Docent Handbook
Welcome, New Docent!

Welcome New Volunteers,

The great thing about being an Exploring Estuaries docent is you get to introduce or reinforce the value of the estuary and the natural world to a group of students. We know that children don’t have the contact with the outdoors like they used to and we get the chance to do something about it.

There is terrific training and the opportunity to gradually develop skills. Having been a teacher is probably a plus, but many of us never were and we do just fine. Before we know it, we become knowledgeable and confident.

It’s great to spend a morning on the Reserve’s trails, putting in our own words, the information we’ve acquired. There are usually 5 or 6 groups of around 10 students plus teachers/chaperones. We take our group of students from station to station and share different aspects of the estuary and its surroundings.

There is no better way to influence future citizens than through interactive nature education. And, we learn so much in the process.

Vivian Howe
Exploring Estuaries Docent

Vivian lives in Scarborough, Maine and has been a docent since 2006. During the school year she leads ‘Exploring Estuaries’ and during the summer she leads ‘Life Between the Tides’, ‘Wildflower Walk’, and ‘Nature Walk’. Vivian is a wonderful naturalist who truly enjoys sharing the secrets of the outdoors that she has discovered on her journey as a life-long learner. You should ask her about some of her favorite books and her international birding trips to exotic locations such as Vietnam and Australia. Thanks, Vivian, for all of your great work! And thank you, new volunteer, for becoming a part of our docent team!
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   "The Docent Handbook"
   Sponsored by the National Docent Symposium Council

Look for this symbol at the end of each Chapter section for an interpretive summary.
Chapter 1: Being a Docent

Docent Definition

The term docent

docent (do’s’nt; G. do tsent’) n. [G., earlier sp. Of dozent, teacher, lecturer < L. docens, prp. of docere, to teach]

1. In some American universities, a teacher or lecturer not on the regular faculty.
2. A tour guide and lecturer, as at a nature center.

In this handbook the term docent describes docents, guides, interpreters, and all of those wonderful trained VOLUNTEERS who:

- Present to visitors, young and old, the natural world while inspiring a sense of wonder about nature
- Translate the language of living beings and life-giving elements; docents speak for the trees for the trees have no tongues! Frogs have tongues, but their life still needs to be interpreted for humans to understand
- Unlock the secrets of the salt marsh for visitors
- Bring to life our heritage and history of a historic salt water farm
- Encourage young audiences to get outside and enjoy nature and Inspire adult audience to be life-long learners

Being a docent means that you are joining a fantastic tribe of explorers and life-long learners.
Welcome to your next life adventure!

Objectives of the Docent Program

1.) To offer a program of informative and enjoyable learning experience for Wells Reserve visitors of all ages.
2.) To enhance the visitors’ knowledge of the estuary ecosystem.
3.) To heighten the visitor’s appreciation and awareness of estuaries in order to foster and attitude of concern for their preservation.
4.) To use interpretive and hands-on techniques, an inquiry and discovery approach, and sensory experiences in the presented programs.
Docent / Volunteer Naturalist Position Description

Title: Volunteer Naturalist

Major Objective: To lead enjoyable, educational programs for visitors of all ages at the Wells Reserve at Laudholm. [www.wellsreserve.org](http://www.wellsreserve.org)

Responsibilities:
1. Attend volunteer naturalist trainings to learn program content
2. Be the lead tour guide for programs that adhere to Wells Reserve education standards; tours are led outside on the trails, are an average size of 10 people, and last 2-3 hours
3. Assist with other education projects and events when possible

Qualifications:
1. Positive and friendly attitude
2. Dedication to the Wells Reserve mission: “The Wells National Estuarine Research Reserve works to expand knowledge about coasts and estuaries, engage people in environmental learning, and involve communities in conserving natural resources, all with a goal of protecting and restoring coastal ecosystems around the Gulf of Maine.”
3. Ability to walk on trails with easy terrain for 3 hours in changing weather
4. Ability to safely lead a group on trails while delivering an educational program
5. Access to outdoor gear for use in leading programs, e.g. rain coat, rain boots, etc.
6. Maintenance of clean appearance and courteous habits when dealing with the public
7. A clean record for working with children and the public
8. Minimum of 18 years of age
9. Good listening and speaking skills are a plus, but trainings are offered on this topic
10. CPR and First Aid certifications are a plus

Training
1. Apply and interview with the Volunteer Coordinator
2. Attend orientation, skills sessions, program training sessions, field trips, and potlucks
3. Shadow programs 1-2 times, then co-lead programs 1-2 times before leading solo
4. Be evaluated by staff in order to compliment and enhance program performance

Time and Place
1. Trainings occur in early spring, early summer, and early fall
2. Programs occur year round and are generally scheduled in the morning on weekdays
3. All trainings and programs are held at the Wells Reserve in Wells, Maine
Commitment
1. Minimum of 10 programs a year

Supervision
1. Direct supervision and support from the Wells Reserve staff

Benefits
1. Enjoy being outside on 7 miles of trails at the site of an historic salt-water farm
2. Learn about local wildlife and the importance of estuaries, where rivers meet the sea
3. Learn how to lead groups outdoors
4. Be a part of a great community of staff, volunteers, and members
5. Support the mission and maintenance of a national treasure

**Volunteers at the Wells Reserve at Laudholm**

One of the great strengths of the Wells Reserve is its spirit of volunteerism, which was essential to the establishment of the Reserve. The Reserve’s volunteer programs engage a diverse corps of more than 400 people who contribute over 15,000 hours annually to advancing the Wells Reserve’s mission. Volunteer programs are directed through a close collaboration with Laudholm Trust.

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

**Volunteer Positions**

Boards and Committees — Much of the work of Laudholm Trust and the Wells Reserve is done by boards and committees. These groups decide policies, raise funds, advise, oversee, and review programs, coordinate events, and get out in the field. Boards include the Wells Reserve Management Authority and the Laudholm Trust Board of Trustees. The committees are the Education Advisory Committee, the Research Advisory Committee, the Resource Management Advisory Committee, Volunteer Advisory Committee, the Library Advisory Committee, and the Building Advisory Committee, and the Sustainability Committee.

Docent — Lead groups through the trails of the Reserve. They lead programs for school groups and summer tours and special programs for the general public. Naturalists (also called volunteer naturalist) attend training led by education staff and guest speakers.
Grounds and Maintenance — Help with the maintenance of the property, including painting, fixing, building, mowing, and odd jobs.

Library Assistant— Help catalogue books and periodicals and staff the library during open hours.

Office Assistant— Help in a variety of ways including word processing and database management, special projects, and mailings. Volunteers work both at the Wells Reserve and the Laudholm Trust offices.

Parking Booth/Welcome Hut Attendant— Greet visitors as they arrive at the Reserve. Take and record parking fees, and give out information about events of the day.

Ranger— Walk the trails on weekends from mid-May through mid-November. Rangers are a resource to our visitors, carry a radio in case of emergencies, watch the condition of trails, encourage visitors to adhere to the regulations of the Reserve, and monitor the nesting piping plovers.

Research Assistant— Participate in ongoing and special projects including Beach Profiling and Phenology Monitoring, etc.

Special Events— Help with the planning and implementation of several events during the year. Annual events include Winter Wildlife Day, Earth Day, Volunteer Recognition, Laudholm Nature Crafts Festival, and Punkinfiddle: A National Estuaries Day Celebration.

