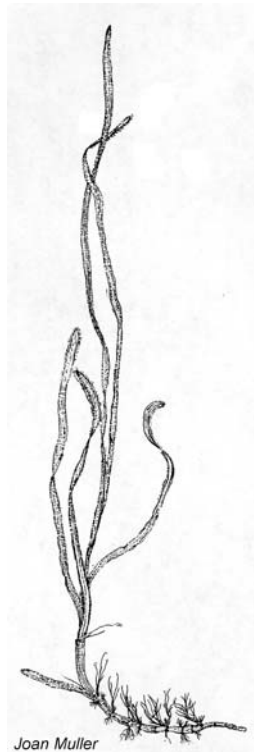


# Waquoit Bay National Estuarine Research Reserve Management Plan 2006-2011

Supporting Coastal Communities through Science



**June 2006**

This management plan has been developed in accordance with NOAA regulations, including all provisions for public involvement. It is consistent with the congressional intent of Section 315 of the Coastal Zone Management Act of 1972, as amended, and the provisions of the Massachusetts Coastal Zone Management, October 17, 2005.

*Cover photograph: Looking southwest from above South Cape Beach at Sage Lot Pond, Waquoit Bay and Dead Neck.*



# Acknowledgements

This management plan was produced by Elizabeth Fuller Valentine, Management Plan Coordinator, and staff members of the Waquoit Bay National Estuarine Research Reserve:

- Brendan Annett, Stewardship Coordinator and Acting Manager
- MaryKay Fox, Assistant Research Coordinator
- Christine Gault, Manager (former)
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- Joan Muller, Education Coordinator
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- Laurie Tompkins, Events Coordinator
- Christopher Weidman, Research Coordinator

Citizens and public officials attended a public meeting in December 2004 to help focus the Reserve's priorities for the next five years. Meeting participants included Rick York; Mashpee Shellfish Constable; Steve Tucker, Cape Cod Commission; and WBNERR volunteers George Harrison and Don Root. The following individuals contributed additional insight during meetings or interviews with the Management Plan Coordinator or provided written comments.

- Megan Amsler, Cape and Islands Self Reliance
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- **National Oceanic and Atmospheric Administration:** Doris Grimm and Erica Sieden.

A second public meeting was held May 3, 2006 to solicit comments on the final draft of this management plan. Attendees included three local citizens: Frank and Betsy Lord and Ken Burnes.

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NATIONAL ESTUARINE RESEARCH RESERVE

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## List of Acronyms

|                 |   |
|-----------------|---|
| BUMP            | Boston University Marine Program                                      |
| CBSM            | Community-based Social Marketing                                      |
| CDMO            | Centralized Data Management Office                                    |
| CDM             | Coastal Decision-Makers   |
| COOPS           | Center for Operational Oceanographic Products and Services            |
| CPWB            | Citizens for the Protection of Waquoit Bay                            |
| CTP             | Coastal Training Program  |
| DCR             | Department of Conservation and Recreation                             |
| DEM             | Department of Environmental Management                                |
| DEP             | Department of Environmental Protection                                |
| DON             | Dissolved Organic Nitrogen  |
| EEOS            | Environmental, Earth and Ocean Sciences Department (at U-Mass Boston) |
| GIS             | Geographic Information Systems  |
| IOOS            | Integrated Ocean Observing System                                     |
| MBL             | Marine Biological Laboratory  |
| MEPA            | Massachusetts Environmental Policy Act                                |
| MCZM            | Massachusetts Coastal Zone Management                                 |
| MNWR            | Mashpee National Wildlife Refuge                                      |
| MOU             | Memorandum of Understanding   |
| NBDS            | National Buoy Data Center   |
| NEP             | National Estuary Program  |
| NERRS           | National Estuarine Research Reserve System                            |
| NHESP           | Natural Heritage and Endangered Species Program (Massachusetts)       |
| NO <sub>2</sub> | Nitrite   |
| NO <sub>3</sub> | Nitrate   |
| NH <sub>3</sub> | Ammonia   |
| NH <sub>4</sub> | Ammonium  |
| NOAA            | National Oceanic and Atmospheric Administration                       |
| PAR             | Photosynthetically Active Radiation                                   |
| PO <sub>4</sub> | Orthophosphate  |
| RSP             | Restoration Science Program   |
| SAV             | Submerged Aquatic Vegetation  |
| SWMP            | System-wide Monitoring Program  |
| UMASS           | University of Massachusetts   |
| USGS            | United States Geological Survey                                       |
| WBNERR          | Waquoit Bay National Estuarine Research Reserve                       |
| WHOI            | Woods Hole Oceanographic Institution                                  |





## Executive Summary

### Overview

*Waquoit Bay National Estuarine Research Reserve Management Plan 2006-2011* is the third management plan for the Waquoit Bay National Estuarine Research Reserve (WBNERR). It describes the history, assets, programs, and administrative structures of WBNERR. It also defines and lays out the strategy for meeting the Reserve's mission over the next five years. The plan provides an update to the *Waquoit Bay National Estuarine Research Reserve Management Plan, September 2000*.

The Reserve's mission and vision are defined below.

**Mission:** To improve the stewardship of the region's estuarine and coastal watershed ecosystems.

**Vision:** To be recognized as a vital regional resource for expertise on sustainable coastal management provided through integrated programs of coastal ecosystem research and monitoring; management and stewardship; and education and training aimed at coastal communities, organizations, and individuals.

The Reserve's goals are to:

1. Improve the understanding of coastal ecosystems and the human influences on them.
2. Improve environmental literacy in our communities to enable environmentally-sustainable decision-making.
3. Demonstrate sustainable stewardship of the land and water ecosystems within the Reserve to serve as a model for community stewardship in the region.
4. Foster dialogue and development of coastal ecosystem management solutions through sustained community engagement.
5. Improve the operations, infrastructure and stature of the Reserve.

Figure 1 (beginning on page 4) depicts the goals and provides a summary of related objectives and key activities. These elements are described in detail in their respective chapters.

The Waquoit Bay National Estuarine Research Reserve supports coastal communities through science. It is a center of excellence with regard to estuarine science: science that is conducted by in-house researchers, in collaboration with scientists from world-renowned laboratories, and by independent researchers who are attracted by the infrastructure and information that the Reserve provides to support and guide their work.

Reserve staff draws upon the scientific work conducted at WBNERR and elsewhere to promote better and more informed coastal management. The Reserve's Training and Education programs specifically guide individuals in their professional and personal roles toward environmentally-sustainable decisions. The Training and Education programs include the Coastal Training, Teacher Training, K-12 and Community Education programs.

WBNERR's Stewardship Program employs adaptive management techniques to protect the land and water resources of the Waquoit Bay watershed. Natural resources management on the Reserve is guided by the results of research conducted at the Reserve and elsewhere and is shared throughout the region through education and training. Furthermore, the Reserve serves as a model of resource management practices for similar coastal lands in the region.

In order to fulfill the Reserve's mission—to improve the stewardship of the region's estuarine and coastal watershed ecosystems—the efforts of WBNERR staff are directed toward motivating local communities to increasingly take responsibility for the development of solutions to coastal ecosystem management issues. WBNERR fosters community action by remaining engaged with coastal management agencies, leveraging training and education activities, making direct assistance available to communities and organizations, and serving on community boards.

The Waquoit Bay NERR is one of 26 sites that comprise the National Estuarine Research Reserve System (NERRS), a Federal state partnership of protected research and education sites administered by the National Oceanic and Atmospheric Administration (NOAA) and state partners. In this case, the partner is the Massachusetts Department of Conservation and Recreation (DCR). The National Estuarine Research Reserve System was created by the Coastal Zone Management Act (CZMA) of 1972, as amended, 16 U.S.C. Section 1461, to augment the Federal Coastal Zone Management (CZM) Program. Reserves are required by Federal regulation, 15 C.F.R. Part 921.13, to have a NOAA-approved management plan that is updated every five years. The plans must describe reserve goals and objectives, management issues, and strategies for addressing them.

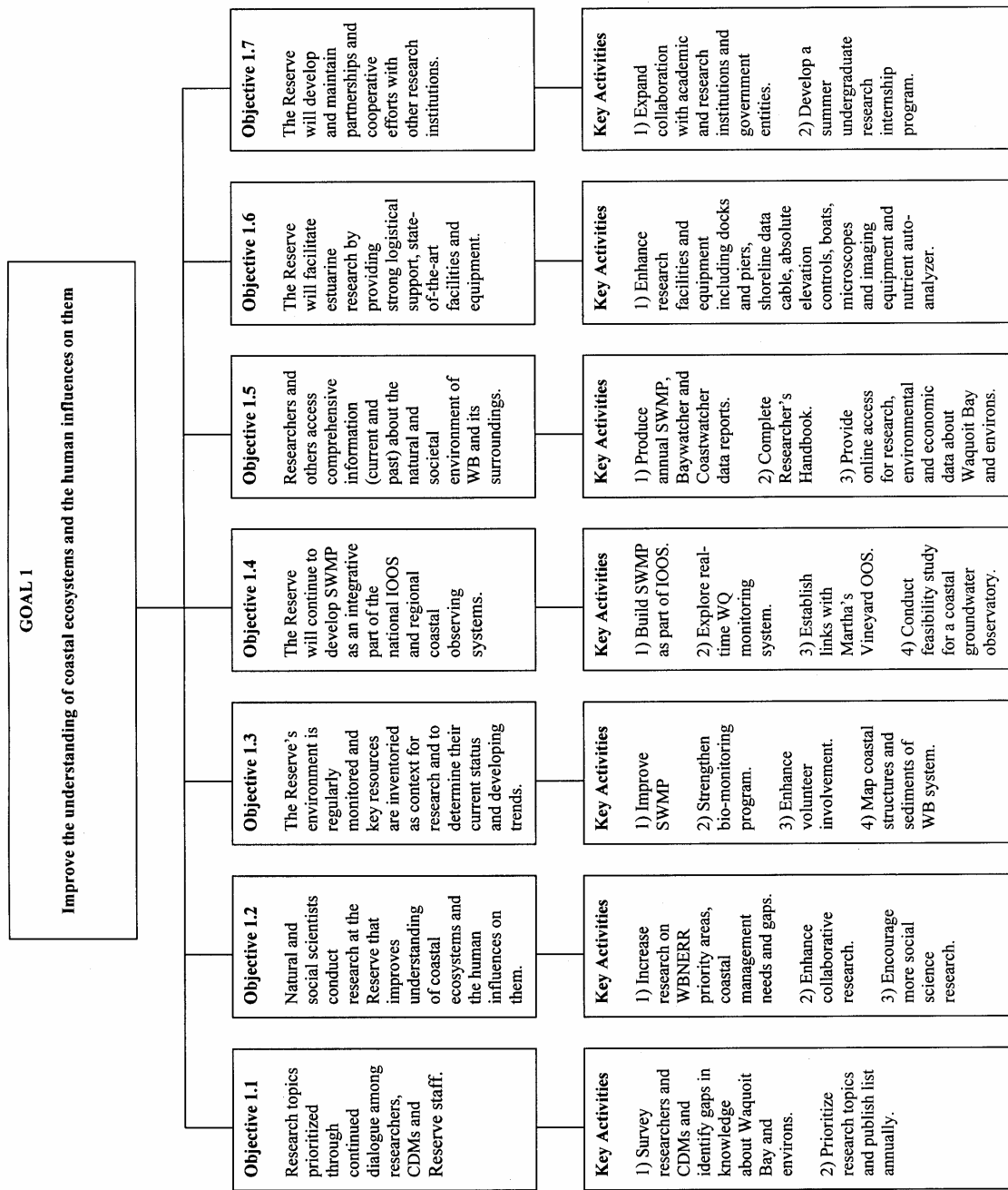
NOAA's stated purposes for management plans are to:

- Provide a vision and framework to guide reserve activities during the next five years.
- Enable the reserves and NOAA to track progress and realize opportunities for growth.
- Present reserve goals, objectives, and strategies for meeting the goals to constituents.
- Guide program evaluation under Section 312 of the CZMA.
- Enable the reserves to acquire facilities construction and land acquisition funds.

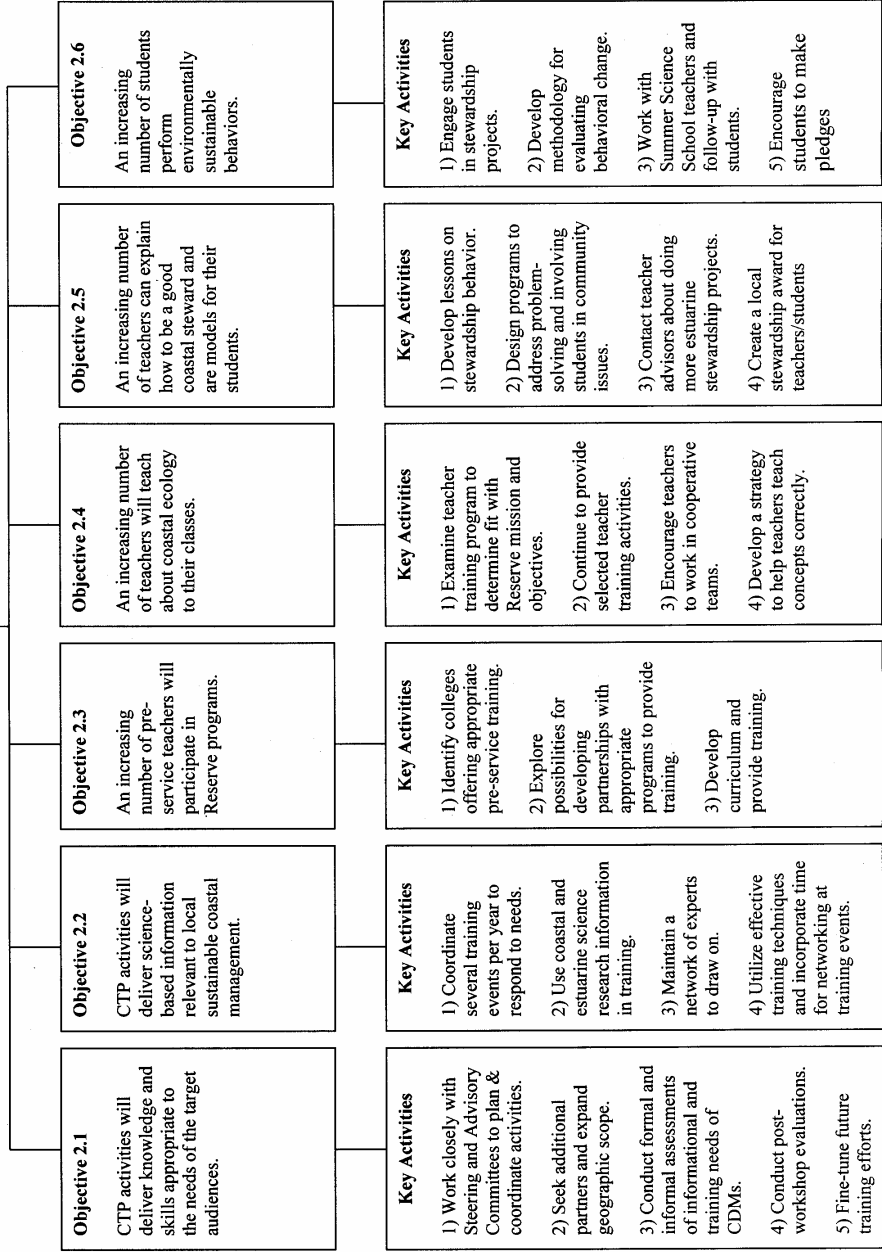
In addition, the Reserve's state partner, DCR, pursuant to M.G.L. Chapter 21, Section 2F, is required to prepare management plans for all reservations, forests and parks under the management of the Department. These plans must include guidelines for operations and land stewardship, shall provide for the protection of natural and cultural resources, and ensure consistency between recreation, resource protection, and sustainable forest management. The Commissioner shall seek and consider public input in the development of management plans, and shall make draft plans available for a public review and comment period through notice in the [Massachusetts] Environmental Monitor. Management plans must be submitted to the DCR Stewardship Council for the Council's adoption. DCR's resource management planning process includes the use of Land Stewardship Zoning Guidelines as a framework for the management of land and resources. The guidelines are incorporated into this management plan.

