated primary quality assurance and quality control reviews of all incoming data and metadata. Reserve staff conduct a secondary review on a quarterly basis before data are posted as authenticated. The CDMO compiles and disseminates all data and summary statistics online for researchers, coastal managers, educators, and other interested parties.

Telemetry, or the delivery of near real-time data to remote users, is an important element of SWMP. The NERR System uses the Geostationary Operational Environmental Satellites system, a critical component of the Integrated Ocean Observing System. SWMP 15-minute data are transmitted hourly via this satellite system so they can be used by agencies, including the National Weather Service, to inform forecasting and modeling. SWMP data is also used by the New England Regional Association of Coastal Ocean Observing System (NERACOOS).

A Reserve staff member serves as SWMP's National Telemetry Support Technician, assisting other reserves with basic troubleshooting and maintenance of their stations.

The Reserve promotes awareness of SWMP data and products within the Gulf of Maine scientific community through attendance and participation in local monitoring working groups and efforts. The NERACOOS data distribution web portal provides an active link to the Reserve's telemetered SWMP data, and to the CDMO data retrieval web portal.

## Sentinel Site Development

The Reserve participates in a national program dedicated to developing a standardized approach to answering management questions across a broad geographic scale, as outlined in NOAA's Coastal Habitat Response to Changing Water Levels: NERR Sentinel Site Application Module 1 guidance document (SSAM-1). This program allows each Reserve "to examine the interplay of water levels, elevation, and plant communities at scales relevant to local, regional, and national decision makers." Building on these foundational elements, the Reserve is in the process of developing a comprehensive Sentinel Site monitoring

Taking saltmarsh surface readings with a Sediment Elevation Table.

plan (estimated draft completion, 2019). In line with this, the Reserve is implementing a suite of activities, as described in the 2012 Reserve System Sentinel Site Guidance Document, to assess the relationship between vegetative communities (emergent vegetation) and sea-level rise. Surface elevation tables and pore water chemistry monitoring, in tandem with our vegetation monitoring transects, help to link SWMP data to a network of vertically controlled water level stations, to allow precise measurement of local sea-level changes, changes in marsh elevation and vegetation communities, and the subsequent impacts these variables might have on key habitats within the Reserve. We are also working in partnership with NOAA's National Geodetic Survey and the Center for Operational Oceanographic Products and Services to support the development of SSAM-1 sites and increase the capacity for the Reserve to collect accurate and precise water level observations within their systems.

# Research Themes

## Estuarine Water Quality & Degradation

Water quality is monitored continuously (data are collected every 15 minutes) at four, long-term stations using automated data loggers, as part of SWMP. Discrete water samples to determine dissolved inorgainc nutrient concentrations (orthophosphate, ammonia, combined nitrate/nitrite, dissolved inorganic nitrogen, silica, and chlorophyll a) are also collected monthly at these sites to understand seasonal trends in nutrient concentration in our local estuaries. Nutrients are also sampled over a 24-hour period at one station to determine diurnal variations in nutrient concentrations and to understand how they vary across tidal cycles.

Our water quality monitoring and associated research has contributed to the designation of several "Priority Watersheds" in south coastal Maine by the Maine Department of Environmental Protection (DEP). This designation us is used to help prioritize nonpoint source (NPS) water pollution control efforts and attract local communities to take action to restore or protect waters impaired or threatened by NPS pollution.

Nutrient data collected by the Reserve as part of SWMP and in collaboration with the 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.

## Climate Change Impacts on Salt Marsh Habitats & 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 experimental 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. 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 Reserve scientists and collaborators.

## Understanding Changing Coastal Habitats

Rapid changes in both climate and ocean chemistry are reshaping ecosystems in ways that affect resources and ecosystem services. The Reserve is interested in the impacts of these drivers on estuarine and coastal ecosystems and their related implications to ecosystem function. To this end, our goals are to continue efforts to assess and understand changing coastal habitats.

Invasive invertebrates covering native kelp.

One of these efforts includes our continued work on marine invasive species monitoring and research. Invasive European green crab (*Carcinus maenas*) populations have exploded statewide with devastating losses to Maine's intertidal resources, including soft-shell clam flats, eelgrass beds, and salt marshes. Research staff will continue studies and partnerships that investigate changes in green crab population dynamics (size, densities, sex ratios, timing of spawning, etc.) as well as the impacts of this crab on intertidal habitats through acoustic telemetry and trapping surveys with local fishers in the area.

A Research Associate will continue to act as state coordinator for the Marine Invader Monitoring and Information Collaborative (MIMIC), which monitors marine invasive species and manage volunteers at 17 long-term sites in Coastal Maine. The results of this monitoring will be entered into the iMap online invasive species database housed at the Maine Natural Areas Program for access by managers, educators, and other scientist/researchers. The data is also available through the lead agency, The Massachusetts Office of Coastal Zone Management. We will continue to partner with the Casco Bay Estuary Partnership to expand monitoring and outreach to the island communities of Casco Bay. A Research Associate will continue to represent the Reserve on the Maine Marine Invasive Species Coalition (MeMISCO) and attend the annual meeting of the Maine Invasive Species Network (MISN).

## Aquatic Resource Restoration in Southern Maine Watersheds

The Reserve will continue to explore restoration and management opportunities in coastal watersheds from the Salmon Falls River to the Scarborough River, giving priority to actions that will improve stream habitat connectivity and tidal flow in saltmarsh systems. The Project Manager will work with The Nature Conservancy of Maine to assess potential salt marsh and sea-run fish restoration projects in southern Maine. The Project Manager will also continue working in Cape Elizabeth and Scarborough to study impacts of road/stream crossings in the Spurwink River marsh and the potential vulnerability of this infrastructure to climate change and sea-level rise. The Reserve will

work with a stakeholder citizens committee in the York River watershed to advance restoration goals of the York River Stewardship Plan, and with the Maine Stream Connectivity Workgroup to facilitate and advance aquatic resource restoration.

## Estuarine and Coastal Fisheries in the Gulf of Maine

Climate change has had a recent and pronounced effect in the coastal waters of the Gulf of Maine. For example, changes in the thermal structure in shallow coastal areas, including estuarine systems, are having profound and adverse effects on economically- and ecologically-important marine species such as lobsters, crabs, and finfish. Indicators of this decline may include reduced fecundity, failure of females to mate, and insufficient or low quality sperm being passed to females. As we expect a changing ocean climate to persist, stressful environmental conditions could impede Gulf of Maine fauna, making it critical to understand how changing environmental parameters might affect a variety of life-history characteristics. An ongoing collaboration with academic and state collaborators is aimed at quantifying changes in lobster reproductive output. Our continued research efforts will help to inform fisheries and coastal resource stakeholders through empirical studies and predictive modeling.

The Jonah crab (*Cancer borealis*) has emerged rapidly as a fishery, with landings more than quadrupling over the past 20 years. Because of this increased fishing effort, a fisheries management plan has been recently implemented. To ensure the long-term health of the Jonah crab fishery, the Research Program is assessing growth rates and determining implications of harvesting techniques. The Research staff work with state and federal partners to provide data that will guide management decisions (e.g., stock assessments).

## Novel Tools to Assess Species of Greatest Conservation Need

Environmental DNA (eDNA) presents an opportunity to harness new technology and fundamentally improve the Reserve's capacity to monitor biological communities. The Research Program plans to expand eDNA monitoring while developing best practices and analyses based on this management tool. The Reserve will work with partners at the University of New Hampshire, University of Maine, Casco Bay Estuary Partnership, and Maine Coastal Program to develop a cost-effective method for monitoring estuarine species of interest, with a focus on anadromous rainbow smelt populations. The Reserve will apply eDNA methods to generating up-to-date information on the status of rainbow smelt populations in small coastal streams where information is lacking.

## Salt Marsh Degradation and Restoration

Since 1991, the Reserve has been studying the impact of tidal restrictions on saltmarsh functions and values, and saltmarsh responses to tidal restoration. Salt-marsh ecosystems in the Gulf of Maine sustained themselves for nearly 5,000 years in the face of sea-level rise and other natural disturbances. 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 over the past century, and especially since the 1950s, 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.

# Academic and Institutional Partnerships

The Reserve maintains professional relationships with colleagues at the University of New Hampshire, the University of New England, University of Massachusetts Lowell, Northeastern University, Boston University, Dartmouth College, Antioch New England Graduate School, Bates College, the University of Maine, Saint Joseph's College, York County Community College, Unity College, and the University of Southern Maine. We have begun to explore formal program partnerships with some 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, and semester-long research internships for undergraduates.

Research Program staff work with undergraduate and graduate interns during both the academic year and the summer field season. The staff also work closely with non-profit groups and citizen scientists, particularly on watershed, fish passage, and estuarine water quality monitoring projects.

The Research Director participates on graduate thesis committees at the University of New Hampshire, the University of Maine, and the University of New England.

## Government Partnerships

The Research Program staff interacts regularly with staff from state and federal agencies, directly and within partnerships, to determine coastal research needs relevant to resource management and to provide scientific support for education, outreach, and training efforts related to freshwater and tidal shorelands. 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 EPA Office of Ecosystem Protection, the U.S. Geological Survey, Maine Sea Grant, New Hampshire Sea Grant, and Rachel Carson National Wildlife Refuge. Research staff also 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 Program cooperates with municipalities. Examples of town-level cooperation include an assessment of the ecological effects of docks and piers in the York River estuary, a study of the sustainability of the Saco River watershed, a study of the importance of buffers to water quality in the Little River watershed (Wells and Kennebunk), and a comprehensive assessment of the fisheries in the York River estuary as part of a National Wild and Scenic Rivers System initiative.

## Mentoring and Internships

The Research Program staff works with undergraduates, graduate students, and 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, students work on Reserve-sponsored research projects. Many students work for credit or to meet a service requirement, while others receive stipends from project funds. Three reliable programs for successful candidates include the NOAA 5-colleges consortium, the NOAA Hollings Scholarship Program, and the University of Southern Maine "Canis Major" program.

Research Program staff work closely with citizen scientists, 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, participants often use their experience at the Reserve as a step toward environment-related employment or graduate study. Benefits continue well after the internships have ended; there is often continued interaction between the Reserve and former interns as they progress in their professions.

## Scientifically Engage External Audiences

The Research Director and staff dedicate time to engage scientifically in several contexts. They may:

- host or participate in local, state, regional, and national scientific meetings
- lead or take part in trainings, webinars, and workshops to support their professional development and growth
- present to local and regional community groups on Reserve science and management projects
- participate in state, regional, and national steering committees and working groups
- contribute to Reserve communications vehicles, such as the website and newsletters
- produce project completion reports
- submit manuscripts to peer-reviewed journals
- review manuscripts and proposals
- train emerging scientists
- encourage and facilitate research by visiting investigators

Research findings are routinely shared as oral presentations, posters, abstracts, technical reports, and peer-reviewed publications.

The Research Program organizes meetings and workshops on topics as varied as soundscape ecology, ocean acidification, nanosatellite and drone

technology, environmental DNA, and fish-passage restoration.

Research Program staff contribute to the development of regional coastal monitoring and research initiatives and provide oversight and planning for coastal monitoring, management, habitat protection, and restoration programs. Participation in working groups and steering committees allows the Reserve to contribute science information and perspective, and to develop alliances and partnerships with representatives from other entities with complementary missions.

## Site Profile

In January 2007, the Reserve published the Site Profile of the Wells National Estuarine Research Reserve, a 326-page document that details the Reserve's physical and biological resources. The Site Profile includes plant and animal species lists, past research and monitoring projects, and contemporary and future research needs. The Site Profile is a comprehensive reference document targeted at researchers and resource managers carrying out projects in south coastal Maine. It is available online (wellsreserve.org/project/site-profile).


The Reserve assigns habitats to four management zones — public and administrative, active management, conservation, and protected — to control types and levels of access and activity. This approach permits research, education, resource management, and public enjoyment while providing adequate protection to sensitive areas and species.

# Resource Management and Stewardship

## Introduction

The Wells 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, environmental monitoring, education, and training, stewardship of natural resources is a major program component of the Reserve.

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 Reserve support distinct plant and animal communities requiring specific stewardship approaches. Woodland and fields are in large part resilient to human use, while salt marshes, dunes, beaches, vernal pools, and bogs 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 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

Habitats within the Reserve are managed to sustain biodiversity and ecosystem functions while providing opportunities for research, education, and public enjoyment.

### 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.
- Protect pristine habitats by directing public, staff, and visiting investigators to less sensitive areas.
- Maintain a system of trails, woods roads, and accesses 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.
- Develop strategies to mitigate, prepare for, respond to, and recover from the effects of natural and man-made disasters.
- Investigate emerging technologies for beneficial use in natural resource management.

### Objective 2

A watershed approach to stewardship and land use is promoted to enhance the quality of water resources in south coastal 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
- Assistance and expertise are provided to communities and organizations to conserve, restore, and manage coastal habitats.
- Strategies
- Engage and work with conservation commissions, land trusts, and the local water district to protect lands within the Reserve's targeted watersheds.
- Provide networking and training opportunities to help municipalities and organizations increase their effectiveness and capacity to conserve lands.
- Serve as a center for providing southern Maine land conservation organizations with geospatial and technological support such as geographic information systems, unmanned aircraft systems, and other technical 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.
- Provide support for long-term monitoring of abiotic and biotic elements of restored habitats.

## Resource Management

### Management Framework

Wells Reserve lands and waters are owned by four entities: Maine Department of Agriculture, Conservation and Forestry (147 land acres), U.S. Fish and Wildlife Service / Rachel Carson National Wildlife Refuge (1,428 acres), Town of Wells (249 acres), and Reserve Management Authority (40 acres). The Maine Department of Agriculture, Conservation and Forestry Reserve also owns 386 acres of submerged lands within the Reserve, though a portion of these are within the Wells Harbor Federal Navigational Channel and so are excluded from the Reserve.

Management of lands owned by the state, the town, and the Reserve Management Authority follows actions outlined in the Reserve's Integrated Natural Resources Management Plan: Terrestrial, Freshwater, and Barrier Beach Habitats – 2013 to 2023. The Reserve also relies on recommendations developed by the Stewardship Advisory Committee. Federal lands are managed by the U.S. Fish and Wildlife Service / Rachel Carson National Wildlife Refuge.

### Natural Resource Protection

Reserve administrative processes and town, 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. These apply to the state, municipal, and federally owned conservation land and water within the Reserve. The U.S. Fish and Wildlife Service monitors and enforces laws within the National Wildlife Refuge. State natural resource agencies enforce laws on state and municipal lands.) A summary of applicable state and federal natural-resource laws is in the Appendix.

The Reserve works closely with state and federal natural resource agencies in protecting Reserve

resources. Staff and trained volunteers routinely monitor human activities, wildlife, and habitats within the Reserve's protected area and staff report violations to the appropriate state enforcement agency. Additionally, each state and federal agency has a representative on the Reserve's Stewardship Advisory Committee. As a result, the agencies remain informed about issues that may affect the Reserve and can address them quickly.

The 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 including 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, town planning.

## Management Zones

The 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 and species.

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 (Buffer)

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 Commons 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 (Buffer)

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 Integrated Natural Resources Management Plan (open-field management section). 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.
- 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 (Buffer)

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 (Core)

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 the Reserve include dune systems; beaches for piping 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.

### Wells Harbor

Wells Harbor (Webhannet River) 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, and has since had maintenance dredging. 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 have been used to assess the effects of dredging on salt marsh accretion and erosion in the context of natural events and processes. In 2018, the upland that was created by the original dredge spoils was put to good use—the Reserve and Town of Wells completed a ½-mile accessible trail adjacent to Wells Harbor.

## Resource Management

The Reserve has been working on resource management projects that address both long-standing and recently emerging issues.

### Disaster Response Plan

A disaster response plan was developed in 2015 using a template provided by five reserves located along the Gulf of Mexico after a brutal hurricane season affected them all. The plan focuses on minimizing the effects of a disaster on water quality and natural landscapes.

The Reserve used a Hazard Identification and Risk Assessment to identify the most likely disaster events for this location. These include severe storms, catastrophic wildfires, hazardous material spills, and nuclear incidents. Reserve staff are represented on the Town of Wells Emergency Management Team and the York County Emergency Management Agency. They support local and regional response efforts with mapping and weather information.