Visitor Center Receptionist— Greet visitors who stop by or call on the phone. Volunteers learn about upcoming programs and events, the mission of the Wells Reserve and the Laudholm Trust, what’s going on in research, the history of the farm, the trails, and the exhibits.

**Docent Naturalist Program**

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

Docents come to the Reserve with a variety of backgrounds that enrich the volunteer community. They are former classroom teachers, veterinarians, engineers, homemakers, land trust employees, doctors, and interior decorators. In addition to completing trainings and leading groups, many docents attend public programs and travel to broaden their experience and knowledge in natural history.
The Education Program ensures that docents are knowledgeable guides, as docents are required to complete extensive training. This includes an orientation session, skill building sessions (e.g. Great Trip Leading, Uplands and Wetlands of the Wells Reserve), and specific program sessions (e.g. Microscopic Marvels, Secrets of the Salt Marsh). Docents also attend a staff-coordinated annual field trip to gain skills, enjoy time together and as a thank you! Past field trips include visiting the Great Bay NERR Discovery Center, Friends of Casco Bay’s volunteer offices, Wells Harbor via boat trips, and the Isles of Shoals Appledore Island Docent Tour.

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

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

Recognition is paramount to retaining quality volunteers. The Reserve aims to develop meaningful relationships with the docent corps by acknowledging docents’ impressive impact on program delivery and capacity, providing rewards incentives (such as Wells Reserve hats and t-shirts), and saying ‘thank you’ as often as possible.

Volunteers make the world go ‘round at the Wells Reserve at Laudholm. Thank you for giving your time!
Your personal notes…
Chapter 2: Introduction to the Wells Reserve at Laudholm

Part of a national system

The National Oceanic and Atmospheric Administration (NOAA) created the National Estuarine Research Reserve System (NERRS) in the 70’s to protect estuaries, where rivers meet the sea, after receiving lots of research confirming that estuaries are very important ecosystems. The NERRS protects more than 1.3 million coastal and estuarine acres in 29 reserves located in 23 states and Puerto Rico for purposes of long-term research, environmental monitoring, education and stewardship.

We are part of a national system! Think of the NERR system like the National Park System, but instead of protecting important areas of land, we protect important areas of water: ESTUARIES!
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 protect human communities from flooding. They act as buffers against coastal storms that would otherwise flood developed inland areas.

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

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.

Human Use of New England Estuaries

Native Americans—Native American tribes inhabited the coasts of Northern New England beginning several thousand years ago. These native peoples moved with the seasons and with the migrations of the shad, eel, alewife, and salmon. From October through March they hunted beaver, otter, moose, bear, and caribou; March brought spawning fish; from May through September they caught fish and shellfish off the coast. They used salt hay for weaving and gathered wild plants for medicine and food, wasting little of what they collected. With cattails, the Indians would bake the roots on the fire or grind them into flour. They added cattail pollen to cereals, flavored stews with the tender shoots, and wove the outside leaves into mats. In the autumn, they would dip cattail heads in bear grease and create torches.

European Settlers—European settlers were first attracted to this area by the extensive salt marshes, which stretched from Kittery to Cape Elizabeth. The marshes proved an ideal place to farm, providing already cleared and seeded pasture and hayfield. From the 1600s through the 1930s, salt hay from this land was used to feed livestock. The fence posts that can be viewed from the Laird-Norton overlook are remnants of the fences that used to keep cattle out of the marsh channels.

Salt hay was harvested with scythes and stacked to dry on wooden platforms called staddles. These staddles were built just tall enough to raise the salt hay above the level of the highest seasonal tides. The preferred grass for hay grew on the high marsh, so farmers would employ agricultural techniques such as ditches, dykes, and tide gates.
The settlers were thus able to maintain cattle throughout the winter, a feat which would have been impossible without salt marsh hay.

Industrialization/Development — By the 1930s, upland hayfields were abundant and marshes were no longer considered valuable. Salt marshes were primarily viewed as mosquito breeding grounds. Many estuarine areas were drained as a mosquito control measure. Salt marshes were used as dumping sites, and problems from sewage and pollution mounted, unrecognized. Marshes were filled in to build airports, houses, and buildings. By the 1950s, fifty percent of all Atlantic Coast estuaries had been altered in some way by human activities.

A changing view of estuaries emerged in the late 1960s. Declines in important fish stocks and a new suspicion of the impact of pollutants on the environment created a sudden interest in better understanding ecosystems and their functions. This new concern was part of a growing, nationwide environmental movement that continues to this day. Since the ‘60s, a large number of federal, state, and private programs have responded to this concern with laws supporting responsible use of estuarine areas.

Estuaries are where rivers meet the sea! This mix of fresh and salt water creates very important habit, providing many services for Humans and Wildlife.

The Wells Reserve at Laudholm

Wells National Estuarine Research Reserve

Mission— The Wells National Estuarine Research Reserve is dedicated to protecting and restoring coastal ecosystems of the Gulf of Maine through integrated research, stewardship, environmental learning, and community partnerships.

The Wells National Estuarine Research Reserve was designated a National Estuarine Research Reserve by the National Oceanic and Atmospheric Administration (NOAA) in 1984. The Wells Reserve is the only NERR in Maine and one of two NERRs located in NOAA’s Acadian Biogeographic Region. It is situated on the southern Maine coast, and comprises 2,250 acres of salt marshes, beaches, dunes, upland fields and forests, riparian areas 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, Town of Wells, the Maine Department of Conservation and the Wells Reserve Management Authority make up the Reserve.

*Laudholm Trust*

Mission—Laudholm Trust is dedicated to advancing the coastal research, education, and stewardship programs of the Wells Reserve and to preserving its historic buildings. Laudholm strives to extend its unique legacy by galvanizing community support and inspiring actions that protect Maine’s coastal environments.

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

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

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

Henry Boade first appeared in Maine in 1636 in Biddeford. In 1641, he moved to what would become known as the Town of Wells, and chose an upland meadow at the highest point of land on the coast to be the site for his estate, roughly the current location of the visitor center. Mr. Boade was appointed chairman of the Town’s first board of selectman and served as town commissioner. William Symonds was a selectman, a frequent member of the annual grand jury and the overseer of wills. The Clark era began in 1717 and lasted 163 years.
Throughout this period, the landscape changed dramatically, from a patchwork of habitats—both wild and those created by the Native Americans—to one that was predominantly agricultural. Fields for crops and livestock replaced forests and shrublands. A regular, predictable pattern was imposed on the landscape.

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

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

George Clement Lord II began living year-round at the farm in 1916. He served as a town selectman, a state representative and state senator and served on the Maine Governor’s Council. He was also active in many farming organizations and was president of the York County Breeder’s Association. (The name Laudholm Farm was established early in the 20th century.) The end of the Lords’ farming operation came in 1952 when the Laudholm Guernsey dairy cow herd was dispersed at auction.

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

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

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

1642 The Henry Boade family moves to the site.
1653 King’s Highway is established past Boade’s house to the mouth of the Little River.
1655 Boade sells the property to the Symonds.

King Philip's War. The Symonds family flees to a nearby garrison.
Abenaki Indians burn the farmhouse to the ground.
1655 The Clark family builds a new farmhouse and occupies the farm for 164 years.
1681 George C. Lord, President of Boston & Maine Railroad, purchases the farm.