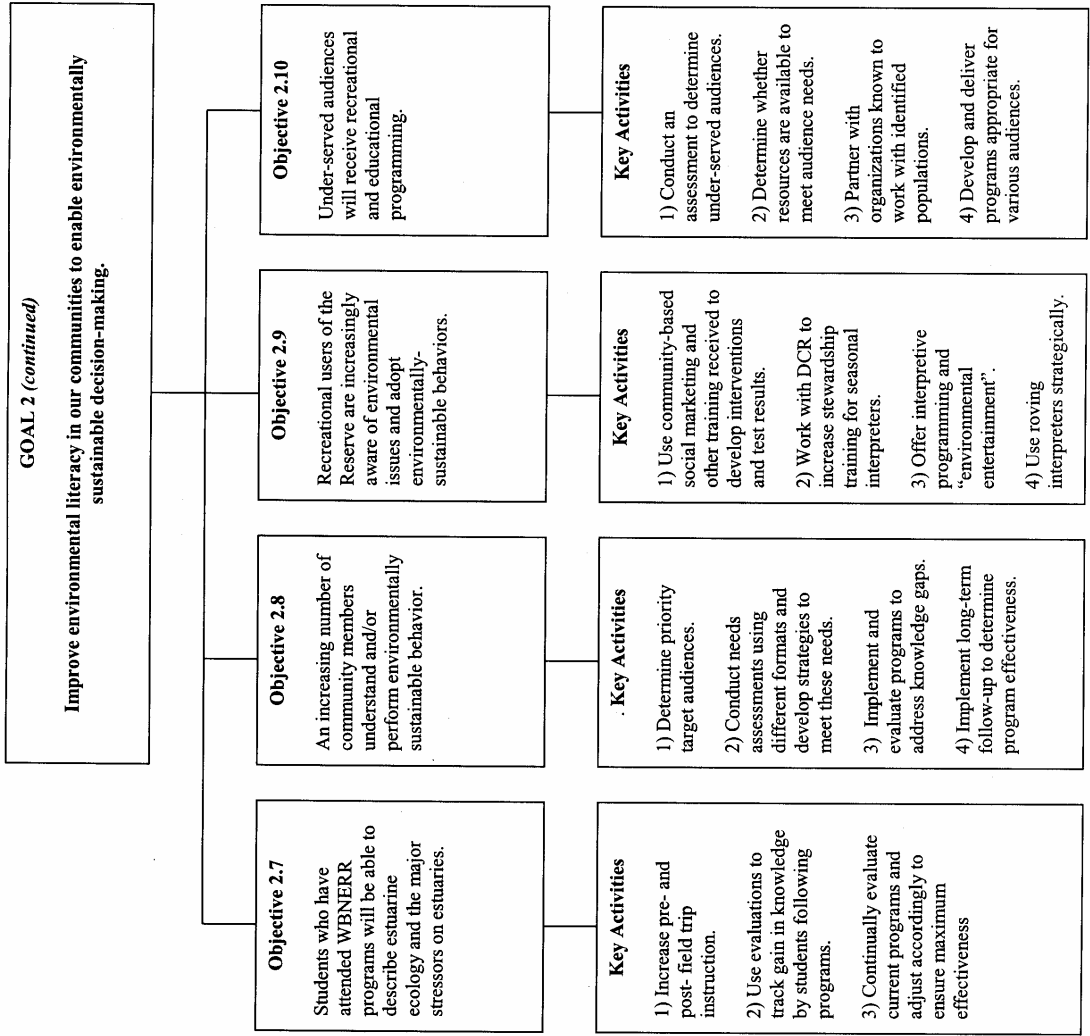
This plan addresses the management planning needs of both partners.

**Figure 1: Summary of WBNERR Goals, Objectives and Key Activities.**



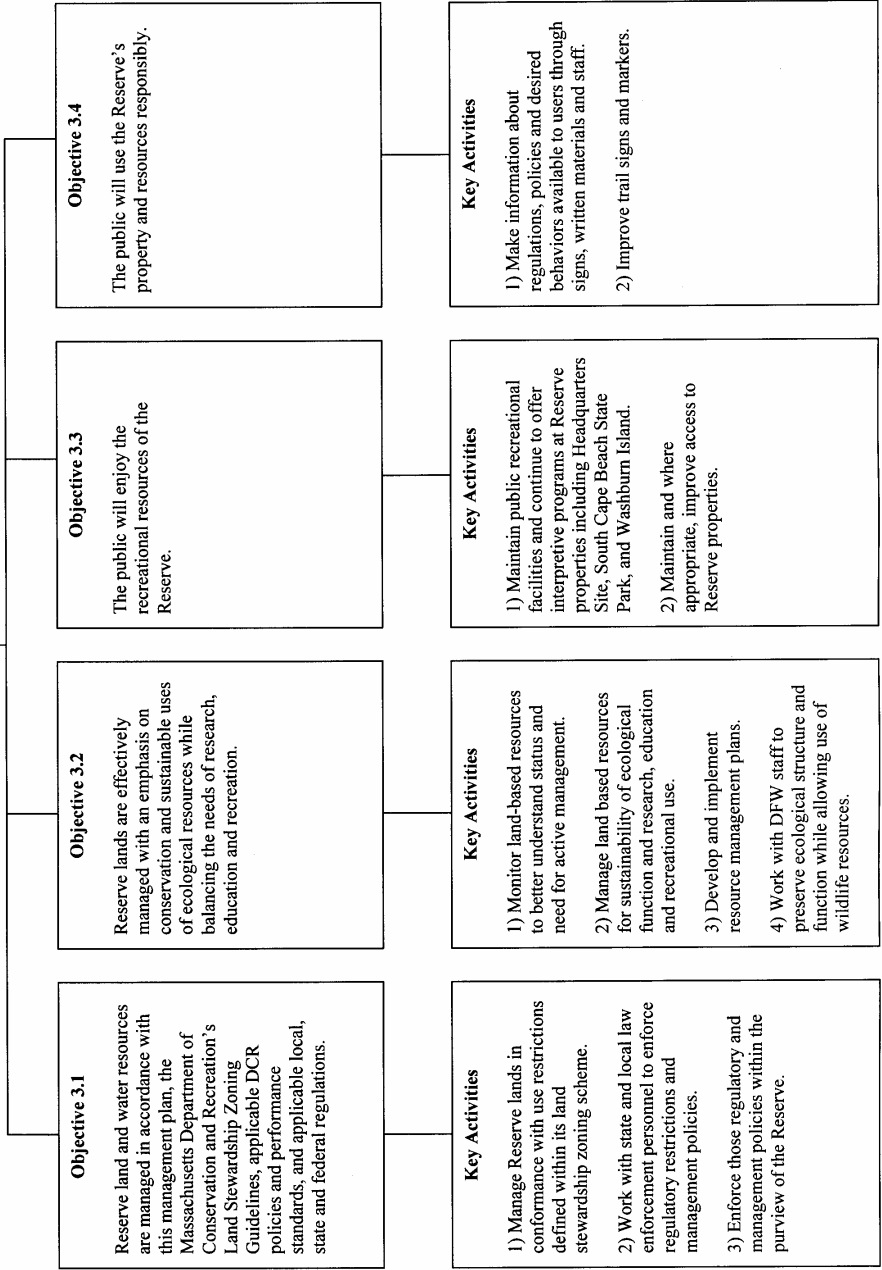
**GOAL 2**  
**Improve environmental literacy in our communities to enable environmentally sustainable decision-making.**





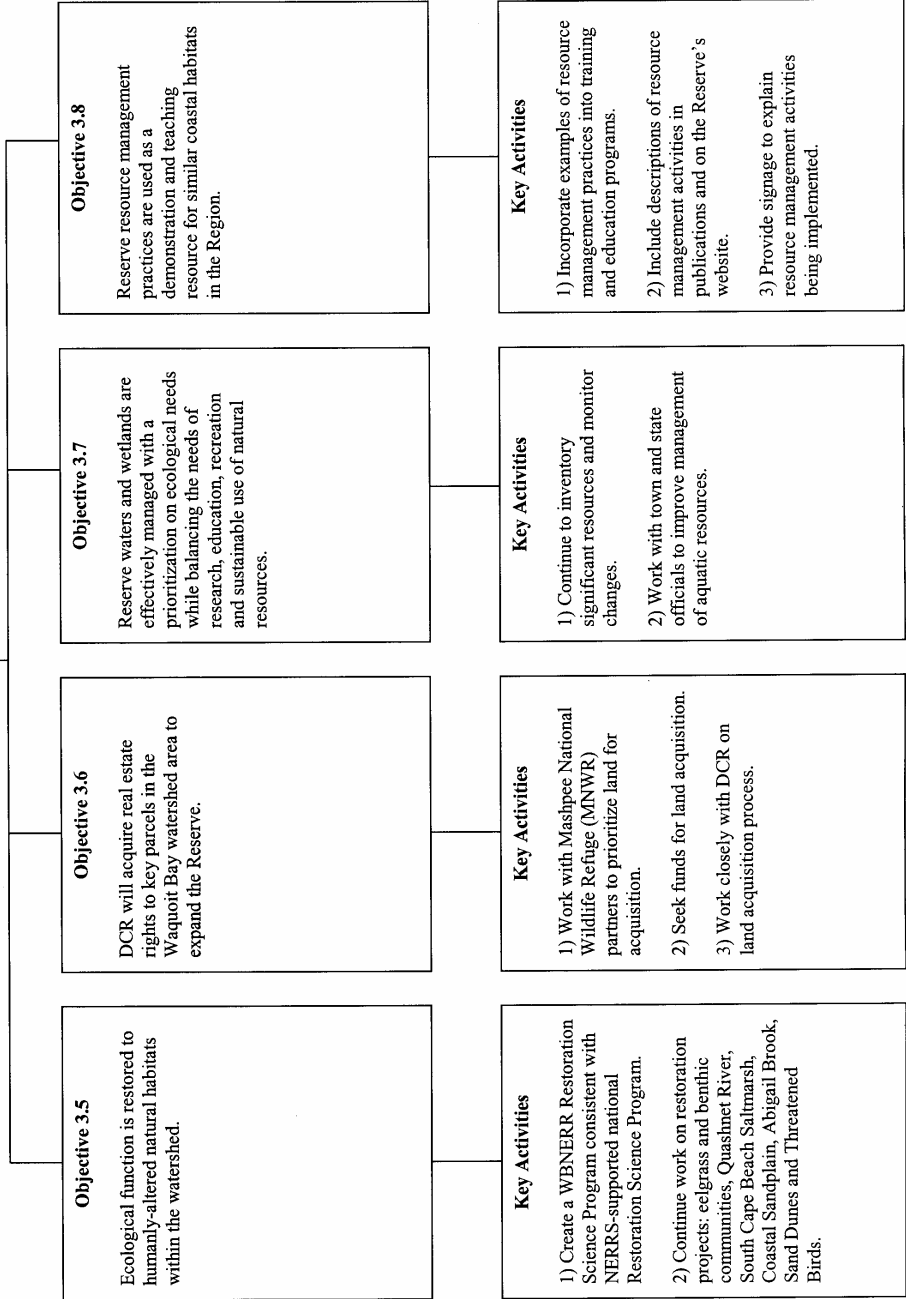


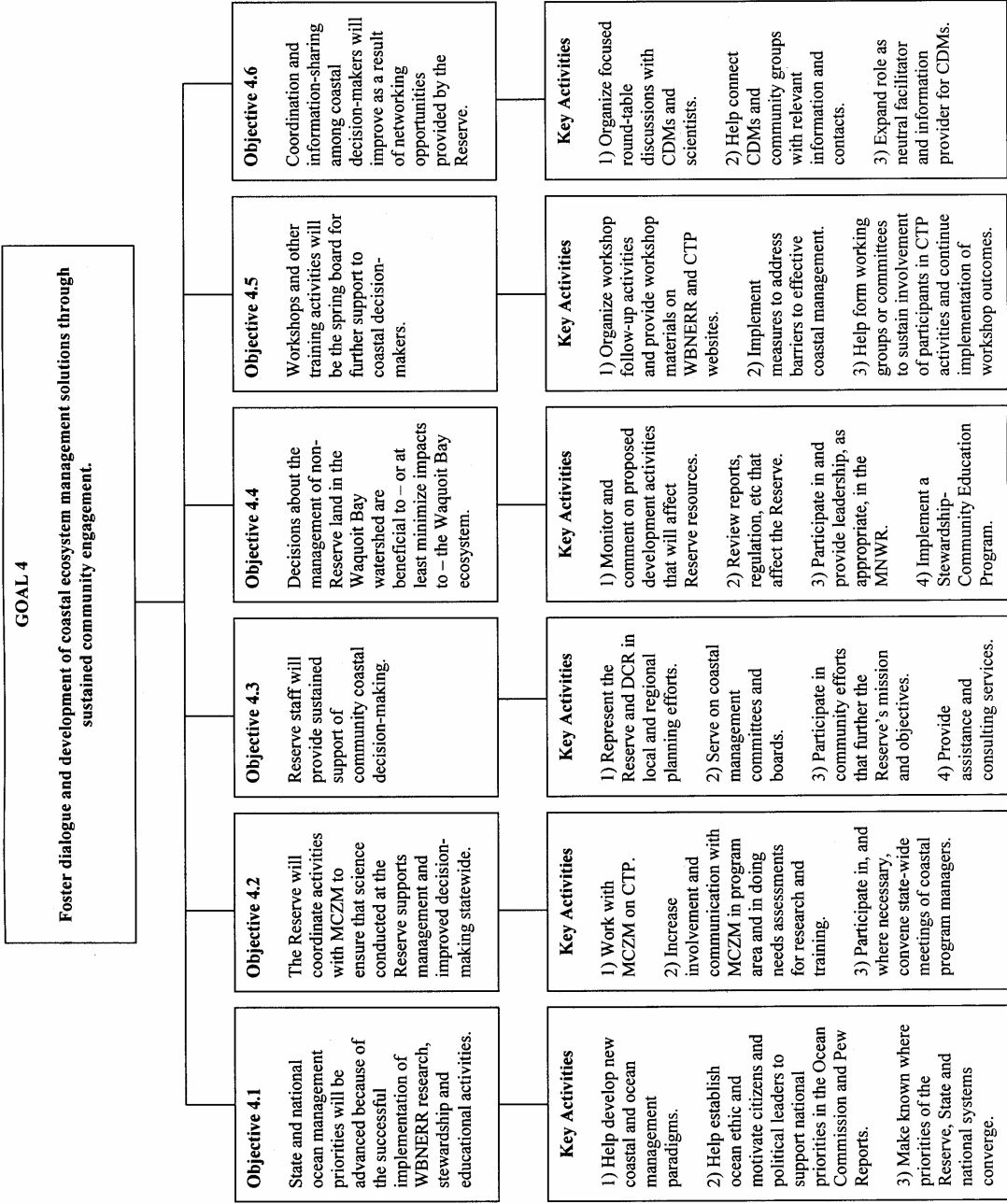
**GOAL 3**  
**Demonstrate sustainable stewardship of the land and water ecosystems within the Reserve to serve as a model for community stewardship in the Region.**