### Deer Population Control

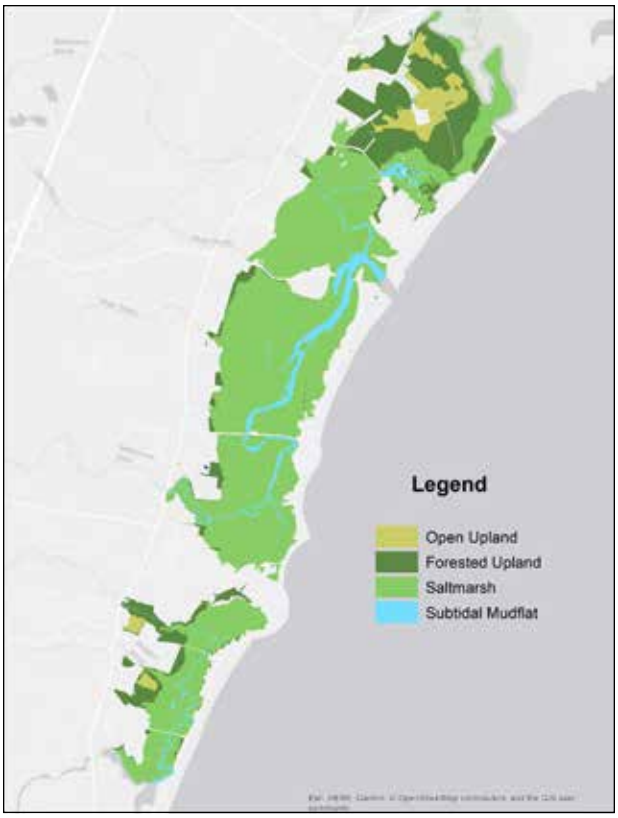
Some forested habitats of the Reserve have been severely damaged by white-tailed deer. Deer browsing has restricted regeneration of native woody and herbaceous vegetation and has favored non-native plants, such as Japanese barberry and Asian honeysuckle. Restoring forested habitats requires reducing deer population density and controlling or removing invasive plant species. The Reserve and its Stewardship Advisory Committee, the U.S. Fish and Wildlife Service, the Maine Department of Inland Fisheries and Wildlife, the Town of Wells, and adjacent landowners instituted a controlled hunt of white-tailed deer in 2002. The limited bow hunt has been successful and a long-term commitment to the program has reduced and maintained 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, but in 2006 the population was about 80 per square mile. The ideal deer density for the southern coastal region of Maine is 15 per square mile. Periodic deer pellet counts help determine deer population densities.

### Invasive Plant Control

In 2010, the Reserve completed a woody and herbaceous invasive plant survey. Thirty species of invasive plants were identified and mapped. Several methods of invasive plant management have been implemented over the past 5 years. These include mechanical removal and herbicide applications to control barberry and honeysuckle. The Integrated Natural Resources Management Plan concentrates invasive plant management in areas of the property that will benefit the most from specific actions.

### Early Successional Habitat Management

The New England cottontail was listed as an endangered species in Maine and made a candidate




Habitat types of the Wells Reseve

species for federal listing in 2007. A significant population of these native rabbits was once found on the Reserve, though their numbers have dwindled in recent years. This prompted an effort to increase the availability of native early successional habitat not only for the cottontail but for other species dependent upon early-successional habitat. In 2008, the Reserve received a Wildlife Habitat Improvement Program grant from the Natural Resources Conservation Service, which included funding for management activities through 2021.

The Reserve is participating in a rabbit translocation project in coordination with the Maine Department of Inland Fisheries and Wildlife. Twenty rabbits that were captive-bred elsewhere in New England were radio-collared and released at the Reserve in 2017 and 2018. Rabbits are monitored via radio tracking and mortalities are investigated.

## Open Field Management

The Reserve adopted an open-field management plan in 2002 with the goals of halting natural succession and maintaining open fields. This plan is folded into the Integrated Natural Resources Management Plan.

The Reserve uses 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. The open fields afford visitors views of the ocean and southern Maine landscape and are part of the site's agricultural heritage.

## Forest Management

Using the Integrated Natural Resources Management Plan as a guide, each forest patch has been surveyed and specific management objectives and recommendations identified. As part of this plan, the Reserve reestablished the Yankee Woodlot Demonstration Forest, which was partially harvested in 2012 as part of a demonstration project to educate area woodlot owners on the processes necessary to manage a forest for specific purposes — from planning to harvesting to long-term management. The Reserve continues to monitor the effects of the harvest and will plan future harvests to improve wildlife habitat.

## Using New Technologies

The emergence of unmanned aircraft systems, commonly known as drones, provides an opportunity to gather aerial imagery with greater detail than is available using other methods. Wells has worked with other reserves to produce proof-of-concept projects in habitat mapping, marine debris monitoring, beach erosion mapping, retrieval of ghost traps (untethered lobster and crab traps), and video/photographic support for public outreach.

The Reserve also deploys sound-recording devices in various habitats as a long-term monitoring tool. Audio recordings provide the ability to answer questions about the relationships between humans and biotic and abiotic environments.

# Community-Based Stewardship

The 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. Community-based stewardship involves

efforts in watershed protection, land conservation, and habitat restoration.

## Targeted Watersheds

The Wells Reserve encompasses one of the largest interconnected back-barrier saltmarsh systems in the state. The rivers that drain into this system, and their surrounding uplands, are largely in good condition and lightly developed. But southern Maine's landscape is threatened by development and protecting the Reserve's targeted watersheds is crucial for ecosystem viability.

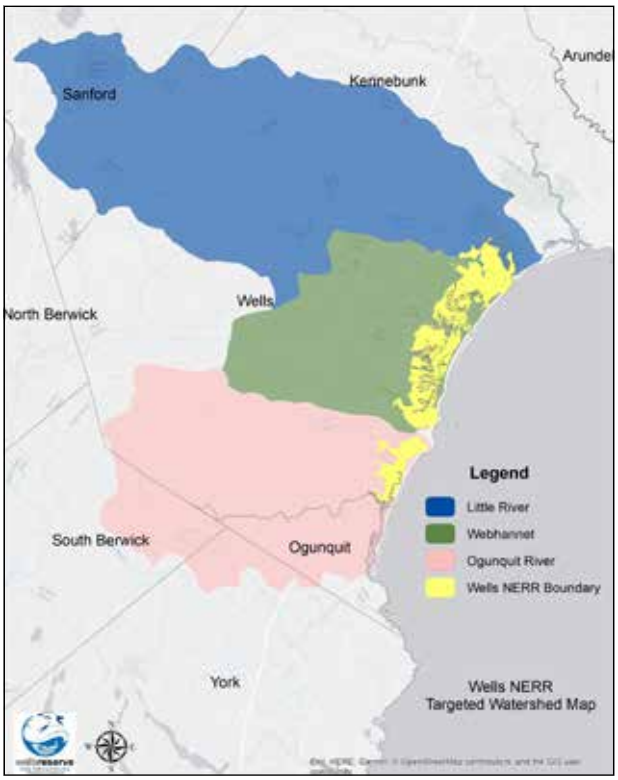
### *Little River Watershed*

Two main tributaries, Branch Brook and Merriland River, form the Little River watershed. The Branch Brook headwaters are at the Kennebunk Plains and Wells Barrens, rare sandplain grasslands that have been the focus of land acquisition by conservation organizations and the local water district for over 25 years. This watershed is also the drinking water supply for three towns. Over the next 5 years the Reserve, in tandem with its conservation partners, will work with the water district on prioritizing, and potentially permanently protecting, high priority conservation lands in the Branch Brook watershed.

The Reserve, the Town of Wells Conservation Commission, and Great Works Regional Land Trust have been working for over two decades to protect land along the Merriland River and its headwaters. The headwaters include the Fenderson Wildlife Commons, a 500-acre protected area with unfragmented forests and wetlands that support diverse community types (sphagnum bogs, vernal pools, four-season flowing springs, red maple swamps). The watershed includes part of the Great Haith, 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 25 years.

### *Webhannet River Watershed*

The headwaters of this river flow from a series of extensive wetlands west of Interstate 95 (including part of the Great Haith). 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 Reserve have identified lands along the main stem and adjacent to the Great Haith as priorities for protection.

### *Ogunquit River Watershed*

The headwaters of this river originate in the Tatnic Hills, which have long been a priority for conservation organizations. The Tatnic Hills is approximately 10,000 acres encompassing portions of Wells, Ogunquit, South Berwick, and York. Its geological history accounts for unique bedrock, shallow soils, numerous pocket wetlands, and vernal pools. The density of vernal pools is among the highest in New England. The significance of the area for its exceptionally high level of biodiversity has been officially recognized by the State of Maine Natural Areas Program, The Nature Conservancy, and other organizations.

## Watershed Protection

The Reserve works with land trusts, municipalities, government agencies, watershed groups, and other organizations to protect, manage, and restore coastal watersheds, and to 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. For over two decades the 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 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, a 10-member coalition of nonprofit organizations and governmental agencies working together on landscape-scale conservation. The coalition focuses on approximately 48,000 acres that encompass varied habitats in Maine's six southernmost coastal zone communities. Over the next 5 years, the Reserve will continue to be an active partner with the goal of protecting more lands within this coastal landscape.

The Reserve extends assistance to other watersheds in southern Maine's coastal zone communities: Spruce Creek and Salmon Falls River (Kittery and Eliot); Josias River (Ogunquit); Mousam River (Kennebunk), and Kennebunk River (Kennebunk and Kennebunkport).

## Habitat and Species Restoration

The Reserve works with partner organizations to plan, implement, and monitor habitat restoration and resiliency projects in southern Maine. Reserve staff apply adaptive management strategies to support restoration efforts by resource managers, such as land trusts and municipalities, by providing scientific expertise, field data collection and analysis, grant writing and administration, and project management and coordination.

Methods developed by the research program enhance restoration outcomes. Examples include using environmental DNA tools to detect anadromous fish populations in coastal streams and tidal-marsh monitoring and assessment protocols developed for the NERR Sentinel Sites Application Module (SSAM).

The Reserve participates in regional collaborative restoration networks in Maine and New England, including the Maine Stream Connectivity Work Group and the Maine Tidal Restoration Planning Committee (provisionally known as the Coast Wise Initiative). These networks provide expert support for restoration practitioners; develop initiatives to advance the quality and pace of restoration through education, training, and funding opportunities; and facilitate collaboration between resource managers and conservation partners.

## Aquatic Organism Passage

In 2013, the Reserve partnered with the Wells, Kennebunk, and Kennebunkport Water District (KKWWD) to repair and upgrade a fish ladder at the filtration-plant dam on Branch Brook. Funding was raised primarily by Wells Reserve through grants from The Nature Conservancy, U.S. Fish and Wildlife Service, and Maine Coastal Program. The Reserve and water district signed a cooperative agreement to operate, maintain, and monitor the performance of the new fishway. Post-restoration monitoring identified target native fish species using the restored fish ladder in the 3 years following restoration. Monitoring of the river will continue.

The Reserve partnered with the water district again in 2014 to remove a stream barrier on Branch Brook at a snowmobile trail crossing, where collapsing stone abutments created a small dam and impoundment. The project was used as a training for regional restoration

practitioners in techniques for manual stream barrier removal projects in remote locations with no vehicle access. Twenty participants from 11 organizations participated in the 2-day project. A manual-removal equipment kit is held at Reserve for use by regional partners. Removal of the stream barrier restored habitat connectivity to more than 7 miles of stream habitat occupied by native brook trout and sea lamprey.

In 2015, the Reserve led efforts to remove a small dam at the head of tide on Goff Mill Brook, a tributary to the Kennebunk River in Arundel. Reserve staff worked with the landowner to develop the project and collaborated with several organizations to raise funding, primarily through the Trout Unlimited Embrace-a-Stream program. Removal of the dam restored tidal exchange in the brook and allowed unobstructed fish movement between freshwater and estuarine stream habitats. Post-restoration monitoring identified estuarine and diadromous species, including several species of concern, using the restored stream habitat.

## Tidal Marsh Restoration

The Reserve supports citizen groups in identifying projects that will restore saltmarsh habitats, providing scientific information to facilitate them, assisting in their implementation, and employing standard monitoring and evaluation protocols for measuring success. As the restoration science database grows, the Reserve collaborates with stakeholders throughout the Gulf of Maine to manage restored sites, document success, and advance the practice of saltmarsh restoration.

The Reserve partners with The Nature Conservancy in coordinating restoration efforts in southern Maine's coastal stream and wetland habitats. The Reserve assesses regional restoration opportunities and communicates with resource managers and municipalities in support of priority projects. This partnership led to collaborative project planning and fundraising for restoration at tidal stream crossings in the Spurwink Marsh in Cape Elizabeth and Scarborough and the York River in York. These communities now act proactively to address infrastructure vulnerability to coastal flooding and to restore tidal marsh habitat based on scientific analysis and planning tools.

# Public Access

## Introduction

The Wells Reserve offers public access to its grounds and facilities for environmental education, scientific research, nature appreciation, and appropriate 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

Access for scientific research, environmental education, appropriate outdoor recreation, nature appreciation, and public events is provided while ensuring the protection of the Reserve's natural resources, historic buildings, and grounds.

### Strategies

- Provide safe, clean, and attractive facilities for public use.
- Maintain a system of trails to safely accommodate low-impact recreation and provide access for scientific and educational programs.
- Maintain Visitor Center and Information Kiosk to properly welcome and orient visitors to the Reserve and its mission.
- Expand access for people with disabilities by making more trails accessible and by ensuring that Reserve facilities accommodate people with disabilities.
- Monitor public use of the site and continually assess visitor impact on wildlife and habitats.
- Conduct periodic studies to determine the number of people who visit the Reserve annually.
- Make trail and facility improvements to ensure that all visitors have an enjoyable and safe stay.
- Establish new trails to enhance the visitor experience and provide new learning opportunities.
- 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 better signage.
- Promote and encourage the appropriate use of the Wells Reserve and its facilities, including the library, auditorium, exhibit area, and the teaching lab.

## Audiences, Hours of Operation, and Fees

More than 30,000 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.

Residents of nearby communities visit the Reserve regularly. Many other people visit from throughout the northeastern United States and eastern Canada. Some visitors come from other regions of North America and overseas. The Reserve is one of the most popular natural attractions in York County.

The Reserve is open every day from 7am to sunset, totaling about 4,000 hours annually. The Visitor Center and exhibits are open about 1,700 hours per year. To date, the Reserve is within its visitor carrying capacity. The Stewardship Advisory Committee, through site inspections, has determined that the Reserve could accommodate more visitors without negatively impacting natural resources or detracting from the site's quietness. The following schedule is in effect:

### Trail Hours

- Every day, 7 am to sunset

### Visitor Center Hours

- April 1 to Memorial Day weekend: Mon–Fri 10-4
- Memorial Day weekend through Indigenous Peoples Day: Every day 10-4
- Indigenous Peoples Day to December: Mon–Fri 10-4
- December to Early April: Closed

### Fees

Admission fees are in effect Memorial Day weekend through Indigenous Peoples Day. Fees are reviewed and established by the Reserve Management Authority at the start of each calendar year. Members of Laudholm Trust enjoy free admission (except for special events) and program discounts.

## 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 the north and southbound sides of the Maine Turnpike, 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 two vehicle access points: a main access road and parking area off Skinner Mill Road and a service entrance at the end of 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 point 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, and the first floor of the restored farmhouse serves as the Visitor Center.


The service entrance extends to a loop road in the center of the campus and to the North Estate. The campus loop includes a 4-car parking area, which is used by visitors with disabilities and for special purposes.

The Alheim Commons property, at 100 Laudholm Farm Road, has a gravel parking area with space for about 20 cars, though most of them are meant to accommodate people staying in the dormitory. The Yankee Woodlot Trail connects the Alheim campus to the rest of the Reserve property.

The Webhannet Marsh Trail is located off Harbor Road, 2 miles from the Laudholm campus. The ½-mile trail, accessible to people with disabilities, includes a saltmarsh overlook and interpretive signs. There is ample parking at the trailhead, including dedicated spaces for visitors with disabilities.

## 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 Laudholm campus. The 7-mile foot-trail system can be accessed from the Laudholm Farm campus and from the Alheim Commons property. People who wish to leave trails must obtain permission from the Executive Director. Visiting researchers, educators, and resource managers who are permitted to leave trails are encouraged to minimize their impact in restricted areas.

The Reserve does not have a public 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 allowed to bring car-top, hand-carried crafts (such as kayaks and canoes) and transport them by foot along the Barrier Beach Trail to Laudholm Beach. It is about a ½-mile walk from the parking area to the beach access point.

## Permitted Activities—Facilities

The 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. Laudholm Trust uses facility rentals to raise funds to benefit the Reserve.

## Wildlife Sanctuary Designation

Portions of 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 Reserve lands owned by the Town of Wells and the Bureau of Public Lands, as well as sections of Rachel Carson National Wildlife Refuge. 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 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.

These key rules are shared on signs at public access points, the trail map, and the website:

- Walk only on trails.
- Carry out what you carry in.
- Do not collect plants, animals, shells, or other natural objects.
- We do not allow dogs and other pets, smoking, bicycles on trails, camping, drones and other remote-controlled aircraft, fires, or feeding wildlife.
- Dogs must be leashed and are allowed only on the Yankee Woodlot and Webhannet Marsh trails.
- Trapping and hunting are not allowed except by special permission.

## Public Access Challenges

As with any protected area with many visitors, the Reserve must monitor public use and visitation to ensure rules are followed, visitors are safe, and trails and access roads and paths are well maintained. Ongoing challenges over the next 5 years include:

- Keeping abreast of changes in society and new uses of the outdoors. Adapting rules to meet those changes, to safeguard habitats and the visitor experience. Recent rule changes prohibit the use of unmanned aerial aircraft (drones) and e-cigarettes.
- Paving pathways and roadways that are over 30 years old and have crumbled in some places. The ability to patch and repave these areas as needed is vital to ensure continued easy and safe access.
- Improving access for people with disabilities, both to trails and to facilites.
- Examining and monitoring facilities to ensure they meet standards for safety and all building codes.
- Replacing the Laudholm campus lighting system, both along the access path and in the parking lot, with a more effective, energy-efficient system.
- Addressing the ongoing problem of dogs, both leashed and unleashed, on Laudholm Beach. This activity is particularly worrisome during shorebird nesting season. Scheduling routine enforcement is difficult due to the beach's distance from the Laudholm campus.
- Recruiting volunteer Rangers, who patrol trails during the peak visitation season, who are vital to the safety of our visitors and their adherence to rules, and Visitor Center and Welcome Hut attendants, who are on the "front lines" of greeting, informing, and collecting fees from visitors.
- Being vigilant in enforcing rules when outside parties rent facilities on the Laudholm campus. Over the past decade, Laudholm Trust has increased rentals to raise revenue for Reserve operations. With high numbers of people (100 to 200+) present on weekends, the Trust hires caretakers to monitor activities.