(Lord was born in 1823 at Kennebunk Landing.)
1688 Lord builds the Elms Railroad Station (currently Harding's Books on Route 1).
1892 George's son, Robert, purchases purebred Guernsey's and establishes the farm's herd.
1893 George C. Lord dies; Robert assumes proprietorship of the farm.
1908 Robert Lord dies; brother Charles replaces him and adds poultry to the farm.
1916 George C. Lord II, son of Charles, takes over management of the farm.
1929 “Laudholm Manor Farms & Cottages” begins taking in summer boarders.
1952 Guernsey herd is auctioned off.
1953 Laudholm Farm hosts the Wells 300th Birthday celebration.
1969 George II sells 199 acres to the Maine Department of Conservation.
1977 George Lord II dies.
1978 Effort to save the farm begins.
1986 Wells National Estuarine Sanctuary is dedicated.

The Laudholm Trust and the Wells Reserve were formed in the early 1980's to protect the historic salt water farm and its estuaries. The Laudholm Farm campus serves as headquarters for the Wells Reserve and its historic buildings were renovated and restored to serve the present goals of research, education, and stewardship. The Wells Reserve at Laudholm is a national treasure that protects 2,250 acres and promotes healthy estuaries and coastal watersheds where coastal Communities and ecosystems thrive.
The three pillars of each Reserve

Research

The Wells Reserve expands knowledge about coasts and estuaries with an emphasis on ensuring healthy salt marsh ecosystems. Most investigations occur along Maine’s southwest coast from the Kennebec to the Piscataqua River, with effort focused between Kittery and Cape Elizabeth. The research program at the Wells Reserve has addressed questions regarding management of water quality, finfish and shellfish, and other wildlife as they apply to marsh-dominated estuaries and their watersheds throughout the Gulf of Maine.

Key themes of Wells Reserve research include:

- Understanding salt marsh habitats and plant communities
- Measuring the value of salt marsh habitats for fish, shellfish, and birds
- Exploring how salt marshes degrade and how they can be restored
- Monitoring water quality in estuaries

Some on-going research projects include:

- Estuary Water Quality
- Salt Marsh Restoration
- Coastal Watershed Land Use
- Wading Bird Monitoring
- Invasive Species
- Estuary Fish Distribution

Education

Each year, more than 8,000 children and adults participate in educational programs at our “living laboratory” and in our classroom and dedicated teaching laboratory. Our programs are developed with these two goals in mind 1.) Design and deliver field-based science education programs that promote stewardship of the Gulf of Maine watershed and coastal environments through understanding and appreciation of ecosystems and 2.) Optimize educational use of the site and increase public awareness of its ecological and cultural significance.

The geographic coverage of Wells Reserve education programs is southern Maine and southeastern New Hampshire. School programs attract teachers and students from a radius of approximately 60 miles, and public programs reach a much expanded audience through tourism. The Wells Reserve tailors its education programs for the general public, kids & families, schools and teachers, and groups (of 10 or more).

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

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

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

Self guided— We offer self-guided programs including the **Discovery Program**, which provides an interactive trail booklet with activity backpacks holding everything you need for a half-day investigation. This is especially fun for kids from 6 to 12 years old. The three topics are **Habitat Hike**, **Time Travels**, and **Water Wonders**.
Summer Guided Walks— Docent-led Interpretive Walks are offered during the summer season. Current walks include: Secrets of the Salt Marsh, Life Between the Tides, Laudholm’s Farming Past, and a Nature Walk. They address the history of Laudholm Farm, bird life, signs of wildlife, seasonal topics in natural history, tidal habitats, wildflowers and other Reserve plants, and estuarine ecology. These tours are led by docent naturalists and appeal to residents and tourists alike.

Day Camps are offered during school vacation weeks in February and April, in addition to the school summer break in June, July, and August. All camps strive to have campers outdoors as much as possible, fully immersed in habitat discovery.

Public— 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. Examples of public program include bird-banding demonstrations, lectures, kayaking, workshops, preschool exploration, nature crafts, celestial events, fall foliage, and wildlife.

Special Events— We have several special events throughout the year to bring the community to the Wells Reserve and to fundraise for Laudholm Trust. Annual events include Winter Wildlife Day, Earth Day, Volunteer Recognition, Laudholm Nature Crafts Festival, and Punkinfiddle: A National Estuaries Day Celebration.

Trunk Rentals— The Education Program offers several curriculum trunks to teachers for use in their classrooms. Topics currently include Maine wildlife, trees, birds, and estuaries. Each trunk has a multitude of activities with corresponding materials. The trunks serve to either extend a group’s field trip visit to the Reserve, or provide a lower-cost environmental education alternative that can be administered without paying for the program fees and transportation that field trips require.

Stewardship
The Wells Reserve landscape is a model for resource stewardship with several hundred acres managed for fish and wildlife habitat. It protects land and water within its boundary and targeted watershed area, and works with communities and organizations throughout southern Maine to help them conserve and better manage natural resources. Among the stewardship activities of the Wells Reserve are:

- maintaining and creating shrublands as wildlife habitat
- protecting rare plants and endangered animals
- maintaining fields for grassland nesting birds
- surveying wildlife populations
- restoring salt marsh habitats
- supporting watershed conservation and protecting priority fish and wildlife habitats
- providing maps and other natural resource data to communities
- holding workshops for conservation decision-makers controlling invasive plant species
Resource Management Projects— The Wells Reserve has been working on various resource management projects over the past five years that address long-standing issues (deer overpopulation) while others (such as Yankee Woodlot management) emerged recently.

- Deer Population Control
- Invasive Plant Control
- Early Successional Habitat Management
- Open Field Management
- Forest Management
- Drakes Island Restoration Monitoring

Community-Based Stewardship Projects— The Wells Reserve works with conservation partners in Southern Maine and throughout the Gulf of Maine to accomplish its coastal stewardship mission. For the most part, these activities occur beyond the Reserve boundary.

- Watershed Protection
- Land Conservation and GIS Center
- Habitat Restoration

The Wells Reserve at Laudholm promotes healthy coastal communities and coastal ecosystems through research, education, and stewardship.
Your personal notes…
Chapter 3: General information

<table>
<thead>
<tr>
<th><strong>Address</strong></th>
<th>Wells National Estuarine Research Reserve</th>
<th>Laudholm Trust</th>
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<tbody>
<tr>
<td></td>
<td>342 Laudholm Farm Road</td>
<td>PO Box 1007</td>
</tr>
<tr>
<td></td>
<td>Wells, ME 04090</td>
<td>Wells, ME 04090</td>
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<tr>
<td><strong>Telephone</strong></td>
<td>(207) 646-1555</td>
<td>(207) 646-4521</td>
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<tr>
<td><strong>Fax</strong></td>
<td>(207) 646-2930</td>
<td>(207) 646-2930</td>
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<td><strong>Web Site</strong></td>
<td>wellsreserve.org</td>
<td>wellsreserve.org</td>
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**Directions**

Wells NERR is about 30 miles north of the New Hampshire border. Use Interstate 95 Exit 2 to Wells, ME. Take a left after the tollbooth, heading east. At the junction with Route 1, turn left (north). Continue for approximately a mile. Our sign will be on the right side of the road before a blinking light and the Maine Diner. Follow the well-marked road to the Wells Reserve at Laudholm campus.

**Hours**

*Grounds:* The gates, trails, and bathrooms are open year round from 7 a.m. to sunset.  
*Visitor Center and Gift Shop:* The Visitor Center is open April through November on weekdays from 10 a.m. - 4 p.m. From Memorial Day in May to Columbus Day in October, it is open Monday through Saturday from 10 a.m. - 4 p.m. and Sunday from 12 p.m. - 4 p.m.