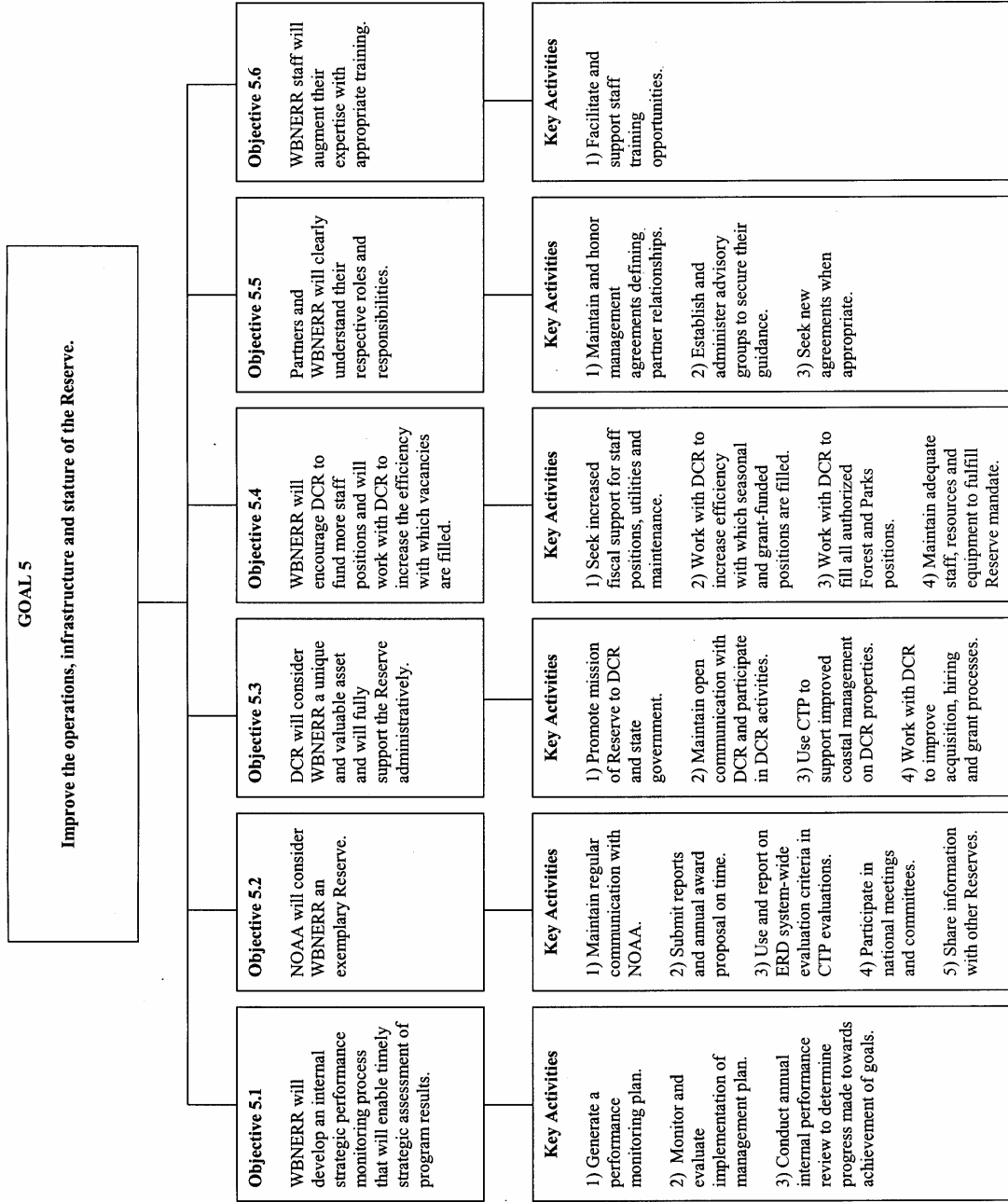


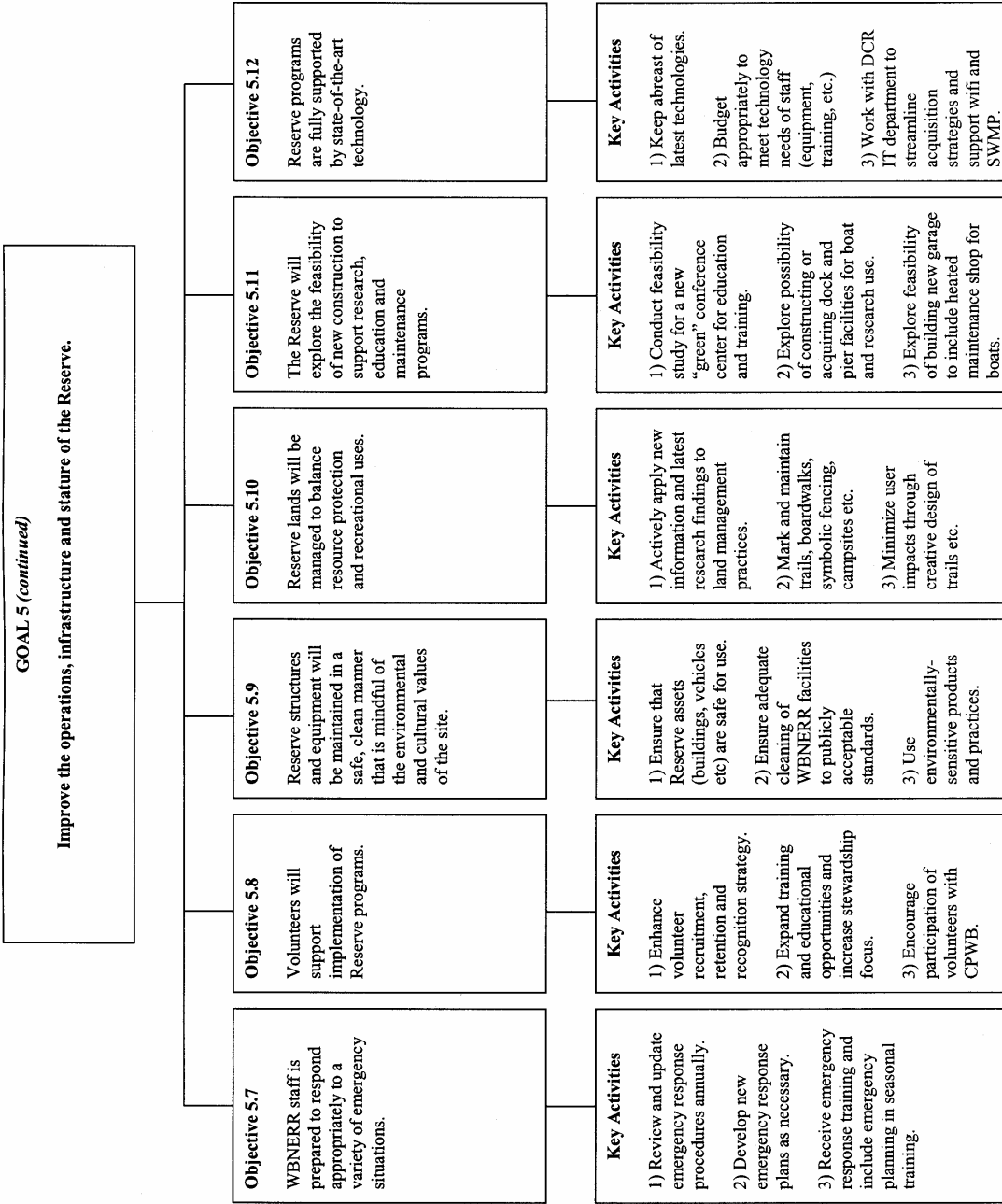
**GOAL 3 (continued)**

**Demonstrate sustainable stewardship of the land and water ecosystems within the Reserve to serve as a model for community stewardship in the Region.**









**GOAL 5 (continued)**  
**Improve the operations, infrastructure and stature of the Reserve.**

|  |  |   |  |   |  |   |
|--|--|---|--|---|--|---|
| <p><b>Objective 5.13</b><br/>         All Reserve programs benefit from the Reserve's Geographic Information systems (GIS), as do selected community partnerships.</p>   | <p><b>Objective 5.14</b><br/>         The Reserve's communications strategy will be supported by an enhanced database.</p>                                       | <p><b>Objective 5.15</b><br/>         Individuals, organizations and communities in coastal Massachusetts recognize WBNERR as a center of excellence for research, training, education and stewardship.</p>   | <p><b>Objective 5.16</b><br/>         Appropriate professional audiences will attend WBNERR training and education events.</p>   | <p><b>Objective 5.17</b><br/>         Local lay audiences are aware of and participate in WBNERR events.</p>  | <p><b>Objective 5.18</b><br/>         An increasing number of community members are aware of WBNERR's research, stewardship or monitoring programs.</p>  | <p><b>Objective 5.19</b><br/>         Citizens, educators, researchers and coastal decision-makers rely on the Reserve and CTP websites as valuable tools.</p>  |
| <p><b>Key Activities</b><br/>         1) Maintain GIS data produced by the Reserve.<br/>         2) Support Reserve staff and GIS partnerships.<br/>         3) Provide GIS support to local organizations.<br/>         4) Submit data to MassGIS or DCR/GIS.</p> | <p><b>Key Activities</b><br/>         1) Maintain and improve a database of key contacts for the Reserve.<br/>         2) Maintain up-to-date mailing lists.</p> | <p><b>Key Activities</b><br/>         1) Produce and distribute in-house publications using consistent image.<br/>         2) Promote the Reserve's programs through writing articles, enhancing relationships with the media and giving presentations.</p> | <p><b>Key Activities</b><br/>         1) Identify target audiences and work with partners to increase their attendance<br/>         2) Improve understanding of town structures on Cape Cod.<br/>         3) Develop a strategy to attract more teachers to WBNERR programs.</p> | <p><b>Key Activities</b><br/>         1) Continue to promote upcoming events through Reserve publications, news releases and other channels.<br/>         2) Advertise upcoming events during interpretive programs.<br/>         3) Partner with organizations to host events.</p> | <p><b>Key Activities</b><br/>         1) Create more lessons on the Reserve's programs.<br/>         3) Foster links between educators and researchers.<br/>         3) Describe research projects in newsletter, <i>Bulletin</i>, and web.<br/>         4) Garner greater press coverage for research activities.</p> | <p><b>Key Activities</b><br/>         1) Maintain and update WBNERR and CTP websites<br/>         2) Host monitoring data and downloadable GIS layers on WBNERR website.<br/>         3) Post information on research studies and publications on WBNERR website.</p> |

## Accomplishments

There have been significant accomplishments during the past five years. These include:

- Acquisition of several parcels of land and an associated boundary change that will be formalized with this management plan.
- Evolution of the Research Translator position into the Coastal Training Coordinator position.
- Formal creation of the Massachusetts Coastal Training Program.
- Expansion of the number of staff positions to include the stewardship coordinator, technology coordinator, events coordinator, volunteer and interpretive coordinator, and assistant research coordinator positions.
- Initiation of a biomonitoring program.
- Graduate credit courses for teachers.
- Increased work with communities to implement solutions to coastal management challenges.
- Expanded collaborations.

## NOAA Final Evaluation Findings

This plan includes objectives that address recommendations made by the NOAA evaluation team as a result of the most recent Section 312 (of the CZMA) Evaluation of the Commonwealth's management of the Reserve. The report issued by NOAA in November 2004 offers seven recommendations that are intended to increase the ability of the Reserve to fulfill its obligations as part of the NERRS (see Appendix K). Five of these recommendations are specific to the relationship between WBNERR and DCR and address Reserve placement within the agency, hiring and procurement processes, the need to fill all authorized positions, and additional financial support from the State.

## Plan Highlights

The objectives in this plan represent a maturation of many of the Reserve's ongoing programs and the introduction of a few new initiatives. Some of the highlights are listed below.

New and recent activities documented with this plan:

- With this management plan, new properties purchased over the past five years are being formally added to the Waquoit Bay NERR. These parcels include the two Childs River parcels, the Abigail Brook land, the Phinney property, and the recently donated NStar land. Protection of these properties prevents their future development and, thus, eliminates potential new sources of nitrogen in the Waquoit Bay estuarine ecosystem. Inclusion of these properties within the Reserve boundary adds underrepresented habitats typical of the biogeographic province, including various migratory fish runs, coastal forested uplands and

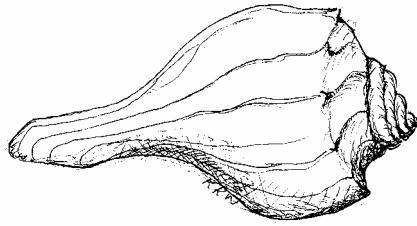
freshwater wetlands. These properties also provide previously non-existing access and further opportunities for the Reserve's research and education programs.

- Development of the System-wide Monitoring Program (SWMP) as an integrative part of the national Integrated Ocean Observing System (IOOS) and regional ocean observing systems.
- Reemphasis on collecting and providing comprehensive information about the Waquoit Bay system to be made available to scientists and to be translated to coastal decision-makers dealing with coastal management issues in similar embayments in the region.
- A more strategic approach to evaluating the effectiveness of the Reserve's programs.
- Increased activities that provide sustained support of community coastal-decision making.
- Increased collaborative efforts to affect better coastal management.
- Increased use of the lessons learned in the Reserve's resource management and restoration practices in training programs.
- Continued and increased coordination with partners, in particular, other coastal management organizations.

New initiatives to be pursued during the term of this management plan:

- Increased state funding for staff positions and/or greater state support for Reserve activities through increased efficiencies.
- New facilities including a coastal training center seating 125 people, a dock for researchers, and a garage large enough for indoor boat and vehicle maintenance during the winter months.
- Application of community-based social-marketing (social science) in the Reserve's activities supporting sustainable coastal communities through science.
- More emphasis on invasive species management and the development of specific resource plans.
- Expansion of the biomonitoring program.
- Development of an integrated restoration science program.
- An increase in the geographic scope of the Reserve's services.
- Training of pre-service teachers.
- More in-depth, longer-term, effective programming for the public, coastal decision-makers and teachers.
- Greater emphasis on increasing public awareness of the research, monitoring, and stewardship activities of the Reserve.





## Chapter 1: Introduction

### Purpose and Scope of Plan

*Waquoit Bay National Estuarine Research Reserve Management Plan 2006-2011* is the third management plan for the Waquoit Bay National Estuarine Research Reserve (WBNERR). It describes the history, assets, programs, and administrative structures of WBNERR. It also defines and lays out the strategy for meeting the Reserve's mission, vision and goals over the next five years.