"Moose 5," an NCCC*AmeriCorps team that assisted the Reserve for several weeks in 2017, takes a break from a beach cleanup. Coordinated state, federal, and international volunteer programs help staff and local volunteers accomplish intensive projects.

# Volunteers

## Introduction

The Wells Reserve volunteer program engages a diverse corps of more than 400 people who contribute more than 16,000 hours annually to advance the Reserve's mission. Volunteers' dedication is the reason the Reserve exists and thrives. Every part of the Reserve is supported by volunteers, ranging from docent-led programs such as Exploring Estuaries to window restoration for the historic buildings. In return, volunteers benefit from their involvement. They connect socially, learn new skills and concepts, utilize their existing skills and talents, and gain life-enhancing experiences. Volunteer programs are directed in close collaboration with Laudholm Trust.

## Objective and Strategies

### Objective

A dedicated and productive volunteer corps is recruited, supported, and retained, thus augmenting all aspects of our programs.

### Strategies

- Recruit and retain a volunteer corps to help accomplish program goals and objectives.
- Foster a culture of inclusiveness and empowerment by understanding and meeting the needs of volunteers. Value the career and life experiences of each volunteer.
- 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.
- Receive feedback from volunteers using both formal and informal methods.
- Gain knowledge from volunteer programs in the region and across the NERR System to place the Wells volunteer program in context and learn from others' experiences.

## 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 100 volunteers. Volunteers play key roles with Winter Wildlife Day, Earth 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, Maine Department of Environmental Protection, local schools, businesses, York County Audubon, local land trusts, and other partners.

## Volunteer Recruitment

The Reserve recruits new volunteers in both formal and informal ways. One of the most effective methods of recruiting new volunteers is positive word of mouth from staff, volunteers, and community members. Volunteers often recruit other volunteers. Formal recruitment efforts include the Reserve's annual volunteer recruitment fair, community volunteer fairs, outreach to schools and community groups, United Way events and website, newspaper and magazine articles, the Reserve's website, a volunteer e-mail newsletter, and listings. A brochure detailing volunteer opportunities is available at programs, events, and in the Visitor Center. Individuals who contact the Reserve's volunteer office are interviewed, given a tour, and leave their interview with a plan to get started.

Students frequently approach the Reserve as an avenue for meeting their academic community service requirements. A number of younger volunteers come through work experience programs such as Career Journeys, or volunteer as part of school or faith groups, and summer camps.

Additional sources of volunteers include corporate groups and service organizations. Annually, the Reserve applies for AmeriCorps NCCC (National Civilian Community Corps) teams who come for four to eight weeks each year. The Reserve also recruits six to eight international Volunteers for Peace for three weeks each summer. These teams of young and energetic individuals provide concentrated volunteer effort that allow the Reserve and Laudholm Trust to accomplish major stewardship, maintenance, and fundraising projects.

## Volunteer Training

Volunteering provides opportunities to use and update existing skills and to learn new ones. Staff and experienced volunteers train new volunteers. Volunteers often team up with others until they are comfortable on their own. New trail rangers patrol the trails in pairs; new volunteer naturalists (docents) shadow experienced volunteers through educational tours. Volunteers are not trained just "once," but update their training, often in the spring, ahead of the busy tourist season. Volunteers who interact with the public receive training in customer service, point-of-sale systems, safety procedures, Reserve rules, and the essential tasks related to their volunteer position.

In many cases, Reserve programs — public lectures, talks, hikes — are used for volunteer training. 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 exhibits and the Discovery Backpack Program, ensuring that they are familiar with each of these popular educational resources.

The most intensive volunteer training is for 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.

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 and the Volunteer Program

Volunteers are not formally evaluated, but instead receive feedback through training and on-the-job experience. Feedback for volunteers and from volunteers often happens in groups, providing opportunities for collaborative problem-solving between volunteers and staff. 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.

Docents are provided with more formal feedback than other volunteers. Education staff regularly observe volunteer docent naturalists and share feedback from teacher surveys. In addition, efforts are underway to implement a more formal evaluation protocol for this group.

## 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, a festive holiday party in December, and other events throughout the year, such as field trips, potlucks, kayak outings, and tours of the research lab. At the volunteer recognition event, awards recognizing exceptional service are given to highly dedicated volunteers. The most important rewards for volunteers are the constant "thank yous," notes, and appreciation they receive from Reserve and Trust staff.

# Administration

## 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 land-holding entities of the Reserve and organizations involved with programs and activities. It provides for consultative decision-making, compliance with applicable regulations, and integration of major program areas.

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

## Objective and Strategies

### Objective

The administrative structure is in place so that Reserve's mission is fulfilled and it conforms 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 Agriculture, Conservation and Forestry; 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 (NOAA) and the State of Maine. Administrative oversight is vested in the Reserve Management

Authority (RMA), an independent state agency established in 1990 by the Maine Legislature to support and promote the interests of the Wells Reserve (see Appendix A). As specified in "An Act to Establish the Wells National Estuarine Research Reserve Management Authority" (LD 2031):

> *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.*

As an independent entity, not part of any state natural resource agency or university, the Reserve is responsible for the development and implementation of its own policies in all areas of administration and management. Accepting this responsibility enables the organization to be administratively flexible and adaptable, thus allowing for improved program delivery.

## Representation on the Reserve Management Authority Board of Directors

The RMA is composed of representatives having a property, management, program, or financial interest in the Wells Reserve. RMA members represent the Bureau of Parks and Lands/Maine Department of Agriculture, Conservation and Forestry; Rachel Carson National Wildlife Refuge/U.S. Fish and Wildlife Service; the Town of Wells; Laudholm Trust; the Maine Coastal Program/Maine Department of Marine Resources; and the Office for Coastal Management/NOAA. A Governor-appointed scientist with an established reputation in the field of marine or estuarine research also serves on the RMA board of directors.

### *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 board.

### *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 board.

### *Town of Wells*

The Town of Wells owns 258 acres of uplands and wetlands in the Wells Reserve, including the historic Laudholm Farm campus. 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 non-federal match for Wells Reserve operations and capital needs. The Trust uses member contributions, corporate donations, foundation grants, and rental income generated from the Reserve site to support the Reserve. The Laudholm Trust Board of Trustees designates a representative, traditionally the Trust President, to serve on the board.

### *Maine Coastal Program*

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

### *U.S. Department of Commerce, NOAA*

The NOAA National Ocean Service / Office for Coastal Management (OCM) administers the National Estuarine Research Reserve System. The Director of the OCM, or the Director's designee, serves on the RMA board as an ex-officio, non-voting member.

## Interagency Memoranda of Understanding

The RMA and its partners have entered several MOUs to guide site administration. A complete copy of each MOU is in Appendix A. They include:

- RMA and NOAA: This MOU describes the purposes of the Wells Reserve and the state and federal agency roles in its management.
- RMA and U.S. Fish and Wildlife Service: This MOU describes rights, responsibilities, and obligations of each entity within the Wells Reserve.
- RMA and Maine Department of Agriculture, Conservation and Forestry: This MOU describes rights and responsibilities regarding submerged lands within the Wells Reserve.
- RMA and Maine Department of Agriculture, Conservation and Forestry: This MOU describes rights and responsibilities regarding 147 acres of state-owned uplands within the Wells Reserve.
- RMA and Town of Wells: This MOU establishes a framework for coordination and collaboration between the Wells Reserve and the Town.
- Wells Reserve and Laudholm Trust: This MOU explains and outlines the roles and responsibilities of each organization's chief executive (Executive Director and President) 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.
- 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.
- 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). Faculty and staff at USM and UMaine collaborate with Wells Reserve researchers, educators, and natural resource managers.
- The University of New England (UNE) is an independent university with numerous degree programs, including emphases on environmental studies and marine science. Faculty at UNE collaborate with Wells Reserve researchers and educators.
- York County Community College (YCCC) is a community college located in Wells. The Wells Reserve and YCCC have had a MOU since 2016. The two organizations collaborate on classes for students in marine and environmental topics. The classes are held at the Reserve and are taught by Reserve staff.
- St. Joseph's College, a small liberal arts college located in Windham, Maine, and the Wells Reserve have had an MOU since 2016. The two organizations collaborate on research and education projects.

- The Casco Bay Estuary Partnership (CBEP) is an EPA-designated National Estuary Program that works to protect the health and integrity of Casco Bay. 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 southernmost Maine. The Reserve collaborates with PREP on projects of shared interest. A staff person of the Reserve serves on PREP's Management Committee.
- The Southern Maine Planning and Development Commission (SMPDC) 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 Reserve and SMPDC routinely collaborate on projects.
- York County 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 Reserve on land conservation, education, and stewardship projects in watersheds of coastal zone communities in southern Maine.
- University of Maine Cooperative Extension (Master Gardener Program) and the Reserve have a cooperative agreement. The organizations collaborate on public education and outreach programs of mutual interest. The extension maintains native plant and vegetable gardens at the Reserve that demonstrate best practices.

## NOAA's Roles and Responsibilities

The Office for Coastal Management establishes standards for designating and operating reserves. It also provides support for reserve operations and capital projects (land and buildings). OCM 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 OCM periodically evaluates NERR operations for compliance with federal requirements and with the individual Reserve's federally-approved management plan.

The NERR System is a federal/state partnership. Management of each Reserve is the state partner's responsibility, but NOAA cooperates and assists the states and reviews the progress of programs through written semi-annual reports submitted by the Reserve. Pursuant to Section 312 of the Coastal Zone Management Act, NOAA conducts thorough, site-based performance evaluations every 5 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.

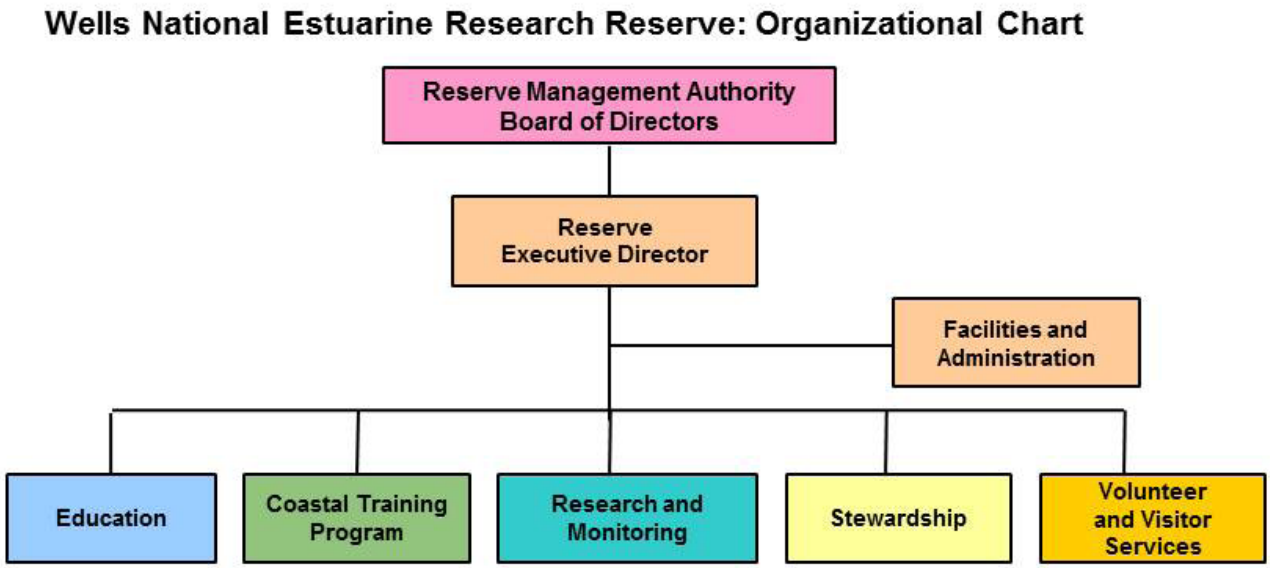
OCM staff, in particular the Program Specialist, communicate regularly with the Reserve staff. This communication strengthens the partnership between the Reserve and OCM; it familiarizes OCM with Reserve program accomplishments and challenges, and solidifies the concept that the individual Reserve is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

## Maine Coastal Program and Maine Sea Grant Program

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

The Maine Coastal Program was instrumental in establishing and designating the Wells Reserve in the mid-1980s, both by requesting the grants from NOAA for acquisition and by providing invaluable assistance in the designation documents. The close partnership continues. Collaborations include research addressing coastal management, outreach to decision-makers with training and information, statewide interpretive education projects addressing coastal issues, land acquisition and protection planning, and the restoration of coastal habitats. The Coastal Program Director serves on the Reserve Management Authority board and on the Reserve's Coastal Training Program (CTP) Advisory Committee.

The Maine Sea Grant Program has 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 Reserve and Maine Sea Grant collaborate often on projects of mutual interest and the Reserve's Executive Director serves as a permanent member of 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.

## 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. This makes the Wells Reserve a public *and private* partnership, which is unique in the National Estuarine Research Reserve System. In addition to grants for operations, the Trust provides key financial support for the construction and land acquisition projects that advance the goals of the Reserve. Members of the Trust's Board of Trustees also serve on the Reserve's advisory committees, providing expertise and input on a range of issues.

To ensure communication and collaboration, one to two 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.

## Reserve Staff Responsibilities

At the Wells Reserve, full-time and part-time staff are responsible for most mission-related planning and implementation. Year-round, the staff averages 15 people, but that number often doubles between spring and fall when interns, temporary staff, and seasonal staff are hired. In addition, the Reserve has many project-based contractors throughout the year. The following summaries represent actual staff responsibilities at the time this management plan was prepared.

The Executive Director serves as the chief executive of the organization and is responsible for the overall management of the Reserve, including the development of all policies, personnel, buildings and grounds, budgets and finances, contractors, and protected area. The Executive Director reports to the RMA board of directors.

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

The Accountant is responsible for financial management, payroll, benefits and human resource administration, and office management.

The Research Director coordinates and directs the Wells Reserve research and monitoring programs. This position is responsible for the administration, management, and development of all facets of research and monitoring, including supervisory responsibilities.

The Monitoring Coordinator/Research Associate is responsible for implementing the System Wide

Monitoring Program. This person also helps to implement the research program and manage the research laboratory.

The Project Manager is responsible for assisting with, and overseeing, research and monitoring projects. This person also coordinates river restoration projects.

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 Education Program Coordinator works closely with the Education Director, overseeing school, docent training, and other public education programs, as well as assisting with Teachers on the Estuary and other education projects.

The Volunteer and Visitor Services Program Director is responsible for the operation of the Visitor Center, exhibit areas, and other public spaces at the Reserve; for the volunteer program; and for the operation of the library. This position also assists the Accountant with office management tasks and supervises seasonal employees.

The Coastal Training Program (CTP) Director manages all aspects of that program, supervises staff and interns, and conducts social science research.

The CTP Coordinator handles day-to-day operations of the Coastal Training Program and pursues related projects.

The Stewardship Director works closely with the Executive Director on stewardship projects and issues on lands within the Reserve boundary. The position is also responsible for the Geographic Information Systems and collaborates closely with the Research Program staff.

Research, Education, and CTP Assistants help implement the Wells Reserve's core programs.

## In-Kind Staff Roles and Responsibilities

The Laudholm Trust Communications Director devotes time to Reserve communications and public relations needs, consulting with the Executive Director and program directors on projects and issues. The Laudholm Trust Operations Director assists the Executive Director with general administrative tasks.

## 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 manage collections in the Coastal Resource Library and work on the organization's archive.
- Research Volunteers participate in projects including water quality monitoring, beach profiling, shoreline surveys, marsh restoration, larval fish studies, marine invasives monitoring, and beach clean-ups.
- Special event volunteers help with the planning and implementation of Winter Wildlife Day, Earth Day Celebration, Punkinfiddle on National Estuaries Day, and other events.

## Wells Reserve Advisory Committees

Seven 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 Director and Program 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 Director on research and monitoring activities in southern Maine's coastal watersheds and in salt marshes throughout the Gulf of Maine. The committee also explores links and partnerships between Wells Reserve and other institutions in New England conducting marine research.

The Stewardship Advisory Committee provides guidance to the Stewardship Director and the Executive Director on protecting the natural and cultural resources of Wells Reserve while providing for research, education, recreation, and interpretation. The committee's advice addresses habitat and wildlife management, control of exotic species, and protection of sensitive, threatened, and endangered species.

The Building Advisory Committee provides guidance to the Executive Director, the Facilities Manager, and the RMA on buildings and lands of the main campuses (Laudholm and Alheim Commons) and the North and South estates. 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 Director and Coordinator on programs to support coastal decision-makers.

The Volunteer Advisory Committee provides guidance to the Volunteer and Visitor Services Program Director on program direction and implementation, including recruitment, retention, and training for volunteers.

The Library Advisory Committee helps the Volunteer and Visitor Services Director and the Education Director to develop and maintain the Coastal Resource Library. The committee assists with organizing and improving collections and archives and staffing the library.

In addition to these standing advisory committees, ad-hoc committees and task forces are formed when particular needs arise.