**The Volunteer People**

Volunteer Coordinator – Nancy Viehmann x118: Nancy works with staff in addressing volunteer needs, supporting and providing recognition for volunteers, and recruiting new ones. Nancy also does community relations outreach to our surrounding communities to increase awareness, membership, and support for the Reserve/Trust.

Docent Coordinator- Caryn Beiter x110: Caryn’s official title is School and Docent Programs Coordinator (programs coordinator). The main tasks associated with this title include coordinating docents, school and group programs, and summer guided walks. Basically, getting people out on the beautiful trails, either with great guides (docents) or on their own!

Environmental Educator—Linda Littlefield Grenfell x128: Linda splits her hours, spending time both out on the trails as an educator and also working with volunteers in various capacities, including scheduling and recruitment.

**Some partner organizations**
- Rachel Carson National Wildlife Refuge
- Sea Grant
- University of Southern Maine & University of New England
- York County Audubon Society
- local land trusts such as, Kittery Land Trust, Great Works Regional Land Trust
**Policies**

*Wells Reserve Regulations*

1. Only foot traffic is allowed on the trails. Remain on designated trails as seen on the Wells Reserve trail map.

2. Smoking is not allowed on Wells Reserve property.

3. **All plants, animals, and artifacts are protected.**
   
   _NO COLLECTING_ is allowed unless a permit has been granted.

4. Release of any animal, feeding of wildlife, or introduction of any plant is strictly prohibited.

5. No pets are allowed on the Wells Reserve.

6. Fires, camping, boating, swimming, and firearms are not permitted.

7. Picnic only in designated areas on the main campus.

8. There are no trash cans. Please carry out what you have brought with you, and watch for litter.

9. Researchers have established experiments around the Wells Reserve. Please do not remove or disturb any stakes, flags, or plots or disrupt experiments in any way.

10. Please stay at the south end of the beach during spring and summer months as piping plovers and least terns (both are endangered species) nest at the north end of the beach.

*Program Discipline Policy*

Discipline is the responsibility of teachers and chaperones during a guided program. The docents and staff at the Wells Reserve are here to provide a fun, educational experience for your students.

The staff and docents will make every attempt to engage students in the field trip experience. However, if a student disrupts the group and creates a difficult learning environment, s/he will be asked for cooperation once. If the student is not responsive, s/he must leave the group and return to the barn with the chaperone.
Communication

The Reserve encourages open communication among volunteers and with the Reserve staff. Successful working conditions and relationships depend upon successful communication. Volunteers should remain aware of changes in procedures, policies and general information; they should communicate their ideas, suggestions, personal goals, or problems that may affect their work and the working environment of the Reserve. The Reserve encourages all volunteers to bring forward their suggestions and good ideas about how our organization can be made a better place to work. When volunteers see an opportunity for improvement, they should contact their immediate supervisor. He or she can help bring the idea to the attention of the people that will be responsible for possibly implementing it.

First Aid
There are first aid kits located at the Visitor's Center, the main floor of the Barn, and in the Maine Coastal Ecology Center, in the docent room closet and in every school backpack.

Safety Comes First
Safety is to be given primary importance in every aspect of planning and performing all Reserve activities. The Reserve wants to protect volunteers against injury and illness, as well as minimize the potential loss of production. When leading a group, you must be carrying a first aid kit and radio on your person to deal with an emergency that might arise on the trail. If the situation is able to be treated with the first aid kit, please do so. If the situation requires further aid, please call for help on the radio to the staff person on campus stationed on the radio. Please report all injuries (no matter how slight) to supervisors immediately, as well as anything that needs repair or is a safety hazard. All safety rules must be followed.

Fire Extinguishers
There are fire extinguishers on every floor of the main house, in the Barn, and the Maine Coastal Ecology Center. Volunteers should become familiar with the location of each extinguisher.

Housekeeping
Volunteers are expected to keep their work area neat and orderly. Easily accessible trash receptacles and recycling containers are located throughout the buildings. Please put all litter and recyclable materials in the appropriate receptacles and containers. Always be aware of good health and safety standards, including fire and loss prevention.

Recycling and Energy Conservation
Energy conservation, recycling, and waste prevention are part of the core philosophy of the Reserve. Volunteers should actively recycle as many materials as possible and
make every effort to conserve energy. As a docent, please strive to be a great role model by bringing your reusable water bottle to use on programs. Thanks!

Employee Parking

Volunteers should park in the main (lower) parking lot. Parking on the campus (next to the copper beech tree), near the barn, or at the Maine Coastal Ecology Center should occur only when delivering items or when a volunteer is here for a short duration (less than an hour). Volunteers should not park in handicapped areas. The Reserve does not assume any liability to volunteers’ vehicles for any loss or damages they may sustain.

Personal Phone Calls, Internet and E-mail, and Postage/Mail

Volunteers should keep personal phone calls to a minimum—personal calls are allowed must not interfere with work or be excessive. Volunteers can use the Reserve’s Internet and e-mail for incidental personal use. However, use of the Reserve’s e-mail, Internet, and letterhead/envelopes for political advocacy or outside business purposes is prohibited.

Personal Use of Reserve Property

Personal use of Reserve’s tools or equipment is discouraged, though permission may be granted to use Reserve property for special occasions. If this is the case, it must be approved by the volunteer’s supervisor. Reserve property issued to volunteers -- such as tools, keys etc. – must be returned to the Reserve at the time of dismissal or resignation, or whenever it is requested by the supervisor or the Reserve Director. Volunteers are responsible to pay for any lost or damaged items.

Theft

Property theft of any type will not be tolerated by the Wells Reserve and will result in a volunteer’s dismissal and/or prosecution.

Substance Abuse

The Wells Reserve is committed to providing its volunteers with a safe workplace and an atmosphere which allows them to protect inventory and other assets placed in their care; Reserve volunteers should not be subject to any safety threats from fellow volunteers and staff. Volunteers are expected to be in suitable mental and physical condition while volunteering, allowing them to perform their jobs effectively and safely.

Violations of Policies

Volunteers are expected to abide by the policies in this Handbook. Failure to do so will lead to appropriate disciplinary action. A written record of all policy violations is maintained in each individual's personnel file.
Your personal notes…
Chapter 4: Ecology

Also read “What is Ecology? An Introduction to Ecology Through Estuaries”

Geography

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

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

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

The Reserve is located in the Gulf of Maine Coastal Lowland Subsection—one of 19 eco-regions in Maine. Called Bailey’s Ecoregions, and developed by the U.S. Forest Service, The Nature Conservancy and the Maine Natural Areas Program, these ecoregions are grouped according to physiography, climate, geology, soils and vegetation. The Gulf of Maine Coastal Lowland Subsection is a 20-plus mile-wide band that extends from the Piscataqua River (which divides Maine and New Hampshire) to Casco Bay. The Atlantic coastal plain, which is broad and clearly defined in states to the south, reaches its eastern extent near Portland. As a result, this eco-region is characterized by a relatively smooth coastline of large headlands, broad bays and sandy beaches. The terrain is relatively flat, with elevations rarely rising above 100 feet—Mount Agamenticus (which reaches an elevation of 691 feet and is the highest point in the region) being one of the exceptions.