**Mission:** To improve the stewardship of the region's estuarine and coastal watershed ecosystems.

**Vision:** To be recognized as a vital regional resource for expertise on sustainable coastal management provided through integrated programs of coastal ecosystem research and monitoring; management and stewardship; and education and training aimed at coastal communities, organizations, and individuals.

**Goals:**

1. Improve the understanding of coastal ecosystems and the human influences on them.
2. Improve environmental literacy in our communities to enable environmentally-sustainable decision-making.
3. Demonstrate sustainable stewardship of the land and water ecosystems within the Reserve to serve as a model for community stewardship in the region.
4. Foster dialogue and development of coastal ecosystem management solutions through sustained community engagement.
5. Improve the operations, infrastructure and stature of the Reserve.

The Management Plan is organized by goals rather than strictly by program area. This being said, the first three goals primarily address the Reserve's program areas of research and monitoring, training and education, and stewardship, respectively. The interconnectedness of the program areas is most especially demonstrated in Chapter 5 which addresses Goal 4 and in the objectives and action items that are listed within each chapter. All of the programs address the themes of water quality/eutrophication, climate change/renewable energy, and coastal ecosystem management.

In addition to goals and theme areas, the Reserve is guided by a series of principles. These overarching guiding principles describe how the Reserve conducts business. They are:

- WBNERR staff from all program and administrative areas collaborates to advance the Reserve's goals and objectives and, thereby, improve stewardship of the region's estuarine and coastal watershed ecosystems.
- Reserve activities and programs are targeted to lead to real behavioral change in support of better coastal stewardship.
- The Reserve guides people toward environmental literacy by presenting information systematically and strategically, and by providing opportunities for people to become engaged in problem solving on environmental issues, over an extended time.
- The Reserve works in partnership with others at the local, state, and Federal level.
- Reserve programs capitalize on the physical setting of the Reserve to inspire questions, learning, and conscious decision-making.
- The management and programs of the Reserve demonstrate good environmental practices and behaviors.
- The Reserve protects natural resources within its designated lands and waters from degradation.
- The Reserve facilitates innovative inquiry of natural and social systems affecting the coast.
- WBNERR staff conducts regular, critical self-evaluations of programs to continually improve the Reserve's scientific, stewardship and educational offerings.
- WBNERR staff conducts their work with integrity, respect, openness, and excellence.

## Public Process for Developing the Plan

The *Waquoit Bay National Estuarine Research Reserve Management Plan, 2006-2011* was developed with input from core constituents and partners. About a dozen citizens attended a public meeting on December 8, 2004 to offer their advice about where the Waquoit Bay Research Reserve's efforts should be focused over the next five years. Participants were invited to address three broad questions:

- Which of the Reserve's programs are most beneficial?
- Which could be improved? and,
- Are there unmet needs the Reserve can address?

WBNERR staff also met individually with representatives of the scientific, education, and coastal management communities (refer to Acknowledgements) to solicit their insight and recommendations for future management of the Reserve. The WBNERR interviewer prepared notes following each meeting and shared these with other staff members, as appropriate, for their consideration and potential inclusion in the Management Plan.

A full draft of the *Management Plan* was circulated in the summer of 2005 to key partners within state and Federal government. Once recommendations generated by this first review were incorporated and partner agencies were comfortable with the content of the plan, a 30-day public comment period was initiated by publishing a notice in the MEPA Environmental Monitor on April 10, 2006. A public meeting was held May 3, 2006. A summary of all comments received during the MEPA review and actions taken to address them is included in Appendix A.

The Massachusetts Office of Coastal Zone Management (MCZM) also reviewed the management plan for federal consistency. They found that the plan is consistent with the MCZM enforceable program policies (Appendix B).

## Reserve Management Structure

The Reserve is a component of the National Estuarine Research Reserve System (NERRS), a Federal-state partnership of protected research sites administered by the National Oceanic and Atmospheric Administration's (NOAA's) Estuarine Reserve Division (ERD) within the Office of Coastal Resources Management (OCRM). The state partner is the Massachusetts Department of Conservation and Recreation (DCR). The strategy laid out in this management plan for Waquoit Bay NERR supports and/or complements the Federal NERRS priorities and satisfies DCR's management planning requirements.

The Reserve manager and staff are DCR employees. They strive to align the Reserve's activities with both NOAA and DCR priorities while remaining true to their mission to improve stewardship of the region's estuarine and coastal watershed ecosystems. The complexity of this three-way relationship is expanded upon in Chapter 6.

## **Introduction to the National Estuarine Research Reserve System**

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

The reserve system is a network of protected areas established to promote informed management of the Nation's estuaries and coastal habitats. The reserve system currently consists of 26 reserves in 21 states and territories, protecting over one million acres of estuarine lands and waters.

### Mission

As stated in the NERRS regulations, 15 C.F.R. Part 921.1(a), the National Estuarine Research Reserve System mission is:

*the establishment and management, through Federal-state cooperation, of a national system of Estuarine Research Reserves representative of the various regions and estuarine types in the United States. Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.*

### Goals

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

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.

### National Estuarine Research Reserve System Strategic Goals 2003 – 2008

The reserve system began a strategic planning process in 1994 in an effort to help NOAA achieve its environmental stewardship mission to "sustain healthy coasts." In conjunction with the strategic planning process, ERD and reserve staff has conducted a multi-year action planning process on an annual basis since 1996. The resulting three-year action plan provides an overall vision and direction for the reserve system.

### Reserve System Strategic Plan Goals (revised 2002):

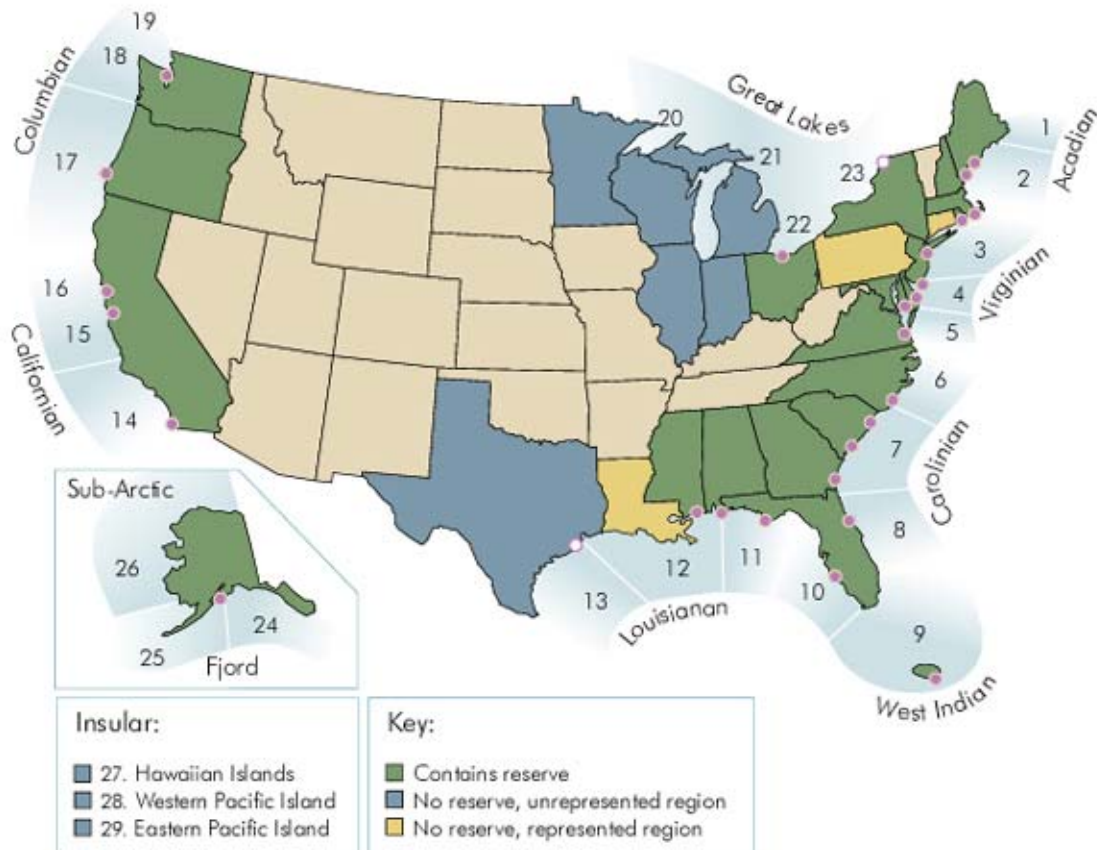
1. Improve coastal decision-making by generating and transferring knowledge about coastal ecosystems.
2. Enhance and expand the National Estuarine Research Reserve System.
3. Increase awareness, use, and support of the reserve system and its estuarine science, education, and stewardship programs.

### Biogeographic Regions

NOAA has identified eleven distinct biogeographic regions and 29 subregions in the U.S., each of which contains several types of estuarine ecosystems (15 C.F.R. Part 921, Appendix I and II). When complete, the reserve system will contain examples of estuarine hydrologic and biological types characteristic of each biogeographic region. As of 2004, the reserve system includes twenty six reserves and one reserve in the process of designation. (Figure 2). The reserves are listed below with their designation date.

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**Figure 2: National Estuarine Research Reserve System.**



|   |   |
|---|---|
| 1. Wells Reserve, Maine (1984)                            | 15. Rookery Bay Reserve, Florida (1978)       |
| 2. Great Bay Reserve, New Hampshire (1989)                | 16. Apalachicola Reserve, Florida (1979)      |
| 3. Waquoit Bay Reserve, Massachusetts (1988)              | 17. Weeks Bay Reserve, Alabama (1986)         |
| 4. Narragansett Bay Reserve, Rhode Island (1980)          | 18. Grand Bay Reserve, Mississippi (1999)     |
| 5. Hudson River Reserve, New York (1982)                  | 19. Proposed Reserve—Texas                    |
| 6. Jacques Cousteau Reserve, New Jersey (1998)            | 20. Tijuana River Reserve, California (1982)  |
| 7. Delaware Reserve (1993)                                | 21. Elkhorn Slough Reserve, California (1979) |
| 8. Chesapeake Bay Reserve, Maryland (1985,1990)           | 22. San Francisco Bay, California (2003)      |
| 9. Chesapeake Bay Reserve, Virginia (1991)                | 23. South Slough Reserve, Oregon (1974)       |
| 10. North Carolina Reserve (1985,1991)                    | 24. Padilla Bay Reserve, Washington (1980)    |
| 11. North Inlet-Winyah Bay Reserve, South Carolina (1992) | 25. Old Woman Creek, Ohio (1980)              |
| 12. ACE Basin Reserve, South Carolina (1992)              | 26. Proposed Reserve—St. Lawrence River       |
| 13. Sapelo Island, Georgia (1976)                         | 27. Kachemak Bay Reserve, Alaska (1999)       |
| 14. Guana Tolomato Matanzas Reserve, Florida (1999)       | 28. Jobos Bay Reserve, Puerto Rico (1981)     |

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## Reserve Designation and Operation

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

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

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

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

## National Estuarine Research Reserve System Administrative Framework

The Estuarine Reserves Division of the Office of Ocean and Coastal Resource Management (OCRM) administers the reserve system. The Division 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 to support decision-making at the national level. As required by Federal regulation, 15 C.F.R. Part 921.40, OCRM periodically evaluates reserves for compliance with Federal requirements and with the individual reserve's Federally-approved management plan.

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

## **Massachusetts Department of Conservation and Recreation**

When Waquoit Bay was formally designated as a National Estuarine Research Reserve in 1988, its state partner was the Department of Environmental Management (DEM). In July of 2003, DEM was merged with the Metropolitan District Commission to form the Department of Conservation and Recreation (see Mass General Law c21§1). The new agency serves to realize operational efficiencies, regain Massachusetts' position at the forefront of the Conservation Movement and also to build upon both agencies' strengths and commitment to creating a world-class parks and recreation system.

The mission of the Department of Conservation and Recreation is to protect, promote, and enhance the natural, cultural and recreational resources of the Commonwealth for the well being of all. In terms of values, DCR staff believes deeply in, and is committed to, the public trust and responsible stewardship, as well as fairness and inclusiveness. Staff also commits to do their work with integrity, respect, openness, and excellence.

DCR manages many facilities that annually attract hundreds of thousands of people from around the globe, including Pilgrim Memorial State Park, the home of Plymouth Rock; Walden Pond State Reservation, Henry David Thoreau's chosen place for peaceful contemplation; the Emerald Necklace of urban parks designed by Frederick Law Olmsted; and the Charles River Esplanade, host site for the Boston Pops' Fourth of July concert and fireworks festivities. In total, more than 35 million people visit Massachusetts' state and urban parks each year.

DCR promotes smart growth in the Commonwealth and helps private landowners and municipalities to protect land and resources through technical assistance, grants programs, and other resource protection services.

DCR staff also provides environmental education programs and oversight for state-designated Areas of Critical Environmental Concern. DCR's stewardship of Massachusetts' natural and historical resources provides significant benefits to the Commonwealth, its citizens, and visitors: healthy, productive forests; clean drinking water; flood control; scenic beauty; historic preservation; healthy ecosystems; wildlife habitat protection; and coastal access, as well as improved public safety and public health.

The agency is divided into three resource divisions: the Division of Urban Parks and Recreation, the Division of Water Supply and Protection, and the Division of State Parks and Recreation (DSPR), of which the Waquoit Bay Reserve is a part (Figure 3). The DSPR is dedicated to improving the quality of life in the Commonwealth of Massachusetts by conserving our natural and cultural resources through professional stewardship, and connecting people to these resources through recreation and education, and cooperating and partnering with others who share our common purpose. The DSPR is the steward of nearly 300,000 acres of the state's forests, beaches, mountains, ponds, riverbanks, trails, and parks outside of the urban park area. The DSPR also manages 20 outdoor swimming pools and owns 18 skating rinks which are managed through leasing

agreements with outside vendors. The DSPR protects land and resources on privately and municipally held land through technical assistance, grant programs, planning programs, policy development, and other resource protection services.

Pursuant to M.G.L. Chapter 21, Section 2F, DCR is required to prepare management plans for all reservations, forests and parks under its management. These plans must include guidelines for operations and land stewardship, shall provide for the protection of natural and cultural resources, and ensure consistency between recreation, resource protection, and sustainable forest management. The Commissioner of DCR shall seek and consider public input in the development of management plans, and shall make draft plans available for a public review and comment period through notice in the Environmental Monitor. Management plans must be submitted to the DCR Stewardship Council for the Council's adoption.



## History of Waquoit Bay Reserve

In response to growing recognition of the importance of estuaries and the changes to them resulting from coastal development, Massachusetts established an estuarine research program in 1963. Results of the study were published in 1975 and the data were subsequently utilized to calculate indices comparing species diversity with environmental quality for selected estuaries within the state.

Between 1974 and 1978, the Commonwealth of Massachusetts investigated the feasibility of applying to the National Estuarine Sanctuary Program (the former name of the National Estuarine Research Reserve System) and considered several possible sites for sanctuary status. At that time the North–South River complex and Waquoit Bay were selected as sites most likely to meet the requirements of the Federal program and benefit from the research and education programs and protection that the designation would provide.

In 1979, the Commonwealth designated Waquoit Bay as an Area of Critical Environmental Concern (ACEC) in accordance with Massachusetts General Laws Chapter 21A Section 2(7). See Chapter 4 for more information about the ACEC program and a map of the Waquoit Bay ACEC (Figure 15). This designation followed an extensive public participation process during which major management issues for the area were addressed and interest in establishing National Estuarine Sanctuary status was expressed.