## Wells Reserve Program Integration Strategy

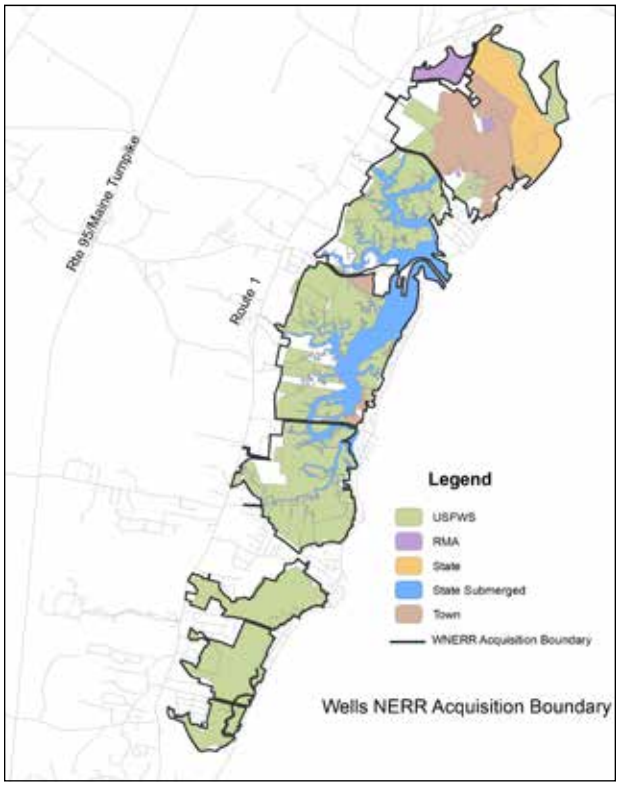
The Wells Reserve integrates its programs through inter-program meetings, shared staff responsibilities, and linkages developed for specific projects. The Executive Director organizes gatherings and briefings where ideas, information, and project updates are exchanged among Laudholm Trust and Reserve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

Program staff also meet to address specific projects and issues. The Stewardship Director, Education Director, CTP Director and Coordinator, and Research Director identify, implement, and coordinate programs and products for the public and coastal decision-makers.

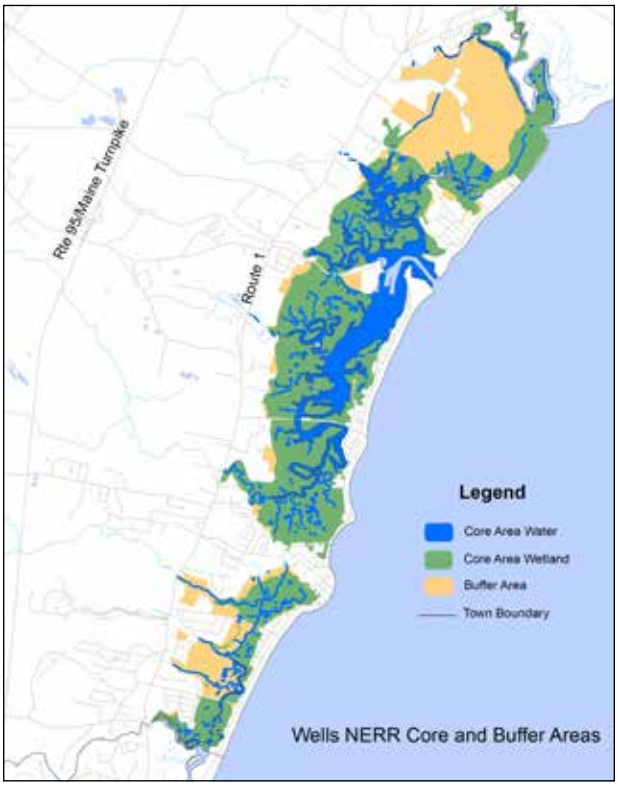
Integration is achieved at the staff level when individuals share duties. For example, the Stewardship Program encompasses on-site natural resource management, GIS, and stewardship activities in the communities in the region. This program plans and implements resource management within the boundaries 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.

Many Wells Reserve projects require the expertise of staff from other programs. The CTP Director, for example, collaborates with the Research Director on projects that require scientific studies and assessments. When writing proposals and grant applications, the Research Director always incorporates a training and education component, ensuring that whatever science is developed will include a communications component. The CTP staff routinely partner with the Stewardship Director on workshops and training activities.

The Reserve's highest priority parcel lies along Laudholm Farm Road across from the Alheim Commons property.




The Wells Reserve acquisition boundary, showing protected areas (shaded) and areas eligible for acquisition using section 315 funds.




Wells Reserve protected lands, indicating core and buffer areas.

# 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 diverse ecosystems and watersheds in south coastal Maine.

The Reserve protects properties within its boundary that constitute both core and buffer areas. These parcels are important to maintaining the ecological integrity of estuaries and for allowing the Reserve to conduct research and 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 three 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 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 conservation partnerships elsewhere in the Reserve's service area.

## Background

When the Wells Reserve was established, its designated boundary was entirely within the Town of Wells between the Little River and Eldridge Road. It followed the shoreline on the east (excluding developed sections) and crossed uplands and salt marsh on the west. The Reserve's 1,600 acres included property owned by the U.S. Fish and Wildlife Service, Town of Wells, and (then) Maine Department of Conservation. The acreage also included key parcels acquired for the purpose of forming the Reserve.

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. With NOAA approval of the 2007-2012 Management Plan, the Reserve extended its boundary to the Ogunquit River and added 359 acres of salt marsh (a core area) within the Moody Division of Rachel Carson NWR.

Also in 2003, Laudholm Trust transferred 35 acres known as the Alheim Property to the Wells Reserve Management Authority. This parcel holds the Reserve's residential campus, a managed woodlot, and interpretive trail. With the approval of the 2007-2012 Management Plan, this property was incorporated into the Reserve's buffer area.

In 2005, the Reserve purchased and protected 2.5 acres of fields adjacent to the Reserve's service road. This parcel had been the highest priority land acquisition project for the Reserve since its founding. With the approval of the 2007-2012 Management Plan, it was incorporated into the Reserve's buffer area.

In 2008, Reserve purchased a 2.5-acre parcel, with farmhouse and barn, adjoining the field parcel. This property currently houses the Reserve's caretaker and is intended as a future education center. With the approval of the 2013-2018 Management Plan, this parcel was incorporated into the Reserve's buffer area.

Geographic information systems have enabled the Reserve to define and calculate its acreage more accurately than when it was established. Rather than boundary surveys and measures shared by partners, the Reserve now uses GIS to determine its total area is 2,250 acres held by four organizations:

- U.S. Fish and Wildlife Service/Rachel Carson National Wildlife Refuge: 1,428 acres
- State of Maine Department of Agriculture, Conservation and Forestry: 533 acres (includes submerged lands)
- Town of Wells: 249 acres
- Wells Reserve Management Authority: 40 acres

## Objective and Strategies

### Objective

Lands are conserved to protect diverse natural resources and to ensure a stable environment for research, education, and nature appreciation.

#### *Strategies*

- Protect the highest priority property within the Reserve's boundary.
- Identify and map existing undeveloped properties and prioritize them for acquisition.
- Increase public awareness of the value of land conservation to ecosystems and communities.
- Make protected property accessible for research, education, and public enjoyment.
- Help secure Section 315 funds and non-federal matching funds for land conservation projects.

## Core and Buffer Areas

The land and water areas within the designated Reserve boundary consist of core areas and adjacent buffer areas (Figure). Core areas include sensitive ecological units essential to the functions of estuaries: main stems of rivers (freshwater and estuarine sections) and associated submerged lands, freshwater and saltwater wetlands that abut rivers, and dunes associated with beaches. Access to these areas is limited because human activities could pose a risk to their ecological integrity and the Reserve's ability to monitor and study them. Core areas are managed to ensure the continuance of long-term research, monitoring, and educational activities.


Buffer areas are designed to protect the ecological integrity of core areas and to provide additional protection to estuarine and riverine-dependent species. These areas are suitable for educational programs, public use, and appropriate active management. Buffer areas may include hiking trails, observation platforms, interpretive signs, and other alterations of the land that advance the Reserve's mission.

## Principal Federal Funding Sources

As a National Estuarine Research Reserve (NERR), 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—either core or buffer areas—within the approved acquisition boundary of the Reserve. When funds are available, Reserves compete for funds from the NERR Construction and Acquisition Fund. The federal funding may not exceed an amount equal to 50 percent of the costs of the land and waters, and the interests therein.

### Principal Non-Federal Funding Sources

Non-federal matching funds for 315 funds come from Laudholm Trust, the state's Land for Maine's Future Program, the Maine Outdoor Heritage Fund, and private foundations.

## Benefits of Protecting Land

The Reserve has long recognized the benefits of protecting land, both in its buffer and core areas and in its broader targeted watersheds. Land acquisition can

protect coastal ecosystems and expand opportunities for research, monitoring, education, and outreach. The Reserve's boundary and acquisition philosophy derives from 15 CFR 921, which applies specifically to delineating a Reserve's boundary.

## Ecology

Section 921.11(c)(3) requires "assurance 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." The Reserve's boundary provides these heightened assurances by helping to maintain the integrity of coastal watersheds and protecting water quality and habitat diversity. The 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, are experiencing 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.

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 risks 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.

In addition, as sea level rises in the Gulf of Maine, saltwater wetlands will extend landward. Protecting edge and upland parcels adjoining current wetlands will allow their expansion with less disruption to human communities.

## Protecting Water Quality

Clean water is essential to the economy of southern Maine. Coastal communities depend on attracting visitors to their extensive sandy beaches with swimmable water. Wells and surrounding towns 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 on 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 degradation or assure maintenance of high-quality water 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 such as 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 three watersheds. The Reserve intends to continue working with partners on conserving tracts of land within these watersheds that will help with landscape-scale habitat protection. Although this acreage is not within the Reserve boundary, these efforts have been crucial to the long-term integrity of the Reserve's protected land.

## 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 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 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, day campers, and student researchers. Water quality and plankton outreach programs aimed at local middle schools, high schools, and adult education classes, would be enhanced by student access to upstream sites in the Reserve's targeted watersheds.

When evaluating parcels for acquisition, the Reserve will consider "the site's importance to education and interpretive efforts, consistent with the need for continued protection of the natural systems" [15 C.F.R. 921.11(c)(6)].

## 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" [15 C.F.R. 921.11(c)(3)].

# 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.
- Includes upland that will allow for the migration of marshes as sea level rises.
- 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, or habitat management.
- Is within the proposed Wells Reserve boundary and targeted watersheds.
- Contains documented land or water resources of significant ecological value.
- Is 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

Several parcels of land within the Reserve 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 parcel is located across Laudholm Farm Road from the Reserve's Alheim Commons property. Most of the property abuts conservation land of the Wells Reserve and Rachel Carson NWR. It consists of field, forest, wetland, and active farmland habitats that provide for a variety of wildlife species. Protecting this parcel would increase contiguous, publicly-owned land in the Reserve, and would allow active habitat management and a new trail linked with the current trail system. This is the highest acquisition priority for the Wells Reserve and has been for 15 years.

Adjacent Parcels along Rivers and Estuarine Areas (core and buffer): Most properties surrounding the Reserve's protected area have already been conserved or developed, but some relatively small parcels (less than 10 acres) could still contribute to the protection of fresh and estuarine waters in the Webhannet and Merriland river watersheds. These lands adjoin, or are close to, town, state, or federal conservation land. Over the next 5 years, the Reserve will work with Rachel Carson NWR to identify these small parcels through GIS mapping and prioritize them for acquisition. Highest priority will be given to wetland parcels or upland areas that will allow marshes to migrate.

# 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 these options for protecting the land.

### *Fee Simple Purchase*

The Wells Reserve will purchase the title and all 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. In consultation with the Stewardship Advisory Committee, the Executive Director and Stewardship Director 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 Director will provide assistance assessing public perception and designing the information and outreach component of the acquisition.

## Holding Title to Acquired Lands

The Reserve Management Authority or one of its partners would hold title to any property obtained within its acquisition boundary. Any property acquired using NOAA funds (Section 315 or Coastal and Estuarine Land Conservation Program) must be held by a non-federal entity.

- The RMA is one of four State of Maine natural resource agencies that can, by statute, hold title to conservation land. It manages lands pursuant to the Reserve management plan and agreements therein.
- The Town of Wells conservation lands ordinance gives management responsibility for conservation lands to the Wells Conservation Commission. The Commission manages its lands consistent with town ordinances and any granting entity's requirements.
- The Maine Department of Agriculture, Conservation and Forestry / Bureau of Parks and Lands can hold title to conservation land. The agency and the RMA would develop a memorandum of understanding to address management of its property.
- The U.S. Fish and Wildlife Service would have management responsibility for any lands held by that agency.

# Facility Development and Improvement

## Introduction

Wells Reserve facilities have to accommodate a broad range of programs and activities — offices for staff, visiting educators and researchers, and partner organizations; laboratories for scientists, teachers, and students; a maintenance and repair shop; interpretive exhibit areas; classrooms; auditorium; gift shop; welcome area; public library; meeting rooms; storage areas; spaces for public events; outdoor shelter for education programs; dormitory living spaces for visiting scientists, educators, and natural resource managers; and a building for caretakers.

Reserve facilities used for these purposes are in two locations: the Laudholm campus, an assemblage of more than a dozen renovated historic farm buildings plus one building constructed in 2001; and the Alheim Commons property, an adjacent parcel holding three buildings ½ mile from the Laudholm campus. The Laudholm campus area includes a core area (the main campus for Reserve and Trust activities) and two extended areas: 1) the North Estate, which consists of numerous old farm outbuildings that, with the exception of two garages, are currently vacant and used for storage, and 2) the South Estate, which consists of a farmhouse, serving as the caretaker residence, an attached barn, and an outbuilding.

In sum, the Reserve holds more than 35,000 gross square feet of building space, about ½ mile of paved roads providing access to the site; parking for 75 cars at the Laudholm campus and 15 cars at the Alheim Commons campus; and about 5,000 feet of boardwalk on its trails.

Over the past 5 years, the Reserve has made occupied buildings more energy efficient through "green retrofits," and is now generating 100% of its electricity with solar arrays.

Continuing priorities for the Reserve are to:

- provide facilities to meet the evolving core program needs of research, monitoring, training, education, and stewardship
- keep up with maintenance and repair needs of all facilities and equipment
- continue efforts to switch to alternative energy sources and to conserve energy
- work with Laudholm Trust to build an endowment fund for capital improvement projects and building and equipment repair and maintenance

This chapter is divided into three sections. Section 1 describes existing facilities and their uses and needs. Section 2 describes needs for energy conservation and renewable energy. Section 3 lists the Reserve's primary facility priorities.

## Objectives and Strategies

### Objective 1

Ongoing and evolving program needs of research, education, stewardship, and assembly activities are maintained and improved; safe and comfortable buildings for staff and partners are provided; and visitors are provided with facilities in which to learn about coastal ecosystems and the landscape history of the site.

#### *Strategies*

- Maintain and improve existing facilities for research, education, training, and stewardship activities.

Continually evaluate facilities to ensure that program needs are met.

- Continue to evaluate interior and exterior structural needs of all buildings and the grounds.
- Adapt and retro-fit buildings, both interior and exterior, so they meet all public safety standards for staff and visitors.
- Make facilities available to partner organizations for uses compatible with the Reserve's mission.
- Recruit and retain qualified Building Advisory Committee members to provide guidance on building maintenance, construction, and energy conservation and generation.

### Objective 2

Carbon emissions and resource consumption are reduced through conservation measures and the use of renewable energy.

#### *Strategies*

- Reduce electrical energy consumption in buildings and equipment through more sustainable operational practices and more efficient use of buildings.
- Replace outdated heating system in Visitor Center and install new, energy-efficient system.
- Insulate and better weatherize buildings to further enhance energy conservation.
- Purchase and install infrastructure that relies on renewable energy (e.g., solar water-heating systems and car-charging stations) and install a new solar array to meet growing alternative electrical demands of the Reserve.
- As appliances, vehicles, and other equipment wear out, purchase replacements with greater energy efficiency.
- Incorporate sustainable standards into building and equipment maintenance and operations.

## Section 1: Existing Facilities — Description and Needs

### Laudholm Campus: Main Campus and Forest Learning Shelter

Since designation, the Laudholm 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 and the region. 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 from the mid-1640s through the mid-1970s. To help document and share this rich history, the Reserve published a 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, the Maine Coastal Ecology Center was built (opened 2001). A Forest Learning Shelter along the Saw-whet Owl Trail was constructed in 2006.

#### *Visitor Center: 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 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 Director, a meeting/gathering room for volunteer docents and rangers, a public reception area and gift shop, a storage area, and interpretive exhibits designed, fabricated, and installed in 2011 and 2017. 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. Current uses of the farmhouse will continue.

The farmhouse is well maintained and in generally good condition, but its radiant heating system, installed 30 years ago, is failing and cannot be effectively repaired. Electrical needs are met with solar energy.

### *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 garage 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 is used as 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 has a unique collection of books, periodicals, reprints, and reports centered on the topic of coastal ecology and management. 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 structurally sound. All of the electricity for the Barn Complex is generated by solar energy. Current uses of the Barn Complex will continue.

To meet public safety standards and evolving needs, the Barn Complex must be retrofitted to incorporate fire suppression infrastructure and proper egress for emergencies. This work is a high priority, as the Barn Complex is intensively used for public programs and events.