The Wells Reserve lies at the heart of the Gulf of Maine watershed, which is one of the world’s most biologically productive environments.
Geology

The creation of the present estuaries in the Gulf of Maine region began with glaciation during the last ice age. Between 20,000 and 18,000 years ago, a massive ice sheet named the Laurentide, moved across the present Gulf of Maine until it reached Georges Bank. At the location of the current Wells Reserve, the ice was about one mile thick. The glacier began its slow retreat between 17,000 and 15,000 years ago, leaving behind meltwater channels, crevasse fillings, and eskers (narrow ridges of gravel deposited by streams flowing within the melting glacier).

As the glacier moved northward, the shoreline moved with it. The glacier acted as an immense weight, depressing the land so it was beneath the sea. This, combined with the vast amounts of meltwater entering the Atlantic, caused the shoreline to move as much as sixty miles inland from the present coast. The current Wells Reserve was covered by water approximately 700 feet deep.

During this time of submergence, streams flowing within the melting glacier transported large amounts of sediments to the glacier/ocean interface. Settling out of the water, the sediments formed a large clay/silt deposit known as the Great Sanford Submarine Fan. The deposited materials would eventually be turned into the present marshes and beaches.

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 and stones. Swamp and Tidal Marsh is the most common deposit type at the Reserve.

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

About 20,000 years ago, the massive sheet of ice known as the Laurentide glacier scoured the soils and shaped all of New England.
Hydrology

Watersheds

A watershed is the area of land across which water moves as it drains towards the ocean. Its boundaries are the high points of land (the divide) and the final destination (lake or ocean). One analogy for the watershed basin is a bowl. Precipitation lands on the rim (the divide) and trickles into the bowl (basin) or outside the bowl (another watershed basin). All the water that is in the bowl is a single watershed.

Watersheds link habitats together since a drop of rain falling in one place flows through many habitats during its journey to the ocean. A contaminant finding its way into one location in a watershed will eventually be transported to other parts of the watershed, so pollution introduced into one habitat may have wide-ranging effects.

Watersheds can be defined according to their different sizes. A tiny brook receives water from a small watershed. The stream that the brook flows into has a watershed that includes the brook’s watershed and the watersheds of all the other brooks that flow into the stream. That stream flows into a river, and the river’s watershed comprises the watersheds of all the streams that flow into it.
Watersheds at the Wells Reserve at Laudholm — The Webhannet and Little Rivers form the Reserve's watershed. The Webhannet River watershed has a drainage area of 14 square miles, entirely within the Town of Wells, 18.6 % of which is developed land. This watershed has a significantly higher percentage of developed land than the neighboring Little River Watershed which has only 5.7 %. The Little River watershed is 31 square miles. Even though the Little River watershed is much larger than the Webhannet watershed, the Webhannet is the larger river with a higher discharge rate. Both watersheds empty into Wells Bay.
The Gulf of Maine watershed — Both the Little River and the Webhannet River watersheds are part of the much larger Gulf of Maine (GOM) watershed. Its northern and western boundaries are defined by the coastline from Cape Cod, Massachusetts to Cape Sable, Nova Scotia. Georges Bank, which rises within thirteen feet of the ocean surface, forms the eastern and southern boundaries of the Gulf of Maine.

These geological features, which form a basin resembling a bathtub 150 meters deep on average, restrict the movement of water in the Gulf of Maine (GOM). The GOM receives a large amount of fresh water from the many rivers in its watershed. This water tends to stay in the GOM, entrapped in its counterclockwise circulation. Since the GOM receives so much fresh water that has no place to go, the salinity in the Gulf of Maine is significantly less than in the open ocean (31-33 ppt as opposed to 35 ppt).

Tides

Tides are caused by the gravitational pull of the moon and sun on the ocean and by centrifugal force. The moon, being closer to us than the sun, has a greater pull. The combined influence of these forces causes water in the oceans to be pulled into two large tidal bulges on opposite sides of the earth. As the earth rotates daily on its axis, high tide occurs when a point on the earth’s surface is in one of these bulges, and low tide happens when the point moves out of the bulge.

As the Gulf of Maine moves into one of these bulges in the course of Earth’s daily rotation, the water level rises here and we experience high tide. We have low tide about six hours (a quarter of a day) later because the earth has spun a quarter of a rotation, and we have spun out of the bulge. As the rotation continues, another high tide develops as we move into the other bulge. This pattern continues, causing the alternating rise and fall of the tides that we see at the seashore.
The Gulf of Maine, like the rest of the east coast of North America, has semi-diurnal, or twice-daily tides. This means that within a 24-hour period there will be two high tides and two low tides. Other parts of the world can experience different tide patterns as a result of geographic conditions that affect the movement of water. Along the southern coast of Maine, the tidal range (the vertical distance between high and low tides) is an average of about 8 feet. The estuary experiences a much greater tidal range, from 1.8 feet to 11.2 feet.

The sun's gravity helps or hinders the moon’s pull, depending upon the alignment of the sun, moon, and earth. When all are in a straight line at full and new moons, the strongest force occurs and the vertical difference between high tide and low tide is the greatest. These highest of high tides are called spring tides. When the sun and moon are at right angles to the earth, at quarter moons, the weakest, or neap tides occur. During each lunar cycle of 28 days there are two spring and two neap tides.

The Gulf of Maine is an amazingly productive body of water because of its shape and cold waters. Think of it like a toilet bowl that flushes; the warm Atlantic current hits Georges Bank and shoots off into open water. Then the cold, northern waters of the Labrador Current funnel through a narrow opening between the tips of Nova Scotia and Georges Bank into the Gulf of Maine (like when you place your thumb over the garden hose to make more water pressure). This cold water shoots quickly into the Gulf of Maine and swirls around in its’ shallow basin, mixing lots of oxygen in the water and removing waste very quickly. That creates great conditions for plankton to grow, which is the base of the food chain. So the shape and cold water create a very healthy habitat for many, many creatures!
Climate

The climate of south coastal Maine is the mildest in the State of Maine. As a rule, south coastal Maine has very pleasant summers and falls, cold winters with frequent thaws and unpredictable springs. The Reserve’s weather station indicates average annual temperatures ranging from 45 to 49°F (7.2 to 9.6°C). Twelve weeks per year show average temperatures below freezing, and the warmest 8 weeks of the year average around 68°F (20°C). Few summer nights are too warm and humid for comfortable sleeping. Autumn has the greatest number of sunny days and the least cloudiness. There appears to be moderate reduction in sunlight in the first few weeks of July, perhaps due to fog as newly warmed inland air meets the still cold air at the ocean’s surface. Winters are quite severe, but begin late and then often extend into the springtime. Heavy seasonal snowfalls, over 100 inches (2,540 mm), occur about every 10 years. True blizzards are very rare. The White Mountains, to the northwest, keep considerable snow from reaching the area and also moderate the temperature. Normal monthly precipitation is remarkably uniform throughout the year. Winds are generally quite light with the highest velocities being confined mostly to March and November. Even in these months the occasional northeasterly gales have usually lost much of their severity before reaching the coast of Maine. Temperatures well below zero °F (-17.8°C) are recorded frequently each winter. Cold waves sometimes come in on strong winds, but extremely low temperatures are generally accompanied by light winds. The average freeze-free season is 139 days. Mid–May is the average occurrence of the last freeze in spring, and the average occurrence of the first freeze in fall is late September.

We experience the mildest climates in the state of Maine because of our southern and coastal location. Large bodies of water change temperature more slowly than land, so living next to the ocean helps regulate temperatures!