Based on the results of the earlier research program and review of alternative sites, Massachusetts recommended Waquoit Bay for designation as a National Estuarine Sanctuary in July 1981. The area proposed included the land and water areas commonly known as Waquoit Bay, Washburn Island, South Cape Beach, the Sargent Estate, Sage Lot Pond, Flat Pond, Hamblin Pond, Jehu Pond and the major salt marshes immediately adjacent to those areas.

In 1981, the Commonwealth applied for and was awarded a Federal “pre-acquisition” grant for further evaluation of the site, collection of information necessary for the preparation of a management plan and a draft environmental impact statement, and preliminary acquisition activities.

In December 1982, the Commonwealth acquired South Cape Beach and in June 1983, the Commonwealth acquired Washburn Island. Based on this commitment to protect significant components of the Waquoit Bay ecosystem, the Commonwealth successfully applied for additional Federal assistance to develop Waquoit Bay as a National Estuarine Sanctuary. The NOAA funding was used to acquire, in November of 1987, the 21-acres of wetlands, waters, and uplands of the Sargent Estate at the head of the Bay to serve as the Reserve Visitor Center and Headquarters. The NOAA funding was also used for construction of necessary support facilities and equipment for Reserve research and education. Formal designation of the Waquoit Bay National Estuarine Research Reserve took place in June 1988.

## Boundaries

The Reserve has continued to expand since its designation. With the addition of 95 acres of new acquired lands, the Reserve now has a total area of 2,780 acres, including 1,286 acres of lands owned by the Commonwealth of Massachusetts, 1,359 acres of waters held in trust by the Commonwealth as well as 135 acres of privately owned salt marshes or “major marsh areas” (described in the original designation, the 1989 Management Plan and the 2000 Management Plan). Lands protected within the Reserve are distributed among eight distinct areas (refer to Figure 4):

- Headquarters, 21 acres of land
- Childs River, 19 acres of land
- Washburn Island, 286 acres of land
- Phinney Property, 10 acres of land
- Quashnet Woods (which includes the new 31 acre NStar property), 426 acres of land
- North Quashnet, 27 acres of land
- Abigail Brook, 35 acres of land
- South Cape Beach State Park, 462 acres of land

With the formal acceptance of the July 2000 Management Plan, two parcels of land were added to the boundary of the Waquoit Bay NERR: the Quashnet River Area and the Great Flat Pond parcel. The Quashnet River land was—and remains—the property of the Commonwealth of Massachusetts and is jointly managed by two state agencies: the Department of Fisheries and Wildlife and the Department of Conservation and Recreation. The Great Flat Pond land was purchased by the Commonwealth from a private entrepreneur and, thus, saved from development. Both parcels are also within the Mashpee National Wildlife Refuge (MNWR). The Refuge was established in 1995 to assure long-term protection of the unique and highly productive natural resources associated with the Waquoit Bay watershed. The MNWR boundary wraps around and overlaps the Reserve in several places. WBNERR is a member of the eight-party MNWR Conservation Partnership. Together, they have protected over 1,400 additional acres in the Waquoit Bay watershed since 1995.

With this management plan, new properties purchased over the past five years are being formally added to the Waquoit Bay NERR. Most of these additional lands have been added as a result of WBNERR's involvement with the Mashpee National Wildlife Refuge (MNWR) Conservation Partnership.

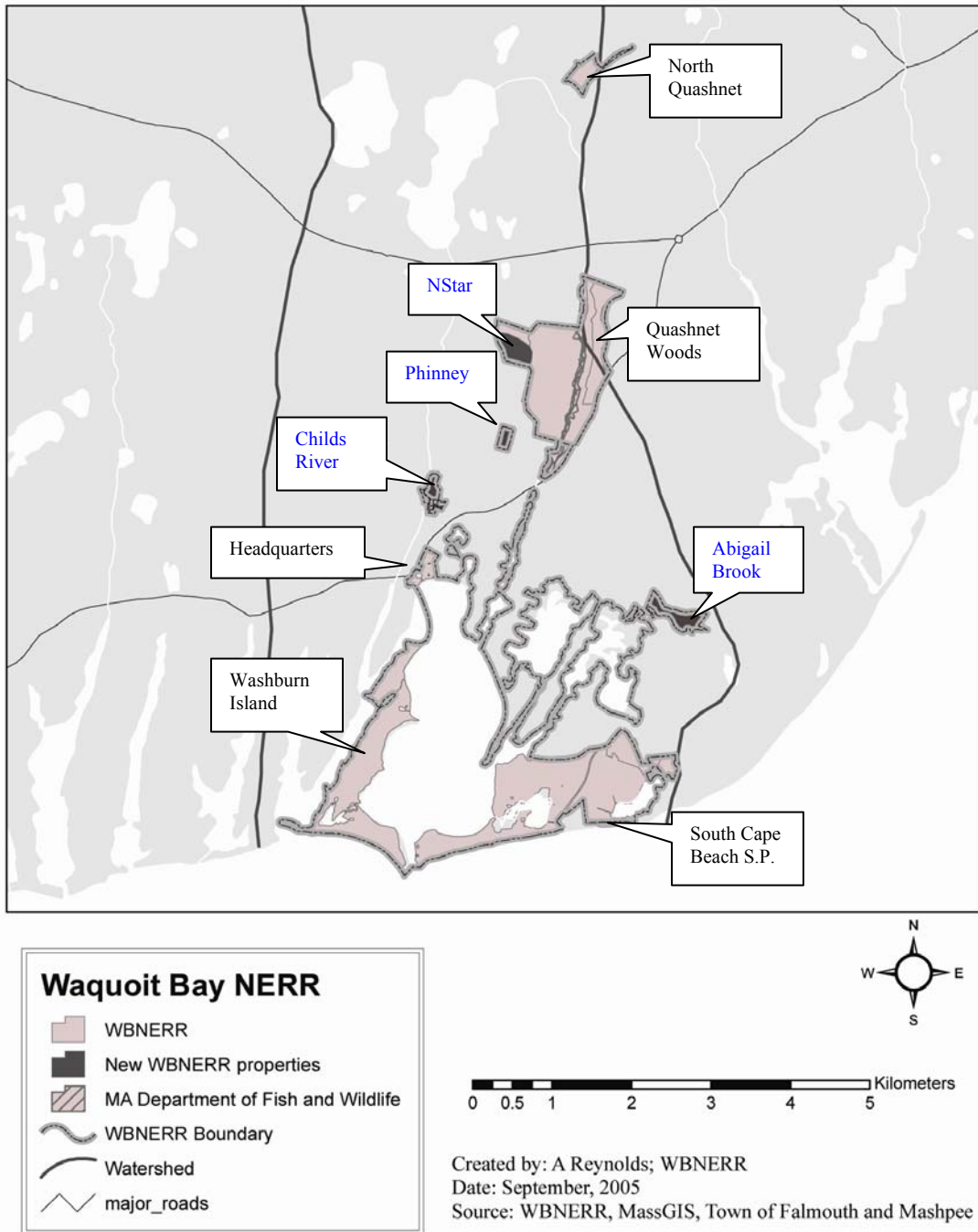
The Reserve added 19 acres in the Childs River in 2002 and in 2003 acquired the Abigail Brook property, a 35-acre parcel of important estuarine habitat. The Reserve purchased 10 acres called the Phinney property in 2004. Additionally, the Reserve received a conservation easement on about 7 acres of Town of Mashpee open space located very close to the Abigail Brook property. In spring 2005, a 31 acre parcel, known as the NStar parcel, was added to the Quashnet River Area.

The addition of these lands to the Reserve's boundary is consistent with the goals of the Reserve System. Specifically, the expansion increases the amount of protected land within the rapidly developing Waquoit Bay watershed (Figure 5). These lands represent a stable environment for research and stewardship. They also provide additional opportunities for education, training and interpretive programs leading to enhanced public understanding of estuarine areas and coastal management issues. Furthermore, by protecting these lands from development, the Reserve has reduced potential nitrogen loading to the Waquoit Bay estuarine system. Refer to Objective 3.6 for further discussion of the WBNERR boundary expansion.

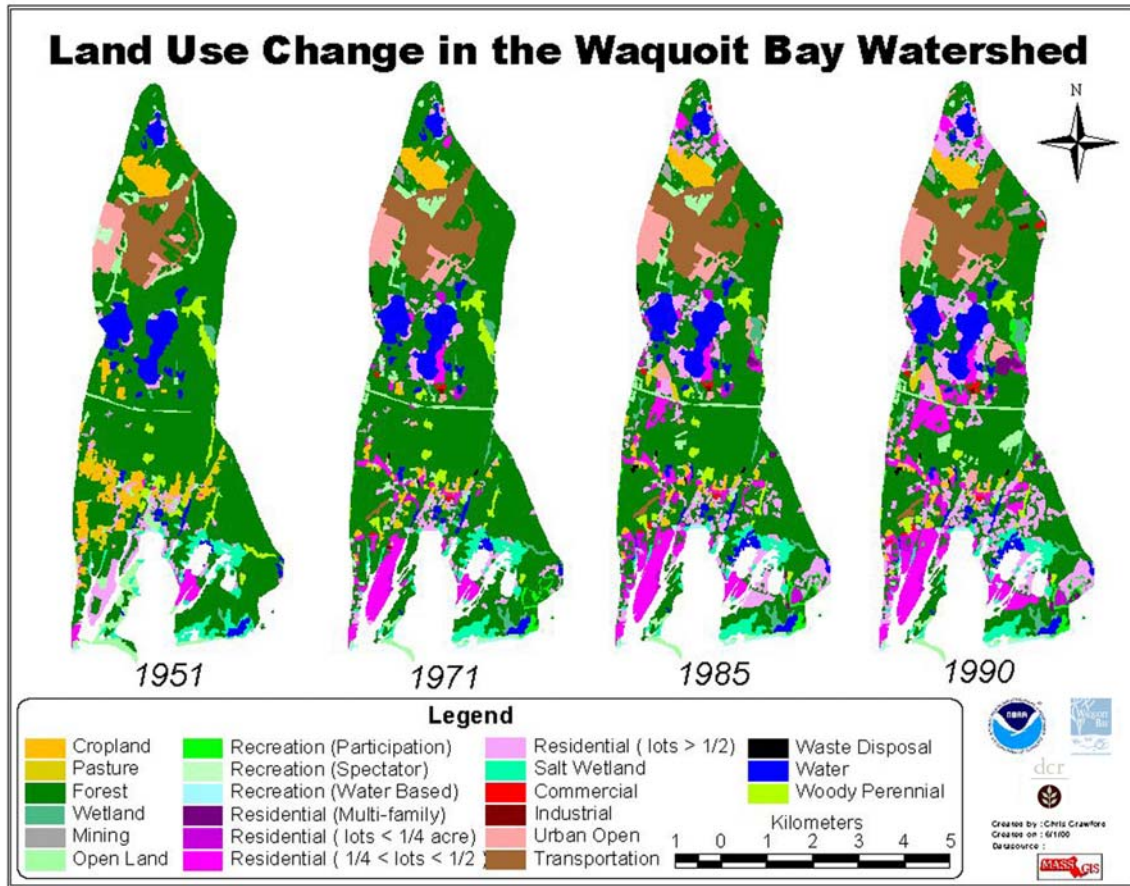
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**Figure 4: WBNERR Boundaries.**



**Figure 5:** Land Use Change in the Waquoit Bay Watershed.



## Assets of Waquoit Bay National Estuarine Research Reserve

### Natural Resources

The Waquoit Bay Reserve on Cape Cod Massachusetts is composed of open waters, salt and fresh marshes, barrier beaches, sand dunes, rivers, mixed pine and oak forests, and sandplain grasslands. The more than 2,700 acres of aquatic and terrestrial habitat in the Reserve are representative of the New England portion of the Virginian biogeographic province. The Reserve's natural features are fully described in *The Ecology of the Waquoit Bay National Estuarine Research Reserve*, edited by Margaret A. Geist and published in 1996. Portions are excerpted below.

Waquoit Bay, with an area of approximately 825 acres, is the dominant feature of the Reserve. With a maximum depth of 8.9 feet and mean depth of 2.6 feet, the shallow bay is warmer in the summer and colder in the winter than neighboring Vineyard Sound. Salinity ranges from 0 parts per thousand (ppt) in the upper reaches of rivers to about 32 ppt in the open Bay. Eelgrass, *Zostera marina*, covered extensive areas of the Waquoit

Bay estuarine complex until recent decades when disease and eutrophication caused rapid declines in abundance and distribution.

The Bay is home to resident finfish populations, serves as a nursery area for other species of finfish, and supports a cadre of diadromous fish. Invertebrates are also well represented by species such as quahogs, *Mercenaria mercenaria*, soft-shell clams, *Mya arenaria*, and blue crab, *Callinectes sapidus*. Other species of the open water include sea ducks in winter, ospreys, *Pandion haliaetus*, each spring and summer, and harbor seals, *Phoca vitulina*.

Approximately 300 acres of salt marsh are located within the Reserve, mainly around Hamblin, Jehu, and Sage Lot ponds, at the head of Great River, along the shores of Washburn Island, at the head of Waquoit Bay and Eel Pond, and at the mouth of the Childs and Moonakis rivers.

Estuarine channels and tidal creek habitats link the open bay environment to the smaller, more tidally restricted salt ponds and their associated salt marshes. The estuarine channels and tidal creek beds within the Reserve are primarily sandy mud with a layer of macroalgae growing over the bottom. They are home to ribbed mussels, *Geukensia demissa*, blue crabs, *Callinectes sapidus*, and lady crabs, *Ovalipes ocellatus*.

About 2.5 miles of beach and sand dunes extend along the southern shore of Washburn Island and South Cape Beach. A portion of the barrier beach at South Cape Beach State Park is used for public recreation. The balance is undeveloped and supports a diverse community of species. On the limited-access Washburn Island, beach plants grow in profusion.

The fresh water wetlands of the Waquoit Bay watershed are rich in plant and animal species. At South Cape Beach, freshwater marsh species include the common cattail, *Typha latifolia*, and reed grass, *Phragmites australis*, as well as twig rush, *Cladium marascooides*, and water lily, *Nymphaea odorata*. Patches of bogs have such species as sheep laurel, *Kalmia augustifolia*, sweet gale, *Myrica gale*, and *Sphagnum* sp. Many waterfowl are solely dependent upon wetlands for their breeding, feeding and migratory needs. Ospreys forage for fish in freshwater areas. Many upland wildlife species, including game and song birds, opossum, raccoons and white-tailed deer, are seasonally dependent on wetlands.

Coastal plain streams provide important sources of water for upland species and are prime habitat for fish, turtles, ducks and geese. The Quashent River is an important habitat for alewife, *Alosa pseudoharengus*, blueback herring, *A. aestivalis*, and American eel, *Anguilla rostrata*, and holds one of the last remaining sea-run brook trout, *Salvelinus fontinalis*, populations in the United States.