### *Maine Coastal Ecology Center*

The 6,000-square-foot Maine Coastal Ecology Center (MCEC), completed in 2001, is a newer facility that complements the style of adjacent historic structures. The Ecology Center holds offices for research and stewardship staff and interns; a research laboratory; a Geographic Information System center; an interpretive exhibit area (installed 2004); 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 Ecology Center during the 2001 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 Ecology Center is in excellent condition and needs only ongoing maintenance and repair. Solar arrays installed on this building in 2013 provide all of its electrical needs.

### *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, as it is part of the historic landscape of the Laudholm Farm campus. Over the last 10 years, the wood decking and railings of this structure rotted to a point where their full replacement was needed. Major repairs and painting were completed in 2018. This structure is in excellent condition.

### *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 restored. It is in excellent condition.

### *Forest Learning Shelter*

This is a 20-foot by 30-foot building is located along the Saw-whet Owl Trail, about ¼ mile from the parking lot. It is accessible by walking or, with permission, by automobile for people with disabilities. The Forest Learning Shelter is used by the Education Program as a classroom, particularly by 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, requiring only regular maintenance and repair.

## Laudholm Campus: North Estate and South Estate

Two parcels, each containing several buildings, came into the full ownership of the Reserve over the past 5 years. Each was purchased by the Reserve in the past, but were subject to life tenancy agreements with the prior owners. Both life tenants passed away over the past 5 years, so the Reserve now has full control and use of the properties.

### *South Estate*

*Former 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 (called the Root Cellar). In 2009, the roofs of the farmhouse and root cellar were reshingled. In 2017, the farmhouse underwent significant repairs to prepare it for occupancy. It was totally rewired with new lighting fixtures and smoke/heat sensors added throughout. A new furnace, and a heating system on the second floor, were installed at that time. The interior was repainted and other repairs were made on the first and second floors. Now in good condition, this house is currently the home of the caretaker.

There is an educational use intended for part of this building, most likely in the attached barn. When this occurs, this section of the building will be named the Mattina Proctor Environmental Education Center and will serve as a classroom and presentation area for education programs. However, the barn will need significant capital improvements to adapt it for use as an educational facility: interior renovation, roofing system, and repairs to the exterior (clapboard replacement and paint).

The root cellar is in stable condition, but it is boarded up and not used. It received new roof singles in 2009. A potential future use of this building is for an artist's studio and a wildlife-watching blind.

### *North Estate*

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

*Manure Shed (circa 1905)*

This building was restored after the Reserve was established. It is in good condition and is used for storage. This is the most appropriate use for this building.

*Sheep Barn (circa 1890-1900)*

The Sheep Barn would be a difficult facility to renovate for future program use. One option would be a 30-seat

classroom and public gathering place, but a major renovation would be required. The only practical and realistic future use for this building is for equipment and vehicle storage.

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

The Farmer's Cottage served as the residence of the Lord family, including a member who was the Reserve's caretaker from 2003 through 2012. It has been vacant since 2012. The Farmer's Cottage has the potential to serve as summer accommodations for visiting scientists or as caretaker quarters. The cottage was partially renovated and winterized during the caretaker's occupation, but the facility will require significant repair before it can be occupied again.

The wood shed, a barn-like structure adjacent to the Farmer's Cottage, is in fair condition. It could be used for storage should the Farmer's Cottage be reoccupied.

*Killing House (early 1900s)*

This small structure is in good condition and was maintained regularly by a member of the Lord family, who used it as a summer cottage from the 1980s through 2008. It has sat vacant since then. It could be used as a summer living space and has the potential to be winterized. This structure would be ideal as housing for a visiting investigator in research, education, or stewardship. It could also be used for additional office space. However, before being adapted to a new use, it will need significant repairs and restoration.

*Chick Brooder Building / Little Residence (circa 1916)*

This one-time chicken-rearing facility was renovated in the 1930s and was 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 working on research, education, or stewardship projects at the Reserve. It could also be used for additional office space. Before being adapted to a new use, it will need significant repairs and restoration.

*Bull Barn (early 1900s)*

The largest building on the Life Estate is currently used for storage. It could meet facility needs of the research and education programs, such as an interpretive exhibit hall, a multi-purpose classroom with spaces for 30 to 40 people, a library, or a seawater lab and a chamber for live organism study. Before being adapted to new uses, the Bull Barn will need to undergo significant repairs and restoration.

*Auto Garages (1907/1920s)*

These two buildings provide storage for Reserve vehicles, maintenance equipment, and other materials.

*Brooder House*

This shed-like structure is used for storage, which is also its most likely future use.

## 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 Reserve, which has since used the facilities mainly as a residential campus. One building serves as an office and meeting space. Three solar arrays recently installed on this property meet all of the campus's electrical needs.

### *Alheim Commons Dormitory (2006)*

To accommodate the need for housing for partners, the Reserve disassembled and removed an old 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, interns, and resource managers collaborating with the 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 2006, it was renovated and converted to a one-room, year-round office and meeting space. It is currently being used as the office for the National Estuarine Research Reserve Association.

### *Ranch-style House – Post-Doc House (circa 1960s)*

This building, which was donated to the Reserve, was moved to the Alheim property in 1998 and renovated to serve as housing for a Reserve post-doctoral research associate or other staff members. In 2011, the furnace was replaced and a new propane heating

system installed. In 2016 and 2018, the building underwent some significant repairs, including new electrical and interior renovations. The house is now in good condition, requiring only regular maintenance and repair.

## Section 2: Energy Conservation and Renewable Energy

To the greatest extent possible, the 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 30 years, the Reserve has met two of environmentalism's three "Rs" – "reuse" and "recycle" (the third is "reduce"). Since it was established, the Reserve has constructed three new buildings (the Maine Coastal Ecology Center, the Forest Learning Shelter, and the Alheim Commons dormitory). In each case, the facilities were constructed with sustainable practices in mind — using wood harvested and milled sustainably in Maine, energy efficient heating systems, and environmentally friendly building materials. As part of standard practice, the Reserve continuously examines ways to recycle materials and reduce its carbon output.

At the start of our previous Management Plan (2013-2018), the Reserve embarked on a 5-year energy conservation and renewable energy project called the "Conserve and Convert Initiative." The Reserve installed four solar arrays that generate 73,000 kWh of electricity a year and, through energy conservation initiatives reduced its electrical and fossil fuel consumption. Today, the Wells Reserve gets 100% of its electrical energy through the on-site solar arrays and has reduced its fossil fuel consumption (compared to pre-2013) by 20%.

Despite these successes, the Reserve continues looking for ways to conserve energy and switch to renewables. The Reserve has replaced "energy hog" equipment with efficient units, installed window inserts to reduce cold-air penetration into the Visitor Center and other buildings, and instituted energy-smart operations.

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

## Section 3: Facility Priorities

Although the Reserve has numerous ongoing needs and special projects, the following six priorities have been identified for 2019-2024:

1. Replace the 30-year old heating system in the Visitor Center with a new, energy-efficient system while tightening the building's envelope and improving its insulation.
2. Retrofit the Barn Complex and other public-use buildings with fire suppression infrastructure and better exits and entryways.
3. Repave driveways, walkways, and parking areas and install a new exterior lighting system on the Laudholm Campus to improve public safety and stormwater runoff.
4. Install photovoltaic systems: To meet the growing demands for electricity as Reserve programs grow, maintain 100% on-site generation of electricity needs. The South Estate barn is ideally situated for solar panels.
5. Install a circulating-seawater laboratory to meet new and ongoing research needs by renovating a room and installing equipment. The Coastal Ecology Center or a North Estate building would be candidates for the lab's location.
6. Renovate and restore the South Estate barn and sections of the house to create the Mattina Proctor Environmental Education Center with classroom and presentation spaces.

## 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. The Maine Historic Preservation Commission serves this role in Maine. As a partner with NOAA, the Reserve complies with the provisions of Section 106 on all of its projects, communicating with representatives of the Commission and moving forward with projects once it has reviewed and approved them.

# Appendices

## A. Memoranda of Understanding

- National Oceanic and Atmospheric Administration and Reserve Management Authority
- U.S. Fish and Wildlife Service and Reserve Management Authority
- Maine Department of Public Lands and Reserve Management Authority — Beach and Uplands
- Maine Department of Public Lands and Reserve Management Authority — Submerged Lands
- Town of Wells and Reserve Management Authority
- Laudholm Trust and Reserve Management Authority

## B. Federal Consistency Determination

## C. Response to Review from Partners and Public Comment

## D. Conservation Easements

- Deed on Laudholm Farm
- Deed at Wells Harbor

## E. State of Maine Legislation

- Act to Establish Wells National Estuarine Research Reserve
- Act to Amend the Laws Regarding the Location of Wells National Estuarine Research Reserve

## F. Rules for Public Use

## G. Natural Resource Laws

## H. Federal Regulations

## I. Coastal Zone Management Act, section 315

# Appendix A-1: NOAA/RMA MOU

NOS Agreement Code: MOA-2019-160/11915

## Appendix 1

Memorandum of Understanding
Between the
National Oceanic and Atmospheric Administration and
The Wells National Estuarine Research Reserve Management Authority
Detailing the State-Federal Roles in the Management of the Wells National Estuarine Research Reserve

This Memorandum of Understanding (agreement) establishes the framework for the cooperative management of the Wells National Estuarine Research Reserve (Wells Reserve) in the State of Maine, between Wells National Estuarine Research Reserve Management Authority (RMA) and the National Oceanic and Atmospheric Administration, Office for Coastal Management (NOAA). This agreement supersedes the previous agreement between NOAA and the RMA regarding the Wells Reserve made on May 19, 2006.

### I. AUTHORITY

The authority for this agreement is the Coastal Zone Management Act of 1972, as amended (CZMA, 16 U.S.C. §§ 1451-65, 1461), and its implementing regulations at 15 C.F.R. Parts 921, 923.

### II. BACKGROUND

A. The State of Maine has determined the waters and related coastal habitats of the Wells Reserve provide unique opportunities for the study of natural and human processes to contribute to the science of estuarine ecosystem processes, enhance environmental education opportunities and public understanding of estuarine areas, and provide a stable environment for research through the long-term protection of reserve resources.

B. The State of Maine has determined that the resources of the Wells Reserve and the values they represent to the citizens of Maine and the United States will benefit from the management of these resources as part of the National Estuarine Research Reserve System.

C. The RMA, as the agency designated by the Governor and Legislature of Maine, is responsible for maintaining, operating and managing the Wells Reserve in accordance with Section 315 of the CZMA, 16 U.S.C. § 1461, and acknowledges the value of state-federal cooperation for the long-term management and protection of the Wells Reserve in a manner consistent with the purpose of its designation.

D. NOAA finds that the State of Maine has satisfied the legal and procedural requirements for designation and, pursuant to its authority under Section 315 of the CZMA, 16 U.S.C. § 1461, and in accordance with implementing regulations at 15 C.F.R. Part 921, has designated the Wells Reserve.

E. The Wells Reserve management plan approved by NOAA describes the goals, objectives, strategies/actions, administrative structure, and institutional arrangements for the Wells Reserve, including this agreement and others. In consideration of the mutual agreements herein, NOAA and RMA agree to the following roles indicated in Section III of this agreement.

## III. STATE-FEDERAL ROLES IN RESERVE MANAGEMENT

### A. RMA Role in Reserve Management

The RMA shall:

1. be responsible for compliance with all federal laws and regulations, and ensure that the Wells Reserve management plan is consistent with the provisions of the CZMA and implementing regulations;

2. ensure protection of the natural and cultural resources of the reserve, and ensure enforcement of the provisions of state law and regulations aimed at protecting the reserve;

3. ensure adequate, long-term protection and management of lands and waters included within the reserve boundary;

4. cooperate with NOAA to apply for and manage funds to support the reserve in accordance with federal and state laws, the reserve management plan, annual funding guidance from NOAA, and any other NOAA directives pertaining to reserve operations, research and monitoring, education and stewardship, and, as necessary, land acquisition and reserve facility construction;

5. conduct and coordinate research and monitoring programs that encourage scientists from a variety of institutions to work together to understand the ecology of the reserve ecosystem to improve coastal management;

6. conduct and maintain programs that disseminate research results via materials, activities, workshops, and conferences to resource users, state and local agencies, school systems, the general public, and other interested parties;

7. provide staff and endeavor to secure state funding for the manager, education coordinator, and research coordinator;

8. secure facilities and equipment required to implement the provisions within the reserve management plan;

9. ensure adequate support for facilities operation and maintenance;

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

11. serve as principal contact for issues involving proposed boundary changes and/or amendments to the reserve management plan; and

12. cooperate with NOAA regarding review of performance pursuant to Section 312 of the CZMA, 16 U.S.C. § 1458, 15 C.F.R. § 921.40, and ongoing management plan approvals.

B. Federal Role in Reserve Management

NOAA's Office for Coastal Management shall:

1. administer the provisions of the Sections 312 and 315 of the CZMA, 16 U.S.C. § 1458 and 16 U.S.C. § 1461, respectively, to ensure that the Wells Reserve operates in accordance with goals of the reserve system and the Wells Reserve management plan;

2. review and process applications for financial assistance from the RMA, consistent with 15 C.F.R. Part 921, for management and operation of the reserve, and, as appropriate, land acquisition and facility construction;

3. advise the RMA of existing and emerging national and regional issues that have bearing on the Wells Reserve and reserve system;

4. maintain an information exchange network among reserves, including available research and monitoring data and educational materials developed within the reserve system; and

5. to the extent possible, facilitate the allocation of NOAA resources and capabilities in support of reserve goals and programs.

C. General Provisions

1. Nothing in this agreement shall obligate either party in the expenditure of funds, or for future payments of money. Each party bears its own costs to implement this agreement. NOAA may provide Federal funding in accordance with the CZMA and any requirements of the U.S. Department of Commerce through financial assistance awards that are separate from this agreement.

2. A free exchange of research and assessment data between the parties is encouraged and is necessary to ensure success of cooperative

studies.

D. Other Provisions

1. Nothing in this agreement diminishes the independent authority or coordination responsibility of either party in administering its respective statutory obligations. Nothing in this agreement is intended to conflict with current written directives or policies of either party. If the terms of this agreement are inconsistent with existing written directives or policies of either party entering this agreement, then those portions of this agreement that are determined to be inconsistent with such written directives or policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. In the event of the discovery of such inconsistency, and at the first opportunity for revision of this agreement, the parties shall seek to amend or terminate this agreement in accordance with the provisions of subsection V of this agreement.

2. Any disagreement on the interpretation of a provision, amendment, or other matter related to this agreement shall be resolved informally at the lowest operating level of each party's respective organization. If such disagreement cannot be resolved, then the area(s) of disagreement shall be stated in writing and presented to the other party for further consideration. If agreement is not reached within thirty (30) days of presentation, then the parties shall forward the written presentation of the disagreement to their respective higher official for appropriate resolution.

IV. PROGRAM EVALUATION

In accordance with section 312 of the CZMA, 16 U.S.C. § 1458, and 15 C.F.R. § 921.40, NOAA's Office for Coastal Management will schedule periodic evaluations of RMA performance in meeting the terms of this agreement and the reserve management plan. Where findings of deficiency occur, NOAA may initiate action in accordance with the interim sanctions or withdrawal of designation procedures established by the CZMA and applicable regulations at 15 C.F.R. Part 921, Subpart E.

V. EFFECTIVE DATE, REVIEW, AMENDMENT, AND TERMINATION

A. This agreement is effective on the date of the last signature on this agreement and shall be in effect until terminated by either party.

B. This agreement will be reviewed periodically by both parties and may only be amended by the mutual written consent of both parties.

C. This agreement may be terminated by mutual consent of both parties or by unilateral termination by either party. Termination of this agreement may provide grounds for NOAA (at its discretion) to

withdraw designation of the reserve from the reserve system, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 C.F.R. Parts 921 (Subpart E) and 923 (Subpart L). Section 315 of the CZMA, 16 U.S.C. § 1461, provides that NOAA may withdraw designation of a National Estuarine Research Reserve if: 1) NOAA finds that any of the criteria for establishing the reserve no longer exist; or 2) a substantial portion of the research conducted within the reserve fails to meet reserve system guidelines. In making any decision to withdraw designation, NOAA will take into consideration factors set forth in 15 C.F.R. § 921.40.

D. If any clause, sentence, or other portion of this agreement shall become illegal, null, or void for any reason, the remaining portions of this agreement shall remain in full force and effect.

E. No waiver of right by either party of any provision of this agreement shall be binding unless expressly confirmed in writing by the party giving the waiver.

IN WITNESS THEREOF, the parties have caused this agreement to be executed.

Jeffrey L. Payne
Director
Office for Coastal Management
National Ocean Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Oct. 22, 2019
Date

Nik Chakov
Chair,
Reserve Management Authority
& President, Laudholm Trust

10/28/19
Date

# Appendix A-2: USFWS/RMA MOU

**MEMORANDUM OF UNDERSTANDING**
**between the**
**U. S. Fish and Wildlife Service, Rachel Carson National Wildlife Refuge**
**and**
**Wells National Estuarine Research Reserve, Reserve Management Authority**

This Memorandum of Understanding (MOU) is made by and between the U.S. Fish and Wildlife Service, hereinafter, "USFWS," and the Wells National Estuarine Research Reserve, Reserve Management Authority, hereinafter, the "Authority." The purpose of the MOU is to outline the framework for coordination, cooperation, and communication between the USFWS and the Authority regarding management of lands within the boundaries of the Wells National Estuarine Research Reserve, hereinafter, the "Reserve," of which portions of Rachel Carson National Wildlife Refuge, hereinafter, the "Refuge, NWR" occur in the boundary of the Reserve.