Habitats and Communities

A habitat is the place where an organism lives. Every species has a set of abiotic and biotic resources and conditions that it needs in order to survive. Resources are entities (e.g., food, light, water, etc.) that the organism uses or consumes during its lifetime. Conditions are characteristics of the environment that influence the survival of an organism but are not consumed by it (e.g., temperature, salinity, pH). When all of a species’ requirements are met, a particular location is a suitable habitat, and that species has the potential to live successfully there. A habitat is always considered from the point of view of an individual organism.

A community is an association of interactive populations and consists of all the living things found in a place; i.e., all the populations of different species living together. A community does not include non-living things, although non-living things (abiotic factors) such as salinity, climate, wind, light, and moisture are important effects.

The vegetation of Gulf of Maine Coastal Lowland Subsection resembles that of the Atlantic Coastal Plain to the south. Ecosystems that reach their northern extensions
Here include sandplain grasslands (found at the Kennebunk Plains Wildlife Management Area, located 6 miles east of the Reserve) and oak-hickory forests (found around Mount Agamenticus). The largest coastal pitch pine communities in Maine occur on the well-drained, nutrient-poor sandy soils in Scarborough, Kennebunk and Wells. Small stands of pitch pine-scrub oak and the state’s most extensive salt marshes are located in this region.

The Wells Reserve contains a variety of habitats, including 1) upland fields and forests, 2) riverine systems, 3) wetlands, 4) sand beach and dunes.

**Upland Fields and Forests**

Uplands lie above the reaches of the highest high tides. Firm, relatively dry soil supports grasses, herbs, shrubs, and tree saplings, which provide shelter and food for animals. Uplands are not part of the estuary, but they influence it. Groundwater and runoff flow through and over uplands, sometimes transporting contaminants to the estuary. Also, uplands animals make use of the estuary to feed.

Surrounding the fields at the Wells Reserve are forested areas in various stages of growth. Over 100 years or so, grasses and shrubs have been crowded out by trees which have blocked out their sunlight, crowded the soil with their roots, and created niches for shade-tolerant plants on the forest floor. Soil in forests is generally moister and cooler than that of fields because of the increased shade. In more level and sandy areas, white pines and red spruce have become the dominant canopy tree. These trees hold up their impressive height and branches with an extensive but shallow root system just below the soil’s surface. Very little light penetrates the thick clusters of needles, and the understory remains relatively open, populated by ferns, mosses, and shade-tolerant hemlock trees.

On hillsides where the ground is less stable, trees with smaller stature and deeper root systems such as red maple, red oak, and white birch dominate. Canopy breaks allow light to reach the forest floor so that shrubs and ferns are often seen in the understory.

Prior to European settlement, oak-pine forest covered lands now encompassed by the Wells Reserve. Beginning in the mid 17th century, forests were cleared for timber, farming and fuel. As farms were abandoned in the 19th and 20th centuries, fields were largely supplanted by forests through natural succession.

The Wells Reserve at Laudholm Farm displays this land-use evolution with four upland habitats: mowed fields, old fields, oak-pine forest and mixed second-growth forest.

**Old Fields** — Adjacent to the Reserve’s mowed fields, two “old fields” are succeeding to shrubs such as barberry, honeysuckle and bayberry. Apple and hawthorn trees line the field edges and hedge rows. White pine and poplar forests overtaking these old fields contain herbs and grasses associated with old fields. The field areas of the Wells Reserve exist on the highest elevations. The dominant vegetation in this area is grasses, and perennial and annual herbs (non-woody plants). Insects are abundant in the fields. Small burrowing mammals such as mice, moles, voles, and shrews inhabit or
visit the fields year-round, while larger animals and birds leave the protection of the nearby forest either by day or night for grazing or hunting.

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

_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.

_Riverine Systems_

From their sources on distant hills and their network of tributaries, rivers carry fresh water and nutrients to the estuary as they flow toward the sea.

The rivers and streams of the estuary vary in temperature, swiftness, and salinity as they flow from fresh toward salt water. There are many changing conditions along the length of a river and from its surface water down to its bottom, which provide distinct habitats for a wide assortment of plants and animals.

As river and ocean waters meet in the estuary, various degrees of mixing occur according to the river’s size. In deep rivers the heavier saltwater sinks to the bottom, forming a wedge below the freshwater. In shallow systems such as the Little River and Webhannet River estuaries in Wells, a thorough mixing of the saltwater and freshwater occurs, making the water brackish. Brackish water is usually salty enough to taste, but not as salty as sea water.

If a system is thoroughly mixed, the shift from salt to fresh water can be seen. As salinity drops, fish, shellfish, and plant species change. Oysters and mussels can no longer reproduce: clams, grasses, and other inhabitants change from saltwater species to freshwater species.

The river community is a diverse assemblage of organisms. Creatures inhabiting the water column include everything from microscopic plants to large marine mammals. Aquatic organisms can be divided into two general groups: nekton and plankton. Nektons are all the aquatic animals that can swim through the water against currents: marine mammals, fish, squid, and some crustaceans. Plankton refers to all waterborne organisms that cannot swim against currents and are transported from place to place by currents.
Wetlands

The majority of the Wells Reserve’s lands are wetlands. Wetlands are marshes and swamps made up of soaked, wet ground or are covered with shallow water over a muddy bottom. In the mud, plants take root to send their stems, leaves, and flowers up above the water. A marsh is made up of many grasses, sedges, and a few shrubs, but not trees or woody plants. Swamps have trees, bushes, and shrubs as well as grasses and sedges.

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

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

The salt marsh features waterlogged, root-filled, springy soil and virtually flat, grassy expanses. It is formed by plants which eventually decay to form a water-logged soil called peat. The peat accumulates in the protected area behind the barriers building the marsh. Marshes are divided into two basic zones: high marsh and low marsh. High marsh consists of peat that has accumulated on top of a foundation of ancient low marsh peat. The low marsh represents newer areas of marsh that have developed (and continue to develop) with slowly rising sea level, extending the marsh further into the bay or river. The Wells Reserve marshes are predominantly high marsh, with only fringes of low marsh lining the rivers and creeks.

The salt marsh plant community displays a distinct pattern of zonation related to salinity and soil wetness. The highest zone, the upland edge of the marsh, contains some alders, a few blueberry plants, several grasses, and sometimes cattails. Between the mean water level and extreme high tide mark is black rush (*Juncus gerardi*). Next is the salt hay (*Spartina patens*) zone, or high marsh, which also includes spike grass, seaside plantain, orach, glasswort, seaside arrowgrass, seaside goldenrod, sea lavender, and milkwort. Cordgrass (*Spartina alterniflora*) dominates the low marsh to the river’s edge.

The salt marsh serves several important purposes. It provides food and shelter for a variety of animals who spend their whole lives there. These animals include a variety of mammals, birds, fish, shellfish, and insects. Many other animals spend just a portion of their lives in the marsh. The marsh acts as a food production and distribution system. It is here that most of the nutrients, discussed above, are produced. Salt marshes produce more nutrients per acre than the richest farm lands.

The salt marsh also acts as a nursery for fish and shellfish. Shad, alewife, and striped bass move through the brackish marsh to freshwater to spawn. The hatchlings move back downstream to the marsh to feed and grow in a protected area until they mature.
and enter the sea, continuing a cycle that has existed for a millennia. Crabs, shrimp, clams, oysters, and mussels also spend all or part of their lives in the salt marsh. Finally, the salt marsh acts as a buffer between the harsh environment of the ocean, with its strong winds and powerful waves, and the upland areas. It protects these uplands by absorbing damaging floodwaters like a giant sponge. The marsh also absorbs harmful pollutants from the land before they enter the ocean waters.