In addition to aquatic resources, the Reserve encompasses 1,286 acres of upland, including notable pine barrens and sandplain grasslands. Pitch pine/scrub oak, *Pinus rigida*/*Quercus illicifolia*, barrens occur on dry, acidic, nutrient poor, well drained soils

in the Waquoit Bay watershed and other coastal outwash plains. Examples of pitch pine/scrub oak barrens are found throughout the Reserve. Typically, a dense understory of scrub oaks and huckleberry, *Gaylussacia baccata*, grows beneath the pitch pines and excludes other plants. Often patches of lowbush blueberry, *Vaccinium augustifolium*, bearberry, *Arctostaphylos uva-ursi*, sweetfern, *Comptonia peregrine*, or lichen grow in the open spaces between oaks. This pine barrens community has adapted to occasional fires for its maintenance as nutrients, generally scarce in the poor soils, become more available in the ashes of a fire.

Sandplain grasslands are open, treeless grasslands on dry, sandy soils. These grasslands are found in areas of glacial deposits in southeastern Massachusetts, including Cape Cod and the Islands, and a few places in Connecticut. Prairie grasses are the dominant species of these grasslands. Bird's foot violet, *Viola pedata*, which grows extensively on the Sargent Estate within the Waquoit Bay Reserve, is an indicator of sandplain grasslands. A large population of New England blazing star, *Liatris scariosa* var. *novae-angliae*, inhabits Washburn Island. This species is listed as a Species of Special Concern in Massachusetts. The federally endangered sandplain gerardia, *Agalinis acuta*, is also found within the Reserve.

### **Archeological, Historical, and Cultural Resources**

Five prehistoric sites have been identified on WBNERR land in Falmouth and many more are known on adjacent lands. In the vicinity of the Reserve, sites which range in age from possibly as early as the Paleo Indian Period (12,000 to 9,000 BP) to the Contact Period (450 BP) may be expected to have survived on undeveloped land. When considered in the context of 12,000 years of human habitation, all of WBNERR must be considered archaeologically sensitive for prehistoric resources.

Artifacts collected on Washburn Island indicate that the island was recurrently occupied over a period of as much as 5,500 years. Artifacts inventoried from the Island (site 19-BN-575) indicate Native American activity from Late Archaic (ca. 6,000 – 3,000 years ago), Early and Middle Woodland (3,000 - 1,100 years ago), and Late Woodland (1,100 – 400 years ago) times. The range of implements and edge tools suggests that Washburn Island served as a habitation site as opposed to some type of special purpose site, e.g., kill or butchering. The sites also may have served in part as lithic workshops, as they have yielded quantities of lithic flaking debris, cores and preforms, indicating stone tool manufacturing. The remains of a 30-year old Native American from an unknown temporal period were also found on Washburn Island.

There are vestiges of more recent history on Reserve land as well. Cellar holes and building rubble mark the location of two of three 19<sup>th</sup> century farmsteads on Washburn Island. A brick foundation is all that remains of an elaborate estate that was built in 1900 by the son of the founder of the Bryant & Sturges shipping firm, which is credited with opening up the Pacific Northwest to trade. The estate was destroyed by fire in 1926. Some concrete exposed at the dune's edge at the far southern end of the island has been identified as the site of a garage belonging to a family that had their beach cottage moved

from the Island to Central Avenue in Falmouth in 1942, before the army took possession of the island.

Between 1942 and 1945 the island served as the Camp Edward's Engineer Amphibian Command. In this capacity the island became one of the Army's principle amphibious training grounds. Washburn Island has been referred to as "the cradle of our European invasion" (Enterprise 1953), as the men who trained on its shores went on to spearhead the assaults at Normandy, France; Oran, Algeria; and Salerno, Italy. Toward the end of the war the base was used as an "R & R" center for convalescing soldiers from nearby Camp Edwards. Many deteriorating concrete foundations and slabs located toward the northern and central portion of the island are associated with this military use. The asphalt roads and the bridge abutments on the northwest shore of the island are also military features.

On the mainland, at the head of Waquoit Bay, is the Reserve's headquarters site, sometimes referred to as the Sargent Estate. The main house was built between 1880-1890 by Ignatious Sargent in the Shingle Style of late Victorian construction and used as a summer "cottage" for family vacations until it was damaged in a hurricane in 1938. The mansion features sixteen rooms with ornate fireplaces and mantels and exotic woods on the first two floors. It included one of the first central vacuum systems. Following the 1938 hurricane, the building was boarded up for almost fifty years until it was acquired by the Commonwealth of Massachusetts in 1987 for use by the Reserve. The estate also includes a carriage house, gate house, boat house, and chicken coop. All of these buildings, except for the chicken coop, have been adapted for new uses by the Reserve.

The Reserve's headquarters are located within the Waquoit National Historic District. The Historic District was established in 2004 in recognition of the area's significance as an isolated Falmouth Village that reached the high point of its development in the 1850s with industrial, marine, agricultural, and summer tourism components.

## **Facilities**

### Headquarters Site

#### *Visitor Center/Main House*

The Visitor Center/Main House is the principal point of contact for visitors to the Reserve and provides office and meeting space for the staff of the Reserve. The first floor is handicapped-accessible and contains a large meeting room and three smaller rooms. Of the smaller rooms, two make up the Exhibit Center and the third is a storage room. The first floor also has two handicapped-accessible toilets. The second floor consists of offices, a small kitchen/lunchroom, and a bathroom for the staff of the Reserve. The cellar and attic are used for storage.

### *Carriage House*

The Carriage House consists of 13 rooms; three are used for research, one is a shower room for researchers, one large room is set up as a classroom/laboratory. Two rooms are handicapped-accessible toilets. There is a furnace room, a two-bay storage area, a two-bay shop area, an office, an employee toilet, and a break room used by maintenance staff. The building sits on a concrete slab and has attic storage space.

### *Gate House*

The Gate House is used primarily as a dormitory for visiting students, scientists, and others. It consists of two floors with a small cellar and small attic. The first floor is fully handicapped-accessible and has one bedroom, toilet, full bath, kitchen, and a sitting room. There are two bedrooms and a full bath on the second floor. Bunk beds on the first and second floors provide sleeping accommodations for 12 people.

### *Boat House*

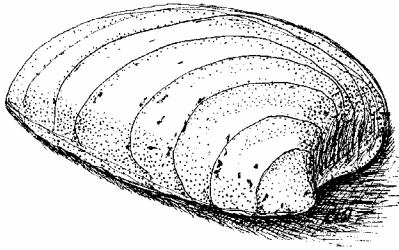
The Boat House consists of one floor of living area and a cellar. The main floor has four rooms: one large space used as a library and meeting room, one room used for office space, a small kitchen, and a bathroom. The cellar is used for boat and research equipment storage.

### South Cape Beach State Park

The 462 acres which make up South Cape Beach State Park are located between Waquoit Bay and Vineyard Sound, to the east of the entrance to the Bay. When the Commonwealth of Massachusetts acquired the property in 1982 it included a small cottage (since removed), a mile of gravel roads, and two small gravel-based parking lots with a total capacity of 110 cars. There are now several new facilities that were modified or constructed by the State within the intensive use recreational area of the Park. These include a beachfront area, boardwalks to the beach, a contact station, two composting toilets, and a 200-car parking area. Trails used in education programs and by visitors traverse some areas of the Park.

### Washburn Island

The Commonwealth acquired the 286 acres that comprise Washburn Island in 1983. At that time there were no structures on the island. Today, the island has several unimproved areas for camping supported by two composting toilets. There are also trails on the island for nature viewing and exploration. Most of the present vegetation on the site dates from after World War II.



## Chapter 2: Understanding Coastal Ecosystems

*Goal 1: Improve the understanding of coastal ecosystems and the human influences on them.*

### Overview

Goal 1 expresses the Reserve's important role in fostering research on coastal ecosystems and the human impacts on them. The Reserve fulfills this role by providing a dedicated, stable natural ecosystem representative of the biogeographic region as a platform for scientific investigation, providing scientists with infrastructure and information that supports and guides their work, and communicating the results to coastal communities to aid their decision-making.

For infrastructure, the Reserve provides researchers with an estuarine base of operations, facilities, and a range of logistical support. For information, the Reserve maintains an intensive research and monitoring program and research archive aimed at providing scientists with a rich set of current and past environmental and societal data to create a broad and detailed context for their studies. The Reserve also obtains and communicates information regarding the important coastal resource management issues in the region to help focus research on community needs. Research results provide feedback to adaptive resource management activities at the Reserve and are incorporated into the Reserve's training and education programs.

Currently, the Reserve's Research Priority Areas are:

- Water quality / eutrophication / watershed land-use
- Climate change / sea level rise / shoreline change
- Assessment of ecosystem response to natural variability and human impacts

These Research Priority Areas are continually refined through dialog between DCR, WBNERR and CZM staff; researchers; and coastal decision-makers, and with consideration for the NERRS Research Goals, Research Priorities and Focus Areas (Figure 6).

Each year, a working group consisting of technical staff from WBNERR, DCR, and CZM (and possibly selected individuals from other EOEA agencies) will develop the annual WBNERR research priorities. These priorities, driven primarily by NOAA guidance and statewide coastal management needs, will guide research activities supported by the reserve.

**Figure 6:** Summary of Statements Guiding WBNERR and NERRS Research and Monitoring.

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| <p><b>Waquoit Bay NERR Priority Research Areas</b></p> <ul style="list-style-type: none"><li>• Water quality / eutrophication / watershed land-use</li><li>• Climate change / sea level rise / shoreline change</li><li>• Assessment of ecosystem response to natural variability and human impacts</li></ul> <p><b>Reserve System Research Goals</b></p> <p>Research at Waquoit Bay Reserve is designed to fulfill the Reserve System goals as defined in program regulations. These include:</p> <ul style="list-style-type: none"><li>• Address coastal management issues identified as significant through coordinated estuarine research within the System;</li><li>• Promote Federal, state, public and private use of one or more reserves within the System when such entities conduct estuarine research; and</li><li>• Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.</li></ul> <p><b>Reserve System Research Funding Priorities</b></p> <p>Federal regulations, 15 C.F.R. Part 921.50 (a), specify the purposes for which research funds are to be used:</p> <ul style="list-style-type: none"><li>• Support management-related research that will enhance scientific understanding of the Reserve ecosystem,</li><li>• Provide information needed by reserve managers and coastal ecosystem policy-makers, and</li><li>• Improve public awareness and understanding of estuarine ecosystems and estuarine management issues.</li></ul> <p>The reserve system is focusing on the following <b>research areas</b> to support the priorities above:</p> <ul style="list-style-type: none"><li>▪ Eutrophication, effects of non-point source pollution and/or nutrient dynamics;</li><li>▪ Habitat conservation and/or restoration;</li><li>▪ Biodiversity and/or the effects of invasive species;</li><li>▪ Mechanisms for sustaining resources within estuarine ecosystems; or</li><li>▪ Economic, sociological, and/or anthropological research applicable to estuarine ecosystem management.</li></ul> |
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Research is conducted internally by Reserve scientific staff, externally by visiting scientists from other institutions and agencies, and in collaborations or partnerships between the Reserve and other scientists, institutions and agencies. Internal research and monitoring have the primary mission of maintaining the Reserve as a natural laboratory by obtaining and providing critical environmental and societal information on the Waquoit Bay estuarine system and adjacent marine and terrestrial systems that influence it. External research by visiting scientists addresses the broad range of natural and social science problems from basic research on the biology and physical environment of



estuaries to applied research addressing specific coastal management problems. Collaborative research, carried out by the Reserve in partnership with outside entities, is focused on filling information gaps identified by the Reserve or addresses pressing local and regional coastal management issues.

Research partnerships, in particular, provide the Reserve with significant leverage in focusing research on critical areas and concerns. Linkages and cooperative efforts with universities and other institutions, both governmental and non-governmental, help to highlight the Reserve as a convenient and effective site for coastal research along with increasing the awareness of coastal resource management needs within the research community.

Research at the Reserve is also driven by the National Estuarine Research Reserve System's Research and Monitoring Plan.

## **Research and Monitoring Plan [§921.50]**

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

There are two reserve system efforts to fund research on the previously described areas. The Graduate Research Fellowship Program (GRF) supports students to produce high quality research in the reserves. The fellowship provides graduate students with funding for 1-3 years to conduct their research, as well as an opportunity to assist with the research and monitoring program at a reserve. Projects must address coastal management issues identified as having regional or national significance; relate them to the reserve system research focus areas; and be conducted at least partially within one or more designated reserve sites.

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

Secondly, research is funded through the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), a partnership between NOAA and the University of New Hampshire (UNH). CICEET uses the capabilities of UNH, the private sector,

academic and public research institutions throughout the U.S., as well as the 26 reserves in the reserve system, to develop and apply new environmental technologies and techniques.

### **System-Wide Monitoring Program**

It is the policy of Waquoit Bay Reserve to implement each phase of the System-Wide Monitoring Plan (SWMP) initiated by ERD in 1989, and as outlined in the reserve system regulations and strategic plan:

- Phase I: Environmental Characterization, including studies necessary for inventory and comprehensive site descriptions;
- Phase II: Site Profile, to include a synthesis of data and information; and
- Phase III: Implementation of the System-wide Monitoring Program.

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

1. **Abiotic Variables:** The monitoring program currently measures pH, conductivity, salinity, temperature, dissolved oxygen, turbidity, water level and atmospheric conditions. In addition, the program collects monthly nutrient and chlorophyll a samples and monthly diel samples at one SWMP data logger station. Each reserve uses a set of automated instruments and weather stations to collect these data for submission to a centralized data management office.
2. **Biotic Variables:** The reserve system will incorporate monitoring of organisms and habitats into the monitoring program as funds become available. The first aspect likely to be incorporated will quantify vegetation (e.g., marsh vegetation, submerged aquatic vegetation) patterns and their change over space and time. Other aspects that could be incorporated include monitoring infaunal benthic, nekton and plankton communities.
3. **Landuse, Habitat Mapping and Change:** This component will be developed to identify changes in coastal ecological conditions with the goal of tracking and evaluating changes in coastal habitats and watershed land use/cover. The main objective of this element will be to examine the links between watershed land use activities and coastal habitat quality.

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

## **Monitoring at WBNERR**

Environmental monitoring is one of the Reserve’s major activities to which it devotes significant resources of equipment, supplies and personnel time. Because of the Reserve’s committed presence to a specific piece of water and land, it is positioned to carry out intensive monitoring critical to detecting environmental variability and long-term trends that would otherwise be difficult to accomplish within the short-term, hypothesis-driven venue typical of most research efforts. Monitoring at the Reserve currently consists of the following five programs (refer to Figure 7 for monitoring sites).