RECITALS

WHEREAS, the National Estuarine Research Reserve System is a network of protected areas through a partnership between the National Oceanic and Atmospheric Administration and coastal states, pursuant to Section 315 of the Coastal Zone Management Act of 1972, as amended; and

WHEREAS, the Wells National Estuarine Research Reserve was designated in 1984 to provide for long-term estuarine research, education, interpretation and resource management; is located on the coast of southern Maine and faces the Atlantic Ocean; and encompasses approximately 2,000 acres of tidally flushed wetlands, riparian and transitional upland fields and forests within the Little River, Webhannet, and Ogunquit watersheds; and

WHEREAS, in 1990, the 114th Legislature of the State of Maine established the 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, a cooperative effort of the Reserve, the Laudholm Trust, the Town of Wells, the Maine Department of Agriculture, Conservation and Forestry/Bureau of Parks and Lands, the Maine Coastal Program, and the USFWS produced a 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 at the Reserve; 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, currently lands within the Reserve boundary are owned in fee title by the Town of Wells, Maine Department of Agriculture, Conservation and Forestry/Bureau of Parks and Lands, the Authority, and the USFWS/Refuge; and

WHEREAS, the USFWS is an agency of the United States Government, Department of the Interior with trust responsibility for fish, wildlife and plants, many of which are endangered species, migratory birds, and anadromous and inter jurisdictional fish species, which are concentrated in, or heavily dependent on coastal land and marine habitats; and responsible for the conservation and management of over 500 national marine monuments and national wildlife refuges, including Rachel Carson NWR, comprised of several properties throughout the southern coast of Maine; 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 USFWS 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, the Secretary of the Interior is authorized to provide assistance to and cooperate with public and private agencies "in the development [and] protection ... of all species of wildlife, resources thereof, and their habitat, in controlling losses of the same from disease or other causes, ... and in carrying out other measures necessary to effectuate the purposes of" 16 U.S.C. §§ 661-666c; and

WHEREAS, under the Migratory Bird Conservation Act of 1929, as amended (16 U.S.C. § 715 *et seq.*), specifically 16 U.S.C. § 715i(b), 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, 16 U.S.C. § 742a 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 believe that the purposes of the Reserve are aligned with the purposes of the Refuge.

II. The parties agree to coordinate, cooperate, and communicate on the management of the Reserve lands (including Refuge lands within the Reserve boundaries), and on shared projects, activities and events; this will include an annual (at a minimum) coordination meeting between the Reserve Director, Reserve staff, Refuge Manager, and Refuge staff.

III. The parties will continue to share information and cooperate in law enforcement efforts within the Refuge.

IV. The USFWS will, to the extent practicable, coordinate on and assist with management of the Reserve lands now owned, or to be acquired by, the Authority, the Town, or the Maine Department of Agriculture, Conservation and Forestry/Bureau of Parks and Lands, within the boundaries of the Reserve, by implementing Refuge wildlife and conservation goals, policies, and applicable regulations on the condition that the management exercised by the USFWS over such Reserve lands strive to be consistent with the goals, policies, and regulations of the National Estuarine Research Reserve System and the Reserve Management Plan.

V. The USFWS will, to the extent practicable, carry out its activities related 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 Reserve Management Plan.

VI. The Authority will, to the extent practicable, manage the Reserve consistent with the purposes and goals for which the Refuge is managed by the USFWS, as identified in the 2007 Rachel Carson NWR Comprehensive Conservation Plan, and the Federal authorities, purposes and goals under which the Refuge was acquired, including the Migratory Bird Conservation Act, 16 U.S.C. § 715d, under which the Refuge was acquired and established "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional Federal authorities under which Refuge land may have been acquired include the:

a. Refuge Recreation Act, 16 U.S.C. § 460k-1, which allows acquisition of land suitable for "(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, [or] (3) the conservation of endangered species or threatened species;"
b. Emergency Wetlands Resources Act of 1986, 16 U.S.C. § 3901(b), which promotes the conservation of wetlands to "maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and convention;"
c. Fish and Wildlife Act of 1956, 16 U.S.C. § 742f(a)(4), which authorizes the Secretary of the Interior to take measures "as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources;" and
d. Fish and Wildlife Act of 1956, 16 U.S.C. § 742f(b)(1), which authorizes the Secretary of the Interior to accept property "for the benefit of the [USFWS], in performing its activities and services."

VII. This MOU is not a fiscal obligation document. Nothing in this MOU obligates the parties to enter into contracts or other funding instruments to carry out the purposes of this MOU. This is a "best efforts" undertaking within available resources.

VIII. Pursuant to 31 U.S.C. § 1341, nothing contained in this MOU shall be construed to obligate the USFWS, the Department of the Interior, or the United States of America to any current or future expenditure of funds in advance of the availability of appropriations from Congress and their administrative allocation for the purposes of this MOU, nor does this MOU obligate

the USFWS, the Department of the Interior, or the United States of America to spend funds on any particular project or purpose, even if funds are available.

IX. The rights and benefits conferred by this MOU shall be subject to the laws of the United States governing the USFWS and the Refuge, 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.

X. Each party agrees that it will be responsible for its own acts and the results thereof and shall not be responsible for the acts of the other party and the results thereof. Each party, therefore, agrees that it will assume all risk and liability to itself, its agents or employees, for any injury to persons or property resulting in any manner from conduct of its own operations, and the operations of its agents, or employees, under this MOU, and for any loss, cost, damage, or expense resulting at any time from any and all causes due to any act or acts, negligence, or the failure to exercise proper precautions, of or by itself or its own agents or its own employees, while occupying or visiting the premises under and pursuant to this MOU. Any accidents and/or injuries to persons and/or property occurring on Refuge lands must be reported to the Refuge within 24 hours. The tort liability of the Federal Government will be governed by the Federal Tort Claims Act.

XI. All activities pursuant to or in association with this MOU shall be conducted without discrimination on grounds of race, color, sexual orientation, national origin, disabilities, religion, age, or sex, as well as in compliance with the requirements of any applicable Federal laws, regulations, executive orders, or policies prohibiting such discrimination.

XII. The Authority certifies that comprehensive actions will be taken to ensure the workplace is drug-free.

XIII. This MOU, including any attachments hereto, and/or documents incorporated by reference herein, contains the sole and entire agreement between the parties. Any formal modification to extend, renew or modify this MOU must be jointly agreed to, and will be prepared by the requesting party and forwarded through the appropriate channels for signature of both parties.

XIV. This MOU amends and supersedes the MOU entered into on May 26, 2006. This MOU becomes effective on the date of signing of the last signature below. The term of this MOU shall be for 5 years, reviewed annually, and may be renewed prior to expiration, in writing, for a period not to exceed 5 years. This MOU may be terminated by any party upon 6 months written notice to the other party, except that the MOU shall be terminated immediately upon the exclusion of all Refuge lands from the Reserve.

XV. The following points of contact will be used by the parties to communicate during the implementation of this MOU. Each party may change its point of contact upon notice to the other party.

For the U.S. Fish & Wildlife Service: Refuge Manager, Rachel Carson NWR

For The Authority: Executive Director, Wells NERR

**IN WITNESS THEREOF**, the parties hereto have executed this Memorandum of Understanding on the last written day, month, and year indicated below.

Regional Chief, NWRS
Fish and Wildlife Service
United States Department of Interior

12/20/18
Date

Chair, Reserve Management Authority
Wells National Estuarine Research Reserve

2/8/2019
Date

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

**Cooperative Agreement**
**Between the**
**Bureau of Parks and Lands of the**
**Maine Department of Agriculture, Conservation and Forestry**
**and**
**Wells National Estuarine Research Reserve Management Authority**

This Agreement is made and entered into, by and between the Bureau of Parks and Lands of the Maine Department of Agriculture, Conservation, and Forestry, acting by and through its Commissioner, pursuant to 12 MRS Section 1803 Subsection 4, as amended, (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 therefrom, 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 respect 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 desires 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

Commissioner,
Maine Department of Agriculture, Conservation and Forestry
22 State House Station
Augusta, ME 04333-0022

**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. 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:**

Walter E. Whitcomb
Commissioner,
Maine Department of Agriculture, Conservation and Forestry

9/6/18
Date

**For the Wells NERR Management Authority:**

Nik Charov, Chair

8/24/18
Date

# Appendix A-4: BPL/RMA MOU (submerged lands)

**Cooperative Agreement**
**Between the**
**Bureau of Parks and Lands of the**
**Maine Department of Agriculture, Conservation and Forestry**
**and**
**Wells National Estuarine Research Reserve Management Authority**

This Agreement is made and entered into by and between the Bureau of Parks and Lands of the Maine Department of Agriculture, Conservation, and Forestry (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 (hereinafter called "Wells NERR").

Whereas under 12 MRS Section 1803(1)(B) and 1804(4), the Bureau is authorized, with the consent of the Commissioner of the Maine State Department of Agriculture, Conservation and Forestry in managing submerged lands, to enter into agreements with public agencies; and

Whereas under Private and Special Law 1989 c.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 MRS Section 1801(9),

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 MRS Section 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 Bureau of Parks and Lands rules, Chapter 53 "Submerged Lands Rules", and 12 MRS Sections 1801, 1803 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 (6) months written notice to the other parties.

**For the Bureau of Parks and Lands:**

Commissioner,
Maine Department of Agriculture, Conservation and Forestry

9/6/18
Date

**For the Wells NERR Management Authority:**

Nik Charov, Chair

8/24/2018
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 a 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 finds obtained in part from the National Oceanic and Atmospheric Administration, Laudholm Trust, and the State of Maine;

WHEREAS, the Maine Department of Agriculture, Conservation, and Forestry'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:**

Karl Ekstedt, Chair
Board of Selectmen

Date: 6/5/18

Jon Carter
Town Manager

Date: 6/5/18

**For the Reserve Management Authority:**

Nik Charov
Chair

Date: 6/11/18

# Appendix A-6: Laudholm Trust/Wells NERR MOU

## Memorandum of Understanding Between Wells National Estuarine Research Reserve and Laudholm Trust

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 the Laudholm Property; and

Whereas the Wells Reserve is part of a network of 29 National Estuarine Research Reserves (NERRs) 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 Wells National Estuarine Research 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; the Maine Bureau of Parks and Lands/Maine Department of Agriculture, Conservation, and Forestry: the U.S. Fish and Wildlife Service; the Town of Wells; the NOAA Office for Coastal Management (ex-officio); the Maine Coastal Program/Maine Department of Marine Resources (ex officio); and a public member with an established reputation in the field of marine or estuarine research, appointed by the Governor; and

Whereas the Wells Reserve encompasses 2,250 acres including the historic Laudholm Farm campus and the Alheim Commons dormitory and has the responsibility to maintain and operate the buildings, grounds, and the adjacent natural land therein; 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 local funding partner of the Wells Reserve, providing the required non-federal match for the Reserve's NOAA financial awards and for other program and facility needs; 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, office management, and volunteer recognition activities; and

Whereas the Trust President is employed by Laudholm Trust as its chief executive and reports to its Board of Trustees, and who serves on the RMA Board of Directors;

Whereas the Wells Reserve Director is employed by the RMA as its chief executive and reports to its seven-member Board of Directors, and serves on the Laudholm Trust board in a non-voting, ex officio capacity;

***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 January 24, 2018, and further provide, as it does to its own staff, the overhead 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 and partners in program areas such as: research and monitoring, education and training, coastal resource stewardship, and facilities and administration; and

Laudholm Trust and the Wells Reserve will work together to develop organizational budgets, annual work plans, management and strategic plans for their respective organizations that take into account each organization'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, or 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 a chartered member 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 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 fundraising activities; and

Laudholm Trust Board of Trustees will have representation on the Reserve's various Program Advisory Committees, as needed or desired; 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 fundamental 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 purposes of meeting the annual operational, programmatic, and capital needs of the Reserve. These donations are accounted for in annual audits and reviews; and

All program fees collected by the Wells Reserve's education and training programs, office and dorm room rentals, parking fees, donation boxes, and other Wells Reserve earned income sources are separate and distinct from contributions made by Laudholm Trust; 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 five years.

Karl Ekstedt, Treasurer
Reserve Management Authority

8/24/18
Date

Jessica Gribbon Joyce, Chair
Laudholm Trust

8/23/18
Date

Paul M. Dest, Director
Wells Reserve

8.23.18
Date

Nik Charov, President
Laudholm Trust

8/23/18
Date

# Appendix B: Federal Consistency Determination

**U.S. DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
**Office for Coastal Management**
Silver Spring Metro Center, Building 4
1305 East-West Highway
Silver Spring, Maryland 20910

April 4, 2019

Ms. Kathleen Leyden
Maine Coastal Program
32 Blossom Lane
21 State House Station
Augusta, Maine 04333

**Re: Coastal Zone Management Act Consistency Determination**
**Wells National Estuarine Research Reserve 2019-2024 Management Plan**

Dear Ms. Leyden:

Pursuant to section 307(c)(1) of the Coastal Zone Management Act, 16 U.S.C. § 1457(c)(1), and 15 C.F.R. part 930, subpart C, for management plan approval, NOAA Office for Coastal Management (OCM) Stewardship Division is submitting this Consistency Determination to the Maine Coastal Program (MCP) , for the Wells National Estuarine Research Reserve (the reserve) revised management plan. The information in this Consistency Determination is provided pursuant to 15 C.F.R. § 930.39 and is being submitted in compliance with 15 C.F.R. § 921.13.

The NOAA Office for Coastal Management believes that the Reserve's revised management plan contains goals, objectives and actions taken in support of meeting the Reserve's mission. The Reserve conducts land conservation and stewardship, research, monitoring, education and training. The Reserve manages construction and use of infrastructure in the form of, but not limited to, launches, buildings, boardwalks, docks and piers. Land management activities include restoration and stabilization of uplands, wetlands, shorelines and submerged lands. Research and monitoring activities conducted by Reserve staff or outside agencies and universities may include manipulation of areas within the Reserve boundary. In addition, the Reserve collaborates with agencies, nongovernmental organizations and other entities to reach out to willing landowners to the purpose of acquiring additional lands to support its research, education, preservation, and conservation goals.

The enforceable policies of Maine Coastal Program (MCP) are codified under Maine Department of Marine Resources (DMR), the conservation, repletion, research and management activities associated with the Reserve are permissible uses under the MCP. Reserve management and staff collaborate closely with the MCP so that activities and actions taken in support of the management plan are also consistent with MCP. The Reserve's activities and actions comply with the MCP's enforceable policies and will be conducted in a manner consistent with the MCP.

NOAA has found that the management plan revision is consistent to the maximum extent practicable with the enforceable policies of the Maine Coastal Program. Pursuant to 15 C.F.R. §930.41, the MCP has 60 days from the receipt of this statement in which to concur with or object to this Consistency Determination, or to request an extension under 15 C.F.R. §930.41 (b). The State's concurrence will be presumed if NOAA does not receive the State's response on the 60th day from receipt of this determination. The State's response should be sent to:

Adrianne Harrison
Senior Coastal Management Specialist
National Oceanic & Atmospheric Administration
NOS, Office for Coastal Management
35 Colovos Rd, Suite 148
Durham, NH 03824

Please let me know if you have any questions or concerns. I can be reached at (603) 862-4272 or Adrianne.harrison@noaa.gov.

Sincerely,

Adrianne Harrison
Senior Coastal Management Specialist
Lynker/CSS Team
On contract with NOAA's OCM

HARRISON.ADRIANNE.RAE.1384755549
Digitally signed by HARRISON.ADRIANNE.RAE.1384755549
Date: 2019.04.04 14:33:36 -04'00'

Attachment

cc: Kerry Kehoe, NOAA Office for Coastal Management
Rebecca Newhall, NOAA Office for Coastal Management
Todd Burrowes, Maine Coastal Program

# Appendix C: Response to Review from Partners and Public Comment



*Date:* Wednesday, September 25, 2019.

*Time:* 5:00 p.m., local time.

*Location:* Rookery Bay Environmental Learning Center, 300 Tower Road, Naples, Florida 34113.

Written comments must be received on or before Friday, October 4, 2019.

**Keelin Kuipers,**

*Deputy Director, Office for Coastal Management, National Ocean Service, National Oceanic and Atmospheric Administration.*

[FR Doc. 2019–15564 Filed 7–22–19; 8:45 am]

**BILLING CODE 3510–22–P**

## DEPARTMENT OF COMMERCE

### National Oceanic and Atmospheric Administration

### Submission for OMB Review; Comment Request

The Department of Commerce will submit to the Office of Management and Budget (OMB) for clearance the following proposal for collection of information under the provisions of the Paperwork Reduction Act (44 U.S.C. chapter 35).

*Agency:* National Oceanic and Atmospheric Administration (NOAA).

*Title:* West Coast Region U.S. Pacific Highly Migratory Species Logbook Family of Forms.

*OMB Control Number:* 0648–0223.

*Form Number(s):* NOAA Form 88–197.

*Type of Request:* Regular submission (extension of a currently approved collection.

*Number of Respondents:* 1,700.

*Average Hours per Response:* 1 hour.

*Burden Hours:* 3,400.