The parts of the benthic zone that are exposed at low tide are called mudflats (or sandflats if they’re sandy). These areas are unmistakable – your nose will alert you to the rotting plant smell from the exposed marsh. Innumerable holes, trails, and shells are evidence of all the burrowing animals that inhabit the flats. The microscopic algae covering the flats as well as detritus, bacteria, and plankton are all important producers in the food web.

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

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

*Brackish Marsh* — as one travels up river from the estuaries of the Wells Reserve, marshes continue to occur in the inter-tidal environments, changing from salt marsh to brackish marsh to tidal freshwater marsh. The largest and most visible brackish marsh at the Reserve occurs on the north side of the Drakes Island Road -- called the Drakes Island Marsh. Tidal flow was once restricted to this marsh by a tide gate, which allowed freshwater, grassy plants such as reeds, cattails, and rushes to invade. Many kinds of insects, birds, mammals, and fish are able to live in this environment. The gate fell off in the late 1980’s and was left un-repaired, which allowed for partial restoration of tidal flow. In 2005, a larger culvert that connects the tides with this marsh and a self-regulating tide-gate were installed. This will increase tidal flow even more, which should result in furthering salt-marsh restoration.

*Sand 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 stabilized foredune exists near the river mouth. Landward of the foredune are stable backdunes and heavily vegetated washover areas.

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

Intertidal habitats include portions of the salt marsh, high energy dynamic beach areas 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.

The Wells Reserve at Laudholm enjoys a wonderful diversity of habitats, from rivers to salt marshes to beaches!

Flora and fauna

Flora

Botanical surveys and observations at the Wells Reserve have identified nearly 500 species of vascular plants. Along the coastline, the Reserve has a couple of 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 of the Wells Reserve, including slender blue flag iris and sassafras. Both are at the northern limit of their ranges. Two varieties of eastern Joe-Pye weed occur on the Reserve. In the uplands, invasive shrubs have invaded and are pervasive, in particular Japanese barberry.

Vascular plants —Vascular plants are characterized by a specialized supporting and water-conducting tissue call xylem, and a food-conduction tissue called phloem. Roots not only anchor a plant and store food, but also take water and minerals up from the soil for the stem and leaves. Inside the plant is like a two-way street: water and minerals travel up from the soil for the stem and leaves, and carbohydrates (manufactured through photosynthesis) are move from the leaves to the stem and roots.

At the Reserve there are several groups of vascular plants: mosses, ferns, conifers (gymnosperms), broad-leaved trees (angiosperms), and numerous wildflowers.

Mosses, ferns, horsetails, and club mosses reproduce from spores rather than from seeds. Sphagnum moss is prevalent along the wet woodland trails. Common ferns include hay-scented, New York, and cinnamon fern.

Conifers, or gymnosperms, have exposed seeds on cones. They are often referred to as evergreens and softwoods. Their leaves are needle-like or scale-like. Most conifers in New England belong to the pine family. Common conifers at the Reserve include eastern white pine, red spruce, and balsam fir.
Broadleaves, or angiosperms, have seeds in an ovary, which flowers and matures into a fruit. Their leaves are broad and flat and drop in the fall, making these trees deciduous. Broadleaves that are common on the Reserve grounds include red maple, red oak, yellow birch, white birch, gray birch, black cherry, speckled alder, and white ash.

Wildflowers abound throughout the spring, summer, and fall. In spring, look for the flowering bluet, common and marsh blue violet, wild geranium, rhodora, red sorrel, and fringed polygala. All summer long, flowering species include the beach or rugosa rose, pasture rose, cow vetch, milkweed, hedge bindweed, beach pea, spotted Joe-Pye weed, cinquefoil, hawkweed, and buttercup. Into October, enjoy the flowering clover, butter-and-eggs, goldenrod, and field mustard. See the VC’s Common Flora of the Wells Reserve handbook for more information, including pressed flower samples.

Algae — Most marine plants are algae: non-vascular, meaning they have no roots, stems, leaves, or flowers. The only vascular marine plant found at the Reserve is eelgrass. Pelagic algae live in the water column and are the free-floating, unattached plants known as phytoplankton. Most are microscopic, and many are unicellular. Most attached algae are multi-cellular and relatively large. The four major groups are named for their colors: blue-green, green, red, and brown.

Blue-green algae are found in the air, on the ground, and in fresh and salt water – anywhere that both light and water are present. Calothrix is one variety found on intertidal rocks, forming dark mats just above the high tide mark in the splash zone.

The other colors of algae make up the bulk of marine plants known as seaweeds. All have stalks, leaf-like structures called fronds, and a rooting structure called a holdfast, which permits them to attach to rocks, shells, piers or substrate. On Laudholm Beach, one may find species of red algae (Irish moss, dulse), brown algae (knotted wrack, rockweed, kelp), and green algae (sea lettuce).

Other “Plants” — Fungi do not carry out photosynthesis. They are decomposers that obtain food from organic matter, living or dead. Mushrooms of all varieties fall into this category and reproduce through single-cells called spores. Common fungi at the Reserve include the coral mushroom, beautiful puffball, earth star, artist’s fungus, rusty hoof fomes, and the cinnabar polypore.

Lichens are organisms made up of both a fungus and either green algae or photosynthetic bacteria. The fungus gathers moisture and mineral nutrition from whatever it grows on, while the algae or bacteria provide nutritional sugars from photosynthesis. Lichens can usually be found growing on rocks and trees in the woodlands and fields of the Reserve.

Invasive flora — Both Japanese barberry and Morrow’s honeysuckle are non-native, highly invasive species which have become major problems at the Reserve. The barberry is currently the subject of extensive research which will hopefully produce ways in which to curb its propagation. Phragmites (a type of reed) and Asiatic bittersweet are also problematic.
Fauna

The primary wildlife groups finding refuge in the Reserve include waterfowl, raptorial birds, shorebirds, wading birds, gulls and terns, songbirds, terrestrial mammals, fish, marine invertebrates, reptiles, and amphibians. Wildlife are attracted to the Reserve due to the variety of vegetation and abundance of food found in its fields, woods, estuaries and wetlands.

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

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

Insects —The largest category of visible inhabitants of the Wells Reserve is, of course, the insects. Monarch butterflies are a regular visitor to milkweed plants on which they lay their eggs and on which their colorful larvae feed. Greenhead flies and salt marsh mosquitoes are especially notorious inhabitants of the salt marsh. Dragonflies and damselflies take wing through the marsh and fields preying upon smaller insects; mosquitoes are a favorite food. The webs of eastern tent caterpillars adorn the trees. Fields are especially rich in insect species.

Aquatic invertebrates —The mudflats, beaches, and riverbanks at the Reserve are host to a number of aquatic invertebrates. Some common marine invertebrates at the Reserve include periwinkles, green crabs, barnacles, mussels, amphipods and isopods. Amphipods are crustaceans with bodies compressed from side to side, while their relatives, the isopods, are usually flattened top to bottom. The most familiar amphipods are the tide-pool inhabiting scuds and the beach fleas that hop along the sand. The best known isopods are the terrestrial pill bugs that are found under decaying logs and roll up into a ball when disturbed. Soft-shell clams, razor clams, and clamworms are common inhabitants of the mudflats and sandflats of the Reserve, living their lives buried in the mud or sand. Jellyfish and comb jellies float in the rivers and ocean and are sometimes found washed up on the beach.