### **1. System-wide Monitoring Program**

The SWMP now serves as the “hard-wiring” framework for the Reserve’s natural laboratory, supplying real-time and archived meteorological and water quality information to Reserve staff, visiting researchers, and surrounding communities. The SWMP currently has three main components:

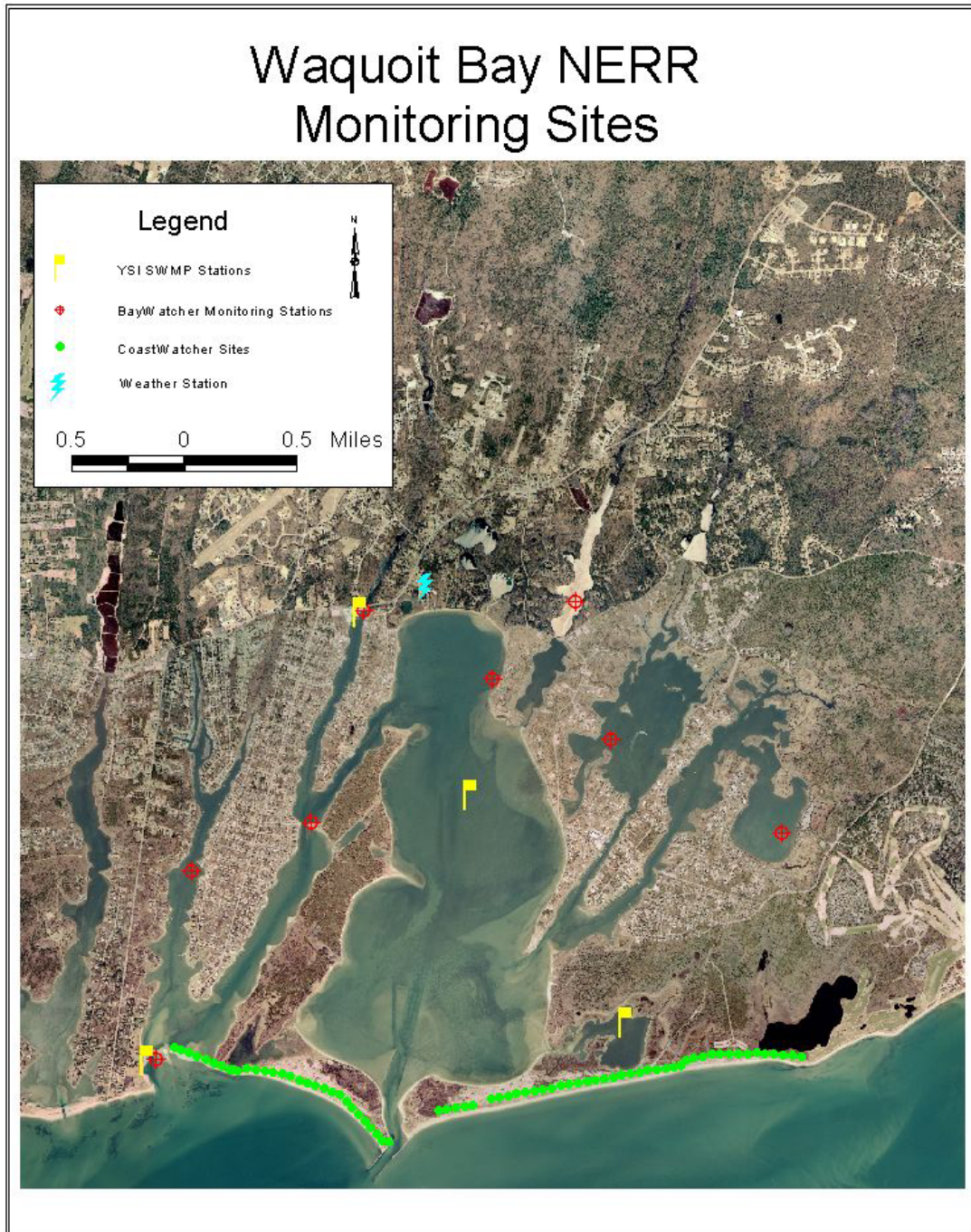
#### **a. Abiotic Variables**

- i. *Water Quality*: continuous ½ hourly measurements at four long-term monitoring stations (Figure 7). The parameters measured using YSI 6600 data loggers are water temperature, conductivity, salinity, dissolved oxygen, water level, pH, turbidity, and fluorescence.
- ii. *Meteorology*: continuous 15 minute measurements at one station. The parameters measured are air temperature, relative humidity, barometric pressure, wind speed and direction, precipitation, and photo-synthetically active radiation (PAR).
- iii. *Nutrients*. Monthly collections are made at four long-term monitoring stations, and one diel set at one of these stations. The parameters measured are dissolved nitrogen (NO<sub>2</sub>, NO<sub>3</sub>, NH<sub>3</sub>, DON), dissolved phosphorus (PO<sub>4</sub>), and Chlorophyll.

- b. Biotic Variables: The Waquoit Bay Reserve has begun monitoring biotic variables through periodic surveys, using aerial imagery and GIS mapping, of the Reserve’s salt marsh and wetland vegetative communities, submerged aquatic vegetation (SAV), and macroalgae to detect change over time. Initiated in 2004, the Research Coordinator expects to repeat the surveys at 2-5 year intervals.

- c. Landuse, Habitat Mapping and Change: As mentioned above, the Waquoit Bay Reserve has begun some mapping of coastal habitat for the biomonitoring project. This activity overlaps with the habitat mapping and change component.
2. **BayWatchers** – BayWatchers is a volunteer Citizen Water Quality Monitoring group based in Waquoit Bay and begun in 1993. Each of the 8 sites throughout the Reserve is measured for dissolved oxygen, salinity, temperature (air and water), water clarity (secchi depth), chlorophyll and nutrients. All sites are monitored once a month in the winter and twice a month in the summer.
3. **CoastWatchers** – CoastWatchers is another group staffed by volunteers. They measure shoreline change on the 3 miles of Waquoit Bay NERR’s Vineyard Sound-facing coastline. Since October 2000, linear and profile measurements have been taken of South Cape Beach and Washburn Island every 2 months from October through April.
4. **Threatened/Endangered Species** – Threatened and endangered species are present throughout the Reserve. Every spring, Piping Plovers (*Charadrius melodus*) appear on the beaches of Washburn Island, South Cape Beach, and neighboring New Seabury. The Reserve’s seasonal Shorebird Manager and trained volunteers monitor the beaches and erect symbolic fencing to protect the Plovers. Other monitored species include the Roseate Tern, Least Tern, Common Tern, Willets, and American Oyster Catchers. Monitoring programs are also in place for rare, endangered or state listed plants, including Northern Blazing Star (*Liatris borealis*) and Sandplain Gerardia (*Agalinus acuta*).
5. **Stewardship Monitoring** – WBNERR’s Stewardship Program conducts additional monitoring programs to inventory, evaluate the status of, and track changes in the valuable natural resources within the Waquoit Bay watershed. Examples include long-term resource monitoring programs of amphibians, aquatic insects, stream fish, vernal pool habitats, and visitor use impacts to natural vegetation.

Figure 7: Waquoit Bay NERR Monitoring Sites.



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## WBNERR Research and Monitoring Objectives

### **Objective 1.1: Research topics are prioritized through continued dialogue among researchers, coastal decision-makers and Reserve staff.**

*WBNERR staff will:*

- a. Review and/or conduct formal and informal surveys and interviews of researchers and coastal decision-makers.
- b. Identify gaps in knowledge about Waquoit Bay's environment and ecosystem.
- c. Publish a prioritized list of research topics and critical coastal resource management concerns annually.

The Research Coordinator is keenly aware of NERRS research goals, priorities, and focus areas. Using this knowledge, the Reserve identifies, refines and prioritizes research topics and critical coastal resource management concerns through literature reviews and regular dialogue among researchers, resource managers (including DCR and Massachusetts Coastal Zone Management staff), and representatives of coastal communities. The CTP Coordinator, working with other Reserve staff, organizes meetings, workshops and other events for this purpose. Less formal discussions also occur on a regular basis, allowing research priorities to evolve in an organic and often rapidly changing manner. This combination of critical thought and flexibility to respond to emerging issues allows the Reserve to catalog research needs on an ongoing basis. The Reserve's current Priority Research Areas were identified through this process (Figure 6).

Similarly, a list of currently recognized management needs for the region has been developed. A partial list of these needs follows.

- Improved assessment of contaminant-loading to local estuaries and strategies for reducing this input and mitigating its effects.
- Improved nitrogen-loading and eutrophication models, in particular, including assessing the impacts of re-development in any consideration of build-out and land-use scenarios for Cape Cod.
- Effective community strategies for reducing coastal nitrogen-loading and reversing eutrophication and associated habitat loss.
- Assessing the short and long-term impacts of climate change and sea level rise on the regional coastal environment and developing strategies to mitigate negative effects.
- Assessing near- and long-term shoreline change in the region and developing strategies to mitigate negative effects.
- Identifying natural variability and its causes in estuarine ecosystems and developing strategies that sustain healthy ecosystems while mitigating negative costs to communities.
- Identifying changes in estuarine ecosystems caused by human activities and developing strategies that change these activities to reduce or eliminate any negative impacts.

- Identify harmful invasive species and develop strategies to eliminate them or reduce their negative impact on estuarine ecosystems.

As noted above, a key aspect of the Reserve's research program is the provision of a rich set of environmental and societal data regarding Waquoit Bay and its watershed. These data establish a broad and detailed context for scientific studies. Knowledge of the Bay is, nonetheless, incomplete. Identifying gaps in knowledge about Waquoit Bay and its related systems is one of the Research Coordinator's primary functions. For example, it is the Research Coordinator's responsibility to maintain the research archive and to be knowledgeable about what research has been conducted in Waquoit Bay. Gaps in knowledge are often identified suddenly when a researcher or coastal manager tries to answer some question. These gaps serve as foci for future research. The Reserve's responsiveness to filling these gaps, once identified, is a key ingredient to the Reserve's success. A partial list of the currently recognized gaps is included here.

- Sub-surface geology and geological history of Waquoit Bay system including sea level rise.
- Current bottom sediment characterization and distribution of Waquoit Bay.
- Sedimentation (composition and rate) history in Waquoit Bay.
- Detailed land-cover and land-use history in Waquoit Bay watershed prior to 1950.
- Sub-tidal habitat changes in Waquoit Bay prior to 1950.
- Water quality / eutrophication history in Waquoit Bay prior to 1990.
- Estuarine faunal and floral population changes in Waquoit Bay and its watershed, including invasive species.
- Microbial ecosystems of the subterranean estuarine environment, in particular at the fresh groundwater / salt estuarine water interface zone.
- Variation of conditions in the fresh groundwater / salt estuarine water interface zone.
- Hydrodynamic model(s) for Waquoit Bay and Vineyard Sound, including combined stratification, wind and tides.
- Wave-environment and characterization within Waquoit Bay and adjacent Vineyard Sound.
- Sediment transport along Reserve's Vineyard Sound shoreline.
- Variations in groundwater levels in Waquoit Bay watershed and inflow rates to Waquoit Bay system.
- Variations in surface fresh water flow from all major creeks and rivers to Waquoit Bay.
- Detailed climate history of Waquoit Bay including impacting-storm history prior to 2002.
- Map and history of human alterations to Waquoit Bay shoreline: docks, seawalls, revetments, groins, marinas, etc.



Based on 1) knowledge of current literature and conversations with researchers and coastal decision-makers and 2) the Research Coordinator's current knowledge of gaps, a prioritized list of research topics will be published annually.

**Objective 1.2: Natural and social scientists conduct research at the Reserve that improves the understanding of coastal ecosystems and the human influences on them.**

*WBNERR staff will:*

- a. Conduct internal and collaborative research within the Reserve focused primarily on the Research Priority Areas, regional and local coastal management needs, and gaps in knowledge of the Waquoit Bay system.
- b. Work with CICEET, GRF, and other NOAA and NERRS programs to support research projects at the Reserve site, as well as more generally within NERRS, that address the Research Priority Areas, regional coastal management needs, and gaps.
- c. Develop a strategy to encourage external researchers to conduct research on WBNERR's priority topics.
- d. Encourage more social science (SS) research on societal attitudes and actions that may impact estuaries.

Research at the Reserve is conducted by three categories of scientists: internal, collaborative, and external. Internal and collaborative research is directed at Priority Areas, critical coastal management needs, and gaps. Collaborative research is that conducted with CICEET funding, by Graduate Research Fellows, and all other research that is jointly conducted by Reserve staff and outside parties. External researchers are those with no direct affiliation with the Reserve. The Reserve encourages external scientists to conduct studies at the Reserve by making them aware of research needs, support (*i.e.*, information and infrastructure), and funding opportunities available through NOAA and NERRS mechanisms. The Research Coordinator will work with the CTP Coordinator to develop a strategy to attract more external researchers. A list of current research is included in Appendix C.

In addition to the Reserve's strong support for natural science research on estuaries, the Reserve is encouraging more social science research on societal attitudes and actions that may impact estuaries. Toward this end, WBNERR is investigating the development of partnerships with social science departments at universities and institutions and the establishment of annual and/or seasonal social science internships (see Objective 1.7.c).

**Objective 1.3: The Reserve's environment is regularly monitored and key resources are inventoried as context for research and to determine their current status and developing trends.**

*WBNERR staff will:*

- a. Continue to implement and, as resources allow, improve SWMP in coordination with NERRS.
- b. Add an additional meteorological station over water in the bay or near its barrier beach areas, resources permitting.
- c. Expand the number of permanent long-term SWMP water quality stations, as resources allow.
- d. Transition the initial bio-monitoring program into a permanent program to include SAV, macro-algae, salt marsh vegetation, and invasive and rare species.
- e. Continue to enlist and train volunteers to participate in ongoing monitoring programs: BayWatchers, CoastWatchers and Endangered Species.
- f. Continue to map the coastal structures of the Waquoit Bay system, including such structures as docks, piers, seawalls, groins and revetments.
- g. Continue to map the bottom sediment composition and distribution of the Waquoit Bay system.
- h. Seek to obtain high-resolution bathymetry of the Waquoit Bay system and Reserve topography using LIDAR or other high-resolution remote-sensing technology.

The Waquoit Bay Research Reserve is committed to the collection of information about the Reserve's environment and key resources. The Reserve fully participates in the SWMP by collecting and transmitting data on abiotic and biotic variables and land use, and by mapping habitat and changes in habitat in accordance with established protocols. As resources allow, the Reserve will improve SWMP at the site level by:

- Achieving less temporal gaps in the data stream,
- Increasing data quality,
- Adding parameters, where appropriate, such as Chlorophyll, Dissolved Silica and Total Suspended Solids and hydrodynamic parameters such as waves and currents,
- Developing a high-frequency, automated measurement capacity where appropriate, and
- Developing a real-time, telemetered capability where appropriate

The Reserve will pursue further improvements to the SWMP at the site. For instance, the installation of an additional meteorological station over water in the bay or near its barrier beach areas would better reflect estuarine meteorological conditions. The Reserve will also endeavor to establish a permanent bio-monitoring program to include SAV, macro-algae, salt marsh vegetation, and invasive and rare species. Additionally, the Reserve will seek to expand the number of permanent long-term SWMP water quality stations at one or more of the following locations:

- Vineyard Sound (marine source to estuary)
- Quashnet or Moonakis River (main surface fresh sources to estuary)
- North Basin near the Boathouse (proximate to many research experiments)
- Groundwater well near Mansion (monitor groundwater conditions and levels)

The Reserve will improve monitoring of the Reserve and its environs beyond the context of the SWMP, as well. For instance, the Reserve will continue to enlist and train volunteers to participate in ongoing monitoring of water quality, shoreline change, and threatened/endangered species. Efforts to map coastal structures and the bottom sediment composition and distribution of the Waquoit Bay system will, likewise, continue. As will efforts to obtain high-resolution bathymetry of the Waquoit Bay system.