*Needs and Uses:* Under the Fishery Management Plan for United States (U.S.) West Coast Fisheries for Highly Migratory Species (HMS) U.S. fishermen, participating in the Pacific hook-and-line (also known as the albacore troll and poll-and-line), coastal purse seine (vessels less than 400 st carrying capacity), large-mesh drift gillnet, and swordfish harpoon fisheries, are required to obtain a Highly Migratory Species (HMS) permit. Permit holders are also required to complete and submit logbooks documenting their daily fishing activities, including catch and effort for each fishing trip. Logbook forms must be completed within 24 hours of the completion of each fishing day and submitted to the Southwest Fisheries Science Center (SWFSC) within 30 days of the end of each trip. Federal regulations allow the use of state logbooks to fulfill this requirement, for example, California has fulfilled this requirement to date for HMS fisheries. These data and associated analyses help the SWFSC provide critical HMS fisheries information to researchers, fisheries managers, and the needed management advice to the U.S. in its negotiations with foreign fishing nations that fish for HMS.

At the November 2018 Pacific Fisheries Management Council meeting, the California Department of Fish and Wildlife submitted an informational report outlining proposed regulations to repeal the state logbook requirements for swordfish harpoon and large-mesh drift gillnet. In December 2018, the California Fish and Wildlife Commission adopted an amendment to the California Code of Regulations (CCR) to eliminate the use of California logbooks for these gear types. These regulations are expected to become effective on April 1, 2019.

As a result, NMFS has developed Federal logbooks to replace the California logbooks. In addition, the SWFSC developed a purse seine logbook for vessels under 400 st (362.8 mt) carrying capacity. This will replace their use of the Inter-American Tropical Tuna Commission (IATTC) Seiner Record and Bridge Log designed for purse seine vessels over 400 st (362.8 mt) carrying capacity.

The SWFSC and representatives from each of the fisheries have reviewed the Federal logbooks. Representatives were chosen based on their experience with State logbooks and specific gear-types. The information collected from the public will remain consistent and information currently collected from California Fish and Wildlife logbooks. There will be no additional burden to the public.

*Affected Public:* Business or other for-profit.

*Frequency:* Submission is required for each HMS fishing trip.

*Respondent's Obligation:* Keep an accurate and complete record of catch, effort, and other data on report forms. The original logbook form for each day of the fishing trip must be submitted to the Southwest Fisheries Science Center within 30 days of each landing of HMS.

This information collection request may be viewed at *reginfo.gov*. Follow the instructions to view Department of Commerce collections currently under review by OMB.

Written comments and recommendations for the proposed information collection should be sent within 30 days of publication of this notice to *OIRA_Submission@omb.eop.gov* or fax to (202) 395–5806.

**Sheleen Dumas,**

*Departmental Lead PRA Officer, Office of the Chief Information Officer, Commerce Department.*

[FR Doc. 2019–15584 Filed 7–22–19; 8:45 am]

**BILLING CODE 3510–22–P**

## DEPARTMENT OF COMMERCE

### National Oceanic and Atmospheric Administration

### Management Plan for National Estuarine Research Reserve Program

**AGENCY:** Office for Coastal Management (OCM), National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce (DOC).

**ACTION:** Notice of public comment period for the Wells National Estuarine Research Reserve management plan revision.

**SUMMARY:** Notice is hereby given that the Stewardship Division, Office for Coastal Management, National Ocean Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce is announcing a thirty (30) day public comment period for the revised management plan for Wells National Estuarine Research Reserve management plan revision.

**ADDRESSES:** You may submit comments on the draft management plan by any of the following methods:

*Written Comments:* Please submit written comments to Paul Dest, Reserve Manager, Wells Reserve, 342 Laudholm Farms Road, Wells, Maine 04090, or email comments to *dest@wellsnerr.org*. Comments that the Office for Coastal Management receives are considered part of the public record and may be publicly accessible. Any personal identifying information (*e.g.*, name, address) submitted voluntarily by the sender may also be publicly accessible. NOAA will accept anonymous comments.

**FOR FURTHER INFORMATION CONTACT:** Adrianne Harrison at (603) 862–4272 or Erica Seiden at (240) 533–0781 of NOAA's National Ocean Service, Stewardship Division, Office for Coastal Management, 1305 East-West Highway, N/ORM5, 10th floor, Silver Spring, MD 20910.

**SUPPLEMENTARY INFORMATION:** Pursuant to 15 CFR 921.33(c), a state must update their management plan. The Wells Reserve revised plan will replace the plan previously approved in 2013.

The revised management plan outlines a strategic plan; administrative structure; research and monitoring, education, stewardship, wetland science and training programs of the reserve; resource protection and manipulation plans, restoration management plan; public access and visitor use plan; considerations for future land acquisition; and facility development to support reserve operations.

The Wells Reserve takes an integrated approach to management, linking research, education, coastal training, and resource management functions. The reserve has outlined how it will manage administration and its core programs, providing detailed actions that will enable it to accomplish specific goals and objectives. Since the last management plan, the reserve has implemented its core and system-wide programs; secured science, education, and conservation grants to serve southern Maine communities; made significant repairs and improvements to buildings including installed solar arrays to generate electricity and renovated the water tower; designed and installed climate change exhibit components in Visitor Center; added a fully accessible trail at Wells Harbor; restored riverine and fisheries habitats in southern Maine watersheds; and helped partners acquire priority conservation lands.

There will be no boundary change with the approval of the revised management plan. The management plan will serve as the guiding document for the 2,250-acre Wells Reserve.

NOAA's Office Coastal Management will be conducting an environmental analysis in accordance with the National Environmental Policy Act on the proposed approval of the Reserve's revised management plan. The public is invited to provide comment or information about any potential environmental impacts of the proposed action, and these comments will be used to inform the decision making.

View the Wells Reserve management plan revision on their website, at *https://www.wellsreserve.org/writable/files/DraftPlan19.pdf,* and provide comments to Paul Dest, *dest@wellsnerr.org.*

**Nkolika Ndubisi,**

*Management and Program Analyst, National Ocean Service, National Oceanic and Atmospheric Administration.*

Federal Domestic Assistance Catalog 11.420, Coastal Zone Management Program Administration.

[FR Doc. 2019–15565 Filed 7–22–19; 8:45 am]

**BILLING CODE 3510–08–P**

Wells Reserve partners contributed to the development of the draft plan. They had no further comment during the review period.

The Wells Reserve received no public comments in response to the Federal Register notice.

## DEPARTMENT OF COMMERCE

### United States Patent and Trademark Office

### Submission for OMB Review; Comment Request; "Requirements for Patent Applications Containing Nucleotide Sequence and/or Amino Acid S[illegible]

The [illegible] Trader[illegible] to the [illegible] (OMB) [illegible] propos[illegible] under [illegible] Reduc[illegible] *Ager[illegible]* Trader[illegible] *Title* Applic[illegible] Sequer[illegible] Disclos[illegible] *OMB Form* • PT[illegible] *Type Num[illegible] Esti[illegible]* USPTO [illegible] approx[illegible] 6 hour[illegible] collect[illegible] gather[illegible] the do[illegible] compl[illegible] *Burd[illegible] Cost[illegible] Need* that co[illegible] acid se[illegible] within[illegible] 1.821([illegible] of the [illegible] the sec[illegible] the req[illegible] 1.825. listing[illegible] patent[illegible] the sec[illegible] examin[illegible] patenta[illegible] applic[illegible] sequen[illegible] of pate[illegible] patents after p[illegible] *Freq[illegible] Resp[illegible]* Obtain[illegible] *OMB* email: *Nicholas_A._Fraser@omb.eop.gov.*

Once submitted, the request will be publicly available in electronic format through *reginfo.gov.* Follow the instructions on the website to view Department of Commerce collections currently under review by OMB.

Further information can be obtained by:

• *Email: InformationCollection@uspto.gov.* Include ''0651–0024 information request'' in the subject line of the message.

• *Mail:* Marcie Lovett, Chief, Records and Information Governance Branch, Office of the Chief Administrative [illegible]

[illegible] instructions for submitting comments through the website.

• *Mail:* Christopher Kirkpatrick, Secretary of the Commission, Commodity Futures Trading Commission, Three Lafayette Centre, 1155 21st Street NW, Washington, DC 20581.

# Appendix D-1: Laudholm Farm Easement

BK 6214 PG054

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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

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.

8. 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.

9. 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,

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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

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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

ıe other, and whenever either of the parties desire to give or erve upon the other any notice, demand, request or other ɔmmunication with respect to this Easement Deed or the Property, ıch such notice, demand, request or other communication shall be ı writing, prepaid registered mail, and addressed to the Town or ıe 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

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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

Witness — By: Thomas Oliver, Chairman

Witness — By: George Finch

Witness — By: Robert Foley

Witness — By: Kenneth Creed, III

Witness — By: 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 Weston F. Walker, its Chairman duly authorized, and has caused this instrument to be signed this 7 day of August, 1992.

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WELLS NATIONAL ESTUARINE RESEARCH
RESERVE MANAGEMENT AUTHORITY

By: Morton K. Mather
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. Barnes
~~Notary Public~~/Attorney-at-Law

RMA

STATE OF MAINE
COUNTY OF YORK, SS.

August ~~May~~ 7, 1992

Personally appeared Morton K. Mather, 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,

"OFFICIAL SEAL"
Margaret P. Drake
Notary Public, State of Maine
My Commission Expires 9/28/97

Margaret P. Drake
MARGARET P. DRAKE
Notary Public/~~Attorney-at-Law~~

# Appendix D-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, 19 86 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.

Dow & Coulombe, Inc.
ENGINEERS AND SURVEYORS
SINCE 1864
LAND USE & PLANNING CONSULTANTS
85 Park Street
Saco, Maine 04072
(207) 284-4521

BOOK 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 drivenn 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)

Dow & Coulombe, Inc.
ENGINEERS AND SURVEYORS
SINCE 1864
LAND USE & PLANNING CONSULTANTS
85 Park Street
Saco, Maine 04072
(207) 284-4521



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 Laudholm Trust" dated April 15, 1986 made by Dow & Coulombe, Inc.

BOOK 3619 PAGE 201

Dow & Coulombe, Inc.
ENGINEERS AND SURVEYORS
SINCE 1864
LAND USE & PLANNING CONSULTANTS
85 Park Street
Saco, Maine 04072
(207) 284-4521

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 Meeing 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 Meeing 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 Facilties". The Town Clerk cound 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 utilitities 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 3819 PAGE 262

Dow & 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)


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

PD/gd
Enclosures

RECEIVED YORK. SS.
1986 APR 24 PM 4: 05
RECORDED REGISTRY OF DEEDS

# Appendix E-1: Act to Establish Wells NERR

| APPROVED | CHAPTER |
|---|---|
| MAR 30 '90 | 108 |
| 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.

3-2680(5)

**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 E-2: Act to Amend Location

APPROVED MAY 06 '03 BY GOVERNOR | CHAPTER 11 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)

# Appendix F: 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*

# Appendix G: Natural Resource Laws

## Federal Laws

### National Environmental Policy Act

Signed into law in 1970, the National Environmental Policy Act (NEPA), is one of the United States' first and most significant environmental laws. Fundamentally, NEPA requires federal agencies to take a hard look and give due consideration to the potential environmental effects of their actions. To this end, NEPA generally requires a federal agency to prepare an Environmental Assessment (EA), or an Environmental Impact Statement (EIS), when the proposed federal action may significantly affect the human environment, to assess and compare the nature and likelihood of environmental effects attributable to alternative courses of action, and thus to inform their decision-making. NEPA allows a federal agency to identify "categorical exclusions", which are certain actions with no or de minimis anticipated adverse environmental effects, regarding which production of an EA or EIS is not required. NEPA requirements apply to the full range of federal agencies' activities, including but not limited to: provision of federal funds to state or local government for public infrastructure projects such as airports, buildings, and highways; construction of a federal project, such as maintenance of a federal navigation channel by the Army Corps of Engineers; acquisition of federal public lands; and issuance of a federal license, permit, lease, or other authorization.

### Endangered Species Act

The purpose of the federal Endangered Species Act (ESA), enacted in 1973, is to provide a means to conserve and recover species listed as endangered and threatened and the ecosystems on which they depend for their survival. All species of plants and animals, except pest insects, are eligible for listing as threatened or endangered. The ESA is administered by the Department of Interior's 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 Commerce and Interior are responsible for determining whether any species is endangered or threatened. All federal agencies must utilize their authorities to conserve and to make sure that their permitting, funding, or other actions do not jeopardize the survival of listed species. Recovery plans must also be developed and implemented to conserve and improve conditions for 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. FWS and NOAA-Fisheries provide some financial assistance for state programs which may be used to carry out species status inventories and monitoring and to establish conservation programs. States may have their own laws regarding management and conservation of threatened and endangered species. See discussion below regarding the Maine Endangered Species Act.

Other federal laws also help protect declining populations of rare species and their habitats, including the Marine Mammal Protection Act, the Migratory Bird Treaty Act, the Fish and Wildlife Coordination 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.

### The National Flood Insurance Act

In 1968, Congress created the National Flood Insurance Program 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, a component of the Federal Emergency Management Agency, 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 NFIP in exchange for the community's commitment to practice sound land use management. Communities in Maine and elsewhere in the nation participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP provides floodplain maps 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 communities participating in the program.

## National Historic Preservation Act

The National Register of Historic Places is the nation's official list of cultural resources deemed worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a nationwide program to coordinate and support public and private efforts to identify, evaluate, and protect 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 National Estuarine Research Reserve's Laudholm Farm campus, for example, is listed on the National Register.

The Secretary of the Interior, with the approval of the pertinent State Historic Preservation Officer, designates sites and structures for inclusion in the National Historic Register. Established through a legislative act in 1971, the Maine Historic Preservation Commission is the state agency which functions as Maine's State Historic Preservation Office. Designation of structures and sites under the Act provides protection with respect to certain agency activities. The National Park Service, an agency within the Department of the Interior, administers the National Historic Register. Any federal agency having jurisdiction over a proposed federal or federally-assisted undertaking, such as the Wells National Estuarine Research Reserve, must consider the effect of that activity on property included in, or eligible for inclusion in, the National Register before the activity is undertaken or expenditure of federal funds is approved.

## Clean Water Act

The Clean Water Act (CWA) is the cornerstone of water quality protection in the United States. The statute employs a variety of regulatory and non-regulatory tools to sharply reduce direct, point source pollutant discharges into waterways, to finance municipal wastewater treatment facilities, and to manage polluted runoff. (Generally-speaking, a "point source" regulated under the CWA is a wastewater outfall pipe or similar structure by or through which water is conveyed for discharge.) These tools are employed to achieve the CWA's basic 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." Congress passed the CWA in 1972. The U.S. Environmental Protection Agency (EPA) administers the law, in cooperation with other federal and state agencies. The CWA contains various provisions and programs to protect, reserve, and restore the nation's water resources, including the several major ones discussed below.

Pursuant to authority delegated by EPA, Maine and many other states manage the National Pollution Discharge Elimination System (NPDES) established by Section 402 of the CWA. The NPDES program provides the standards (including state-developed water quality standards) and process for review, issuance, and enforcement of permits allowing certain point source discharges of pollutants into the waters of the United States. Section 401 of the CWA provides states a related authority to review and certify that an activity for which a federal license or permit is required that may result in a discharge, such a hydroelectric dam subject to regulation by the Federal Energy Regulation Commission, meets applicable state water quality standards.

Section 404 of the CWA authorizes the United States Army Corps of Engineers to regulate the temporary or permanent discharge of dredged or fill material into the "waters of the United States." The definition of waters of the United States includes most waterways and their adjacent wetlands. Covering a broad range of habitat types, the term "wetlands" as used in the CWA includes "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 of the CWA addresses non-point source pollution, often called polluted runoff, which

represents the most significant source of pollution overall in the country. Under the CWA, nonpoint sources make up a broad category of means, other than a pipe or other discrete conveyance that meets the CWA's definition of a "point source", by which pollutants are introduced into waterways. In general, nonpoint sources involve a mixture of precipitation and pollutants added as water bodies as the polluted runoff flows over or through the ground. Agriculture, forestry, road construction, and many other activities have potential to create nonpoint sources of pollution that is addressed under the CWA, in some cases through voluntary use of "best management practices" (BMPs) designed to prevent or treat polluted runoff. Pollutants commonly associated with nonpoint sources include nutrients (phosphorus and nitrogen), pathogens, sediments, oil and grease, salt, and pesticides. EPA and the Maine Department of Environmental Protection have non-regulatory programs that address non-point source pollution, including those that encourage a watershed approach to reduction of nonpoint source pollution in coastal and estuarine waters, in part through use of BMPs and technical assistance and public education on their use.

## Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act (RHA) governs the excavation, fill, or other alteration of navigable rivers and harbors. Section 10 of the RHA authorizes the United States Army Corps of Engineers to regulate temporary or permanent structures and work in navigable waters of the United States. Navigable waters include all waters subject to the ebb and flow of the tide and certain key waterways that have been declared navigable by Congress, such as the Kennebec and Penobscot Rivers and Lake Umbagog. Structures and work include, without limitation, the following: any wharf, float, dolphin, weir, boom, breakwater, jetty, or groin; bank protection or stabilization activity (e.g. riprap, revetment, or bulkhead); aquaculture installation; permanent mooring structures such as pilings; aerial or subaqueous power transmission lines; intake or outfall pipes; permanently moored floating vessels; tunnels, artificial canals; boat ramps; aids to navigation; any permanent or semi-permanent obstacle or obstruction; dredging or disposal of dredged material, excavation, and filling; or other modifications affecting the course, location, condition, or capacity of navigable waters of the United States.