The freshwater wetlands of the Reserve are host to numerous aquatic invertebrates. Water striders skate across the tops of ponds. Water boatmen, giant water bugs, and predaceous diving beetles can be found swimming in most bodies of freshwater. The larval forms of flies, mosquitoes, and dragonflies also inhabit the aquatic world. Mosquitoes lay their eggs on the surface of any standing water. Their larvae remain in the water, swimming about, until they are ready to metamorphose into the common...
adult form. Caddis fly larvae are common predators of freshwater ponds, and make their homes out of tiny rocks, sticks and leaves.

**Plankton** — Plankton are water-borne organisms that swim feebly, if at all, and are at the mercy of the currents. Some of the most abundant organisms on earth, plankton can be divided into two groups: phytoplankton, which are plants, and zooplankton, which are animals. Many people think of plankton as tiny, microscopic plants and animals. However, not all plankton are small. Many jellyfish, for example, are often relatively large, but they are considered plankton because they simply drift with the currents. Common types of phytoplankton in the local ocean and river are diatoms, dinoflagellates and coccolithophores. Some dinoflagellates are responsible for the dreaded "red tides" that occasionally bathe our coasts in reddish or reddish-brown water.

Common zooplankton are copepods, Cladocera species, and jellyfish. Copepods are herbivorous zooplankton, eating phytoplankton as their primary food source. They are crustaceans, relatives of crabs and lobsters. These zooplankton spend their entire lives as plankton. However, many familiar creatures only begin their lives as plankton — barnacles, sand dollars, sea stars, sea urchins, crabs, eels, spiny lobsters, and many varieties of fish. These planktonic larvae float in the water until they metamorphose into adults and settle out of the water column or develop the ability to swim freely through the water column.

Plankton populations fluctuate on a seasonal basis. Huge bursts of phytoplankton growth are called blooms and typically occur in the spring and autumn. Zooplankton populations increase in response to the spring phytoplankton bloom.

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

Fifty-five fish species from 30 families have been documented at the Wells Reserve. They were found between 1989 and 2001 during surveys of the Little River, Webhannet River, Merriland River, Branch Brook and Wells embayment. The most common were the American eel, alewife, common mummichog, Atlantic silverside and three stickleback species (fourspine, threespine, and ninespine). Four reptile species, seven amphibian species, more than 230 bird species and at least 32 mammal species have been documented at the Wells Reserve.

**Birds** — Over 200 species of birds can be viewed at the Reserve during the course of the year. The Reserve is an integral part of the Atlantic Coast Bird Migration Corridor. Thousands of birds annually move through the Reserve, stopping to rest and feed on their journey northward or southward. Species of loons and grebes, cormorants, bitterns, herons and ibises, swans, geese and ducks, vultures, hawks and falcon, grouse, pheasants, plovers and sandpipers, gulls, terns, murres, owls, woodpeckers, swallows, crows, chickadees, kinglets, starlings, waxwings, sparrows and finches are some of the many types of birds that use the Reserve as either a home or a
resting place as they migrate.

**Mammals** — At the Reserve, the majority of mammals live in the upland forests and fields. Many venture into the salt marsh or to the river in search of food. In the forests and fields, one may see white-tailed deer, coyotes, red foxes, bats, woodchucks, voles, shrews, mice, porcupines, bats, squirrels, chipmunks, snowshoe hares and cottontail rabbits. Raccoons, skunks, coyotes, and foxes forage and hunt in the salt marsh and along the beach. River otter and mink fish in the rivers. Harbor seals haul out onto the beach and will swim into the river mouth.

**Amphibians** — Amphibians are cold-blooded and develop from aquatic, water-breathing larvae to terrestrial, air-breathing adults. They must live near freshwater to avoid dehydration and to lay their eggs in water. Frogs, toads, and salamanders can be found underneath logs, rocks, and leaves in any wooded area and in or near any freshwater pool or swamp. They cannot survive in saltwater. Frogs found at the Reserve include spring peepers, wood, and green frogs. The American toad is the most likely toad species to be encountered along the woodland trails.

The northern redback salamander is the most abundant amphibian, and probably the most abundant vertebrate animal, in this region. The northern redback is a small, dark salamander with a reddish-brown stripe down its back. The spotted salamander, a striking, large, black salamander with yellow spots, can sometimes be found in woodland pools in the spring.

**Reptiles** — The most common reptile at the Reserve is the garter snake. Typically, this snake has three yellowish or brownish stripes on its back; however, colors and patterns vary. Garter snakes are found in a variety of habitats including fields, marshes, forests, forest edges, and edges of streams and ponds. Milk snakes are also commonly seen at the Reserve, especially in and around barn. The most common turtle, the painted turtle, prefers shallow ponds, marshes, and bogs. They are often seen basking in the sun on warm summer days.

**Fish** — Some fish species found at the Reserve are estuarine residents, spending most of their time there, while other fish come and go from the estuary. The former tend to be small fish, including mummichogs, sticklebacks, Atlantic silversides, American sand lance, pipefish, and American eels. Schools of tiny brown mummichogs can be seen darting in the shallows of the salt marsh and in pannes. Larger fish visit the estuary to feed or spawn. At the Wells Reserve, these include bluefish, striped bass, herring, alewife, Atlantic tomcod, white hake, rainbow smelt, brook trout, brown trout, white perch, and flounder.

Because The Wells Reserve at Laudholm has such a wonderful diversity of habitats, we enjoy all of the plant and Animal Communities that live in these habitats!
Your personal notes…
Chapter 5: Interpretation

Introduction to interpretation and environmental education

What is Interpretation? Interpretation is a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource.

Using interpretation allows a teacher, docent, and guide to communicate important information in a meaningful way. Information, as such, is not Interpretation. Interpretation is revelation based on information. It is an art which combines many arts, whether the materials presented are scientific, historical, or architectural. Interpretation should aim to present a whole rather than a part. It must relate what is being displayed or described to something within the personality or experience of the individual. When addressed to children, interpretation should not be a dilution of the presentation to adults; rather, it should follow a fundamentally different approach. Remember, the chief aim of interpretation is not instruction, but provocation.

Interpretation is a tool that can create an amazing and memorable experience for a visitor and their leader. As a docent at the Wells Reserve, you will be an environmental educator that communicates using interpretation.

But then what is Environmental Education? Environmental education (EE) teaches children and adults how to learn about and investigate their environment, and to make intelligent, informed decisions about how they can take care of it. The hallmark of EE is that it is experiential, hands-on and happens immersed in the learning environment. EE allows and encourages students to explore the world with all of their senses while out in it.

EE is taught in traditional classrooms, in communities, and in settings like nature centers, museums, parks, and zoos. Learning about the environment involves many subjects—earth science, biology, chemistry, social studies, even math and language arts—because understanding how the environment works, and keeping it healthy, involves knowledge and skills from many disciplines.

EE works best when it is taught in an organized sequence. In schools, EE often reflects state and national learning standards. "Done right," EE not only leads to environmentally literate people, but also helps increase student academic achievement.

The following selections are to guide you through your journey to becoming an environmental educator that uses the wonderful communication tools of interpretation.

Interpretation is...
Heart + Mind + Smile = Great experience!
Your personal notes…
Your personal notes…