**Objective 1.4: The Reserve will continue to develop SWMP as an integrative part of the national IOOS and regional coastal observing systems.**

*WBNERR staff will:*

- Continue to coordinate with NERRS to build its SWMP infrastructure and technology to be a fully functioning part of IOOS.
- Continue to work with other regional entities, including regional IOOS associations, to participate in the development of IOOS.
- Work with several Cape towns and other regional entities to explore the development of a real-time water quality monitoring system for Cape Cod and southeastern Massachusetts.
- Establish a working relationship with the Martha's Vineyard Ocean Observing System including, where appropriate, data exchange and exploration and inclusion of data in education programs.
- Assess, in collaboration with others (WHOI and USGS), the feasibility of establishing a coastal groundwater observatory at the Reserve and, based on those assessments, develop plans and implement recommendations.

The coastal component of the Integrated Ocean Observing System (IOOS) is envisioned as a national network of data acquisition and dissemination sites that will provide comprehensive and timely information about the status, condition, and future of the nation's estuaries and coastal ocean waters. The Federal coastal IOOS will consist of regional observing systems that represent a collaboration of state and Federal agencies, academia, private industry, and non-governmental organizations. In 2004, the NERR SWMP was identified as an integral part of the coastal "backbone" of IOOS and, as such, a key design element of the coastal observing system. Over the term of this Management Plan (next 5 years), the integration of SWMP with IOOS is expected to be a major influence on the implementation, development and further expansion of SWMP within NERRS. This will likely entail significant changes in SWMP at the Reserve level including data collection, instrumentation, data quality control, and data accessibility.

The Reserve will explore the establishment of linkages with regional organizations to create a Cape and Islands/Southeastern Massachusetts real-time water quality monitoring

network as part of IOOS development. In addition, the Reserve will coordinate with other intensive research and monitoring marine observatories in the area—the closest being the Martha’s Vineyard Ocean Observatory operated by the Woods Hole Oceanographic Institution—to expand the types of environments available for coastal researchers. Similarly, many researchers using the Waquoit Bay Reserve have long focused on the problem of eutrophication and the delivery of nutrient laden groundwater to the estuary. Within the next five years, the Research Coordinator will explore the option of creating a coastal groundwater observatory, possibly in partnership with USGS and WHOI.

**Objective 1.5: Researchers and others will be able to access comprehensive information about the natural and societal environment of Waquoit Bay, its surrounding watershed and communities, both current and past.**

*WBNERR staff will:*

- a. Continue to summarize and characterize SWMP abiotic data in an annual report that will also be available on the Reserve's web site.
- b. Continue to summarize *Baywatcher* and *Coastwatcher* data in an annual report that will also be available on the web site.
- c. Continue to up-date the Reserve’s research bibliography annually.
- d. Make real-time SWMP data available on the web.
- e. Complete the Waquoit Bay Researchers’ Handbook, a compendium and summarization of environmental information about Waquoit Bay.
- f. Continue to post downloadable GIS products (*i.e.*, maps of Waquoit Bay and environs) on the Reserve’s web site.
- g. Make societal information—such as NOAA’s Census and Bureau of Economic Analysis Data—for the region surrounding the Reserve available on the web.
- h. Create links from the Reserve web site to other data relevant to Waquoit Bay research.

The Reserve packages information so that it is readily available to researchers. Making the data sets listed above accessible is part of the Reserve's commitment to providing a comprehensive research platform.

**Objective 1.6: The Reserve will facilitate estuarine research by providing strong logistical support, state-of-the-art facilities and equipment.**

*WBNERR staff will:*

- a. Review and assess its needs for research infrastructure, including improvements to buildings and laboratory spaces.
- b. Proceed with plans and recommended actions, based upon the assessment of need (1.6.a) and as funds allow, to insure adequate state-of-the-art research facilities.
- c. Develop a feasibility study for construction or acquisition of dock and pier facilities for boat and research use. (same as 5.11.b)
- d. Assess the feasibility of installing a data cable along the Boathouse shoreline.
- e. Assess the feasibility of installing absolute elevation controls at several key points throughout the Reserve.
- f. Regularly assess its research boat needs, including onboard equipment.
- g. Seek to acquire and install a microscope and associated imaging equipment and software.
- h. Periodically reassess the need for in-house nutrient analysis and may obtain related equipment, such as a nutrient auto-analyzer for the laboratory.

The Reserve offers physical structures and equipment as yet another facet of its comprehensive research platform. Existing facilities include the laboratory in the Carriage House and space on the first floor of the Boat House for equipment storage. The Reserve also maintains several boats for research and monitoring use. The Research Coordinator can employ the boats in support of internal, collaborative and external research and monitoring. Because of DCR regulations, however, the motorized boats must be operated by trained Reserve staff.

The laboratory currently includes cold and dry storage for samples, sorting tables and workbenches, and wet lab facilities including a fume hood, water filtration equipment, micro-balance, sinks and tight tank for handling toxic substances, distilled water, and flourometer and spectrophotometer.

During the period of this Management Plan, the Reserve will seek to improve its physical infrastructure. State-of-the-art lab facilities will accommodate and enhance good science. A dock will be a platform for scientific experiments and will allow for easier access to vessels and is recommended in the 2004 *Final 312 Evaluation Report* issued by NOAA (refer also to Objective 5.11, *Construction Plan*). The installation of a data cable will allow researchers to connect equipment that provides real-time access to their experimental data. The installation of absolute elevation controls will enable better monitoring of the environment in reference to local sea level and sea level rise.

Similarly, the Reserve will seek to identify and acquire the most appropriate and beneficial equipment needed to support research at the Reserve. For instance, equipment for the research vessels may include an improved GPS/sounder with data storage capacity, an underwater video system, and an onboard vibra-coring system. The acquisition of a microscope and associated imaging equipment and software will improve

the Reserve's capacity for monitoring planktonic and benthic micro-organisms and identifying environmental signals in microscopic growth structures of marine organisms. A nutrient auto-analyzer will permit the Reserve to conduct in-house nutrient analysis should the Research Coordinator determine that it would be beneficial to do so.

**Objective 1.7: The Reserve will develop and maintain partnerships and cooperative efforts with other research institutions.**

*WBNERR staff will:*

- a. Maintain, explore and develop collaborative efforts with academic and research institutions including the University of Massachusetts, Boston College, Boston University, Marine Biological Laboratory, Woods Hole Oceanographic Institution, Cape Cod Community College, and other academic and research institutions as appropriate.
- b. Maintain, explore and develop collaborative efforts with governmental entities engaged in coastal science including the Massachusetts Office of Coastal Zone Management, Massachusetts Division of Marine Fisheries, U.S. Geological Survey, and the Buzzards Bay National Estuary Program.
- c. Explore the development of a summer undergraduate research internship program.

The Waquoit Bay Research Reserve maintains mutually beneficial relationships with numerous academic and private research institutions, as well as with government agencies engaged in coastal science. In exploring and carrying out all research partnerships and collaborative efforts, the Reserve promotes its capacity to provide expertise on effective education and outreach for research. The Reserve's relationships with other institutions are summarized below.

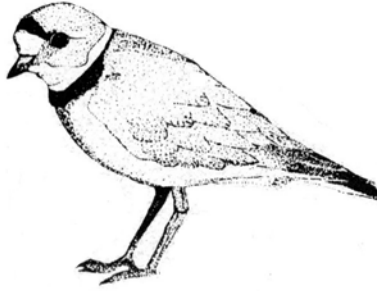
- **University of Massachusetts-Boston:** The Reserve will maintain its relationship and Memorandum of Understanding (MOU) with the Environmental, Earth and Ocean Sciences (EEOS) Department and the Urban Harbors Institute, seek opportunities to cooperate on research and education when and where appropriate, and investigate the possible establishment of a field site for the EEOS at the Reserve.
- **U-Mass System:** The Reserve will explore partnerships and collaborative efforts with other University of Massachusetts campuses and colleges including UMASS-Dartmouth, UMASS-Amherst, Bridgewater State College and Massachusetts Maritime Academy.
- **Boston College:** The Reserve will continue to provide logistical support to graduate and undergraduate researchers from the Geology and Geophysics Department at Boston College and explore possible collaborative research.
- **Boston University:** The Reserve will maintain cooperative links with the Boston University Marine Program (BUMP) that operates through the Marine Biological Laboratory.

- **Marine Biological Laboratory (MBL):** The Reserve will continue to 1) act as a host site for undergraduate, graduate, and post-doctoral research and education experience; 2) act as a field site for The Ecosystem Center's Semester in Environmental Science (SES), an undergraduate education and research program; 3) host other researchers; and 4) explore closer ties to the MBL/WHOI library system.
- **Woods Hole Oceanographic Institution (WHOI):** The Reserve will continue to encourage researchers to use the Reserve site, explore collaborative projects with the Coastal Ocean Institute, continue to work closely with WHOI Sea Grant on research projects located in Waquoit Bay, and help prioritize research needs for both Sea Grant and the Reserve.
- **Massachusetts Office of Coastal Zone Management:** The Reserve will continue to work with the MCZM program on several projects such as wetlands assessments and to provide logistics for other assessment projects.
- **Massachusetts Division of Marine Fisheries:** The Reserve will provide staff support to the annual winter flounder survey on the south shore of Cape Cod to maintain and enhance the 30 year data set.
- **U.S. Geological Survey (USGS):** The Reserve will continue to provide a site for groundwater and coastal research. USGS will provide the Reserve with logistical support, technical assistance, and equipment, especially stream gauges and groundwater wells needed for the IOOS network.
- **Buzzards Bay National Estuary Program:** The Reserve will explore the possibility of the NEP being an IOOS partner in a regional network.

As part of partnerships with other institutions, the Reserve will also explore creating undergraduate research opportunities. In particular, the Reserve will investigate the development of a summer undergraduate internship program to support researchers (internal and external) by pairing interns with physical and social scientists and offering housing and a stipend.

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Joan Muller

## Chapter 3: Improving Environmental Literacy

*Goal 2: Improve environmental literacy in our communities to enable environmentally-sustainable decision-making.*

### Overview

This chapter describes a maturation of philosophy with regard to the most effective educational techniques to apply to the development and implementation of solutions to coastal management issues. The Reserve has assumed for years that providing information through courses, workshops, materials, and presentations—in other words, educating people—would result in changed behavior and lead to better coastal management. However, discussions over the past year, fueled by inquiry into the best approaches for fostering environmental literacy and sustainable behavior, have caused Reserve staff to question the long-standing belief that if you provide information to people, they will do the “right” thing. Research suggests (McKenzie-Mohr and Smith, 1999) that information alone does not change behavior or even lead to environmental literacy. Rather, programs that actively engage people in explorations and problem solving over time (*i.e.*, a day, several sessions) develop participants’ sense of personal investment in the issue. Because of these findings, the Reserve will focus more resources on longer, more involved programs that systematically present environmental literacy concepts and involve people in hands-on problem solving activities, preferably out in the field.

In order to provide education and training programs that inform learners and promote changes toward sustainable behaviors, Reserve staff members design classes, courses, workshops, and materials that engage learners over time and include in-depth information and activities. Research about the “spaced learning effect” supports the practice of providing multiple opportunities to study and learn new material, as well as the value of having interactive lessons. Dempster (1991) reports, “With total study time equated, two or more opportunities to study the same material are much more effective than a single opportunity.” One way the Reserve is incorporating this approach is to offer teacher

training courses, rather than just one-day sessions. In these courses, instructors introduce concepts and skills in one session and then review and reinforce them in subsequent sessions.

While all WBNERR programs promote environmental literacy, it is the Training and Education programs that specifically guide individuals in their professional and personal roles toward environmentally-sustainable decisions. These decisions will, in turn, translate into environmentally-sustainable behavior at both the individual and community levels. The Training and Education programs include the Coastal Training, Teacher Training, K-12, and Community Education Programs. All Training and Education activities support the NERRS Education Mission and Goals and NERRS Education Objectives (see Figure 8).

The Reserve's education and training programs utilize the benefits of the protected natural habitats within the Reserve and transfer knowledge of coastal ecosystem processes developed by research results from here and elsewhere to various audiences. Resource management issues are incorporated into the activities.

**Figure 8:** Summary of Statements Guiding WBNERR and NERRS Training and Education.

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| <p><b>Waquoit Bay NERR: Training and Education Mission Statements</b></p> <ul style="list-style-type: none"><li>• <u>CTP</u>: The CTP fosters sound science-based coastal decision-making in Massachusetts by 1) providing up-to-date scientific information and skill building opportunities that are directly responsive to the needs of the coastal management community and 2) contributing to the development of networks of decision-makers and researchers.</li><li>• <u>K-12 and Professional Teacher Development</u>: Programs for students and teachers increase learners' knowledge of coastal ecology and the impacts of human actions on coastal areas to promote ecologically sustainable behaviors.</li><li>• <u>Community Education</u>: The Community Education Program fosters behavioral change that leads to resource conservation and advances the mission of the Reserve.</li></ul> <p><b>Reserve System Education Mission and Goals</b></p> <p>The National Estuarine Research Reserve System's mission includes an emphasis on education, interpretation, and outreach. Education policy at Waquoit Bay Reserve is designed to fulfill the reserve system goals as defined in the regulations (15 C.F.R Part 921(b). Education goals include:</p> <ul style="list-style-type: none"><li>• Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;</li><li>• Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.</li></ul> <p><b>Reserve System Education Objectives</b></p> <p>Education-related objectives in the Reserve System Strategic Plan (FY 03-08) include:</p> <ul style="list-style-type: none"><li>• Enhance the transfer of knowledge, information and skills to coastal decision makers for improved coastal stewardship.</li><li>• Provide education programs for students, teachers and the public to increase literacy about estuarine systems.</li></ul> |
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## **Education Plan [§921.13(a)(4)]**

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

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

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

### **Reserve System Coastal Training Program**

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

Coastal Training Programs offered by reserves relate to coastal habitat conservation and restoration, biodiversity, water quality and sustainable resource management and integrate reserve-based research, monitoring and stewardship activities. Programs target a range of audiences, such as land-use planners, elected officials, regulators, land developers, community groups, environmental non-profits, business and applied scientific groups. These training programs provide opportunities for professionals to network across disciplines, and develop new collaborative relationships to solve complex environmental problems. Additionally, the CTP provides a critical feedback loop to ensure that professional audiences inform local and regional science and research

agendas. Programs are developed in a variety of formats ranging from seminars, hands-on skill training, participatory workshops, lectures, and technology demonstrations. Participants benefit from opportunities to share experiences and network in a multidisciplinary setting, often with a reserve-based field activity.

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

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

### **The Massachusetts Coastal Training Program**

The reserve system Coastal Training Program is manifested at the Waquoit Bay NERR as the Massachusetts CTP. Its mission is to foster sound science-based coastal decision-making. CTP accomplishes this mission by serving as a link between research, policy, community support, and education. As an active member of the coastal management community, the CTP Coordinator stays abreast of current scientific research and policy issues and is engaged with State and community boards and commissions. The CTP Coordinator incorporates the most current and effective educational techniques into CTP programs and materials. The approach is consistent with constructivist learning theory that is applied to the Reserve's K-12 programs. Activities include targeted training and education at the state and local level that is directly responsive to the needs of the coastal management community and that provides the best available information, including cutting-edge research. The CTP program is also available for one-on-one consultancies and provides information through its web site ([www.coastaltraining.org](http://www.coastaltraining.org)) and written materials.

The CTP has been very successful in providing scientific data, practical training, and outreach materials on such varied topics as wastewater management, coastal landscaping using native plants, the management of docks and piers, salt marsh restoration, atmospheric nitrogen deposition, nutrient loading and eutrophication, renewable energy use, and local initiatives to respond to global climate change. Positive