## Coastal Barrier Resources Act

Some coastal beaches and dunes form a sand and gravel landform, or barrier, between the ocean and a coastal wetland. These coastal barriers and 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. Maine's coastal barriers also 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 man-made structures.

Congress has recognized the importance of coastal barriers through the Coastal Barrier Resources Act of 1982, which establishes a detailed process to identify coastal barriers and generally prohibits the expenditure of federal funds that support activities incompatible with the ability of these fragile areas to accommodate them. The United States Fish and Wildlife Service has primary responsibility for the law's implementation.

See the discussion below regarding the comparable state law that similarly restricts provision of state funds and financial assistance in state-designated coastal barriers.

## Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) was enacted in 1972 and establishes a unique federal-state partnership and management framework aimed at ensuring well-balanced protection and wise use of the nation's coastal resources. The CZMA provides coastal states, such as Maine, which have developed a coastal management program approved by NOAA both funding to implement that state program and authority to review proposed federal agency activities for consistency with the program's enforceable policies. In Maine, the standards of approval under the

Site Law, Natural Resources Protection Act, and other state land use and environmental laws serve as the State's enforceable policies for CZMA purposes.

At present, every state located on ocean waters or on the Great Lakes, except Alaska, has a coastal zone management program approved by NOAA under the CZMA. Approved in 1978, the Maine Coastal Program, which is in the Department of Marine Resources, is the lead agency for State's networked coastal zone management program which is implemented in collaboration with the Department of Environmental Protection, the Maine Geological Survey, and other state agency partners, as well as local government officials and others.

Section 315 in the CZMA (see Appendix G) established the National Estuarine Research Reserve System (NERRS) in participating coastal and Great Lake states. This CZMA provision 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. The Wells National Estuarine Research Reserve was established under this authority in 1986.

### Magnuson-Stevens Fishery Conservation and Management Act

Enacted in 1976, the Magnuson–Stevens Fishery Conservation and Management Act (MSFCMA) is the main law governing management of marine fisheries and fishing activity in federal waters, which offshore Maine is the ocean area seaward of the three-mile limit of state ownership to the 200-limit of the United States' Exclusive Economic Zone. The MSFCMA's main policy goals include: conservation of fishery resources; support for commercial fishing consistent with its conservation and sustainability-oriented policies; development of under-utilized fisheries; and, as further described below, protection of "essential fish habitat."

Eight regional fishery management councils created by the Act are tasked with development of fishery management plans (FMPs), subject to review and approval by the Secretary of Commerce. The New England and the Mid-Atlantic Fishery Management Councils have management responsibility for commercial fish stocks in federal waters off the coast of Maine and other New England states. The Councils' members include both representatives of government agencies with fisheries management-related authority and expertise as well as the commercial fishing industry. In addition, highly migratory species (HMS) such as Atlantic tunas, swordfish, sharks, and billfish are managed both domestically and internationally. NOAA Fisheries has the primary authority for developing and implementing an Atlantic HMS FMP. Using scientific information about the current and projected population(s) of the species or complex of species they address, FMPs are designed to prevent over-fishing and where necessary to restore stocks of species that have been over-fished. FMPs typically set annual and individual limits on how many fish may be caught without jeopardizing sustainable harvesting into the future and include provisions on when, when, and how (e.g., allowable types of gear) fishing may be conducted.

Enacted in 1996, the Sustainable Fisheries Act (SFA) made numerous changes to the MSFCMA to update and improve the MSFCMA's provisions aimed at preventing overfishing of species targeted for harvest as well as reducing unintended harvest (by-catch) of non-target species. Notably, the SFA directed NOAA Fisheries, in coordination with each regional fishery management council, to identify "essential fish habitat" (EFH) for each federally-managed species in its region. A federal agency must consult with NOAA Fisheries if its proposed action, such as construction of a federal project, federal funding, or issuance of a federal permit, may adversely affect EFH and address NOAA Fisheries' recommendations on how to avoid, minimize, or compensate for adverse effects on EFH.

## State Laws

### Submerged and Intertidal Lands Law

This law authorizes the director of the Bureau of Parks and Lands (BPL) in the Department of Agriculture, Conservation and Forestry to lease or grant assignable easements, for terms of up to thirty years, on state-owned submerged or intertidal lands. After soliciting public input and consulting with local, state, or federal agencies as he or she deems appropriate, the director may grant the right to dredge, fill, or erect causeways, bridges, marinas, wharves, docks, pilings, moorings, or other permanent structures on such state lands. The annual rental fee charged for each lease is

meant to compensate the public for the loss of use of the publicly-owned lands covered by the lease. The rental fee approximates the fair market rental value of the leased land and is adjusted based on the nature of the proposed use. Payment of a rental fee is not required for a BPL lease issued for certain uses, such as municipal and state-owned public access facilities and navigation-related activities of the federal government.

## Fish and Wildlife Laws

The Maine Department of Inland Fisheries and Wildlife (MDIFW) is the state agency charged with stewardship of the State's fish and wildlife resources and the habitats upon which they depend. MDIFW's 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. Under a variety of state laws and related agency regulations, MDIFW carries out multiple fish and wildlife conservation programs focused on maintaining abundant game resources, as well as managing non-game wildlife and restoring endangered species. See discussion section regarding the Maine Endangered Species Act. In addition to fish and wildlife research and management, water access, and education programs, MDIFW's Bureau of Warden Service is responsible for enforcing the State's fish and wildlife laws regarding both game and non-game species. Maine Warden Service also has regulatory authority for recreational boating, snowmobiling, all-terrain vehicle (ATV) operation, and whitewater rafting, and a central role in search and rescue operations in the forests, fields, waterways, and on the ice.

## Marine Resource Laws

The Maine Department of Marine Resources (MDMR) is the state agency tasked with management and conservation of the State's marine and estuarine resources. Through implementation of a variety state laws and related agency regulations, MDMR conducts and sponsors scientific research; manages commercial and recreational salt water fish stocks and fishing activities which target them; and advises and cooperates with local, state, and federal officials in reviewing the potential marine resources-related effects of licensed, permitted, and other activities in coastal waters. MDMR is responsible for enforcement of the laws and regulations governing commercial fishing and other uses of coastal resources. Its law enforcement bureau, the Maine Marine Patrol, also plays a key role in at-sea search and rescue operations.

The overall purpose of the State's marine resources laws administered by MDMR is to protect and manage all renewable marine and estuarine resources, such as fish, shellfish, marine worms, marine plants, and their habitat and supporting ecology. MDMR has authority to enter reciprocal enforcement agreements with other states, interstate regional authorities, and the federal government. MDMR may adopt fisheries management plans and regulations for conservation purposes using any of the following factors: time, method, number, weight, length, or location, including emergency rules if needed to address time-sensitive management issues such as "unusual damage or imminent depletion." MDMR may also adopt regulations to protect public health and safety and prevent gear conflict.

## Maine Endangered Species Act

The Maine Legislature enacted the Maine Endangered Species Act (MESA) in 1975 in response to concerns that various species of fish and wildlife were in danger of disappearing from the State. Endangered and threatened fish and wildlife species in Maine are listed under MESA, the federal Endangered Species Act (ESA), or both. Species listed under both laws are protected and managed by both MESA and the ESA and related state and federal laws. In addition to provisions prescribing a variety of types of harm ("take") to listed species, both MESA and the ESA contain provisions that authorize identification and development of management measures to protect habitat deemed essential to listed species' survival and recovery. Like the federal ESA, MESA also has provisions that allow "incidental take" of a listed species where an activity's adverse effects on the species are unavoidable, minor, and pose no threat to its recovery.

MESA covers Maine's inland fish and wildlife (including all birds and invertebrates) as well as marine species listed under the federal ESA. MDIFW has the authority and responsibility to implement MESA's provisions as applied to inland species as well as birds in any habitat. MESA-listed marine species are subject to a somewhat different management program, which is focused on management measures aimed at facilitating

compliance with the federal ESA (MESA's provisions regarding "take" do not apply to listed marine species) and is administered by MDMR.

MESA establishes the categories of "endangered" and "threatened" species. An act of the Legislature in response to a recommendation by the Commissioner of MDIFW or MDMR is required to add or remove a species to or from these categories. By policy rather than regulation, MDIFW has established other MESA-related administrative categories that cover species of special concern and extirpated species which are used for planning and informational purposes. Species in these categories do not have the legal protections afforded threatened and endangered species. By rule, MDIFW must review all species under its authority once every eight years to determine which species qualify for listing. During this comprehensive review, MDIFW biologists, guided by the Maine Endangered and Threatened Species Listing Handbook, compile a list of species likely eligible for addition to or removal from the state list of threatened and endangered species and share this list of candidate species with specialists in Maine and elsewhere. Based on input from these specialists, MDIFW may revise the list before presenting it to the public at public hearings. Ultimately, MDIFW submits its final recommendations to the Legislature for its review and approval.

See the discussion above regarding the federal Endangered Species Act.

## State Coastal Barriers Resources System Act

Like its federal counterpart (see above), the state Coastal Barrier Resources System Act (CBRSA), enacted in 1986, declares that certain areas of the Maine coast, because of their fragile nature and valuable habitat and their storm buffering abilities, should be protected and conserved in their natural state. Subject to several exceptions, this law bars expenditure of state funds or provision of state financial assistance for development in areas included within the state coastal barrier resources system. Thirty-two coastal areas, including Crescent Surf Beach in Kennebunk and Ogunquit Beach in Ogunquit, are within the State's coastal barrier system, maps of which are maintained by the Maine Geological Survey, in the Department of Agriculture, Conservation, and Forestry.

Comprehensive Planning and Land Use Regulation Act

The Comprehensive Planning and Land Use Regulation Act, commonly known as the Growth Management Act, was enacted in 1987 to ensure that each municipality of in the state would conduct comprehensive planning and land use management. The Act's following goals concern protection of the environment, natural and historic resources, and related uses:

- encourage orderly growth and development in appropriate areas of each community while protecting the State's rural character and preventing development sprawl;
- protect the quality and manage the quantity of the State's water resources, including lakes, aquifers, great ponds, estuaries, rivers and coastal areas;
- 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;
- 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;
- safeguard the State's agricultural and forest resources from development that threatens those resources;
- preserve the State's historic and archaeological resources; and
- promote and protect the availability of outdoor recreational opportunities for all Maine citizens, including access to waters.

The Act encourages each municipality in the State's organized area to develop a local growth management program that is consistent with its ten state goals. Development of a local growth management program involves two major steps: the preparation of a comprehensive plan that complies with the Act and the preparation of an implementation program that is consistent with that comprehensive plan. The comprehensive plan, which is the primary feature in the local growth management program, 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 it

articulates. 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 and by providing some financial assistance through planning grants.

## Coastal Management Policies Act

The Coastal Management Policies Act (CMPA) articulates legislative policies to guide management of Maine's coastal resources and uses. The CMPA calls for federal, state, and local agencies which are responsible for regulating, planning, developing, or managing coastal resources to conduct their activities consistently with the following general 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.

Not enforceable themselves, these policies are implemented through state and local land use and environmental laws.

## Site Location of Development Act (Site Law)

The Site Law, administered by the Maine Department of Environmental Protection (MDEP) and several of the State's larger municipalities in accordance with authority delegated by MDEP, requires review and permitting of developments that may have a substantial effect upon the environment. Identified in statute, these developments include projects occupying more than 20 acres; metallic mineral and advanced exploration projects; development activity that will result in creation of three acres or more of impervious area, such as roads or parking lots; certain large subdivisions, and oil terminal facilities. A permit is issued if the project meets applicable standards addressing topics such as stormwater management, groundwater protection, infrastructure, wildlife and fisheries, noise, and unusual natural areas.

The applicant for a new development that requires a Site Law permit (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. This meeting with MDEP's permitting staff is intended to help identify issues, processing times, fees, and the types of information and documentation necessary for the MDEP to properly assess the project.

## Natural Resources Protection Act

Administered primarily by MDEP, the Natural Resources Protection Act (NRPA) is focused on protection of natural resources of statewide significance. These protected natural resources include rivers and streams, great ponds, fragile mountain areas, freshwater wetlands, significant wildlife habitats, coastal wetlands, and coastal sand dune systems. Legislative findings in the NRPA emphasize that these resources

have uniquely significant natural resources-related characteristics, as well as recreational, cultural, historical, aesthetic, and environmental value that merit management to prevent their degradation and maintain their significant economic and environmental benefits.

An NRPA permit is required when an "activity" will be:

- Located in, on or over any protected natural resource, or
- Located adjacent to a coastal wetland, great pond, river, stream or brook or significant wildlife habitat contained within a freshwater wetland, or certain freshwater wetlands.

An "activity" is dredging, bulldozing, removing or displacing soil, sand, vegetation or other materials; draining or otherwise dewatering; filling, including adding sand or other material to a sand dune; or any construction, repair or alteration of any permanent structure.

## Mandatory Shoreland Zoning Act

Focused on areas adjacent to great ponds, rivers and larger streams, coastal areas, and wetlands, the Shoreland Zoning Act helps Maine communities to: 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; 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.

This law requires municipalities to protect shoreland areas through adopting shoreland zoning maps and ordinances. Zoning ordinances establish resource protection, general development, residential, and other zones which provide for what types of activities may occur in specified areas and address building size, setbacks, and comparable matters. The shoreland zone covered by the Act includes 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 whose duties include oversight of municipalities' implementation of the Act.

## Stormwater Management Law

MDEP's stormwater program works to protect and restore surface and groundwater affected 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.

MDEP regulates stormwater under three other state laws summarized in this appendix: the Site Location of Development Act, the Stormwater Management law, and the Wastewater Discharge Law. Some aspects of stormwater management are also addressed under industry specific laws such as the borrow pit and solid waste laws, and the rules applicable to the State's unorganized areas administered by the Maine Land Use Planning Commission.

## Erosion and Sedimentation Control Law

The erosion control law has a brief and basic standard requiring a person who conducts an activity involving filling, displacing, or exposing earthen materials to take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into waterbodies. 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 Planning Commission's standards are deemed to comply.

MDEP, which administers this law, 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. Both MDEP and municipal code enforcement officers have authority to enforce this law.

## Waste Water Discharge Laws

Administered by MDEP, the State's wastewater discharge laws require that a license be obtained for the discharge of pollutants to state waters, such as streams, rivers, or lakes, wetlands, or the ocean. Regulated discharges include sanitary waste water and process water as well as stormwater 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. MDEP administers the state wastewater discharge permitting laws in conjunction with the federal Clean Water Act's NPDES program discussed above.

## Maine Waterway Development and Conservation Act

The Maine Waterway Development and Conservation Act (MWDCA) requires that a permit be issued for the construction, reconstruction, or structural alteration (including some maintenance and repair) of new or existing hydropower projects. Hydropower projects include water-powered electrical and mechanical generating projects, including tidal power projects, and water storage projects. The MWDCA provides a comprehensive, one-stop state permitting process that is administered by MDEP for projects in organized municipalities and by the Land Use Planning Commission in the State's unorganized areas. The law requires consideration of the full range of economic, environmental, and energy benefits and adverse impacts of a hydropower project, including: the financial capability of the applicant to complete the proposed project, including any conditions of the permit; public safety; public benefits, including significant economic benefits and creation of employment opportunities; traffic movement out of or into the development area; environmental mitigation of adverse environmental impacts; environmental and energy-related considerations, focused on whether the advantages of the project are greater than its direct and cumulative adverse impacts; and the project's effects on water quality in the impoundment and in any classified water bodies downstream of the 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 in a community without such an entity, 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. In order to approve it, the municipal reviewing authority must determine that a proposed subdivision:

- 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;
- is backed by financial and technical capacity adequate 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;
- identifies the subdivider's determination, 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;
- identifies any river, stream, or brook and all freshwater wetlands on any maps submitted as part of the application, regardless of size of wetland;
- will provide for adequate storm water management;
- does not create spaghetti-lots (i.e., lot depth to shore frontage ratio greater than 5-to-1 prohibited);
- will not create cumulative effects that 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; and
- meets timber harvesting standards applicable to the proposed project as well as those applicable within five years prior to subdivision proposal.

# Appendix H: 15 CFR part 921 – NERRS Regulations

## Code of Federal Regulations

## Title 15: Commerce and Foreign Trade

## Part 921—National Estuarine Research Reserve System Regulations

### Contents



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 carrier 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 carrier 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, necessar 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 carrier 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-then-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 Esturaine 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 carrier 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 Reserve 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 comprehensivsitedescription/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 leyera, 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 Myricu, prunus, and Rosa.
2. Southeast areas: Floral dominants include Myrica, Baccharis, and Iles.
3. Western areas: Adenostoma, arcotyphylos, 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 underlaying 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, dinoflaggellates, filamintous 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 Ascophylium at the mid-tidal level, and Laminaria and other kelplike 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 possesses algae consisting mostly of single-celled or filamentour 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 and 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 keep, 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 aresufficient. 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 shorefront.

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 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 shorefront.

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 benthis algae such as Rhizoclonium, the mineral encrusting Schiuzothrix, and the vascular plant Ruppia maritima. Characteristic fauna which exhibit a high degree of endemicity, 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 orgin.

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 subtrate, 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 graduation 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 steepgradient 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 influx 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 influx 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.

# Appendix I: 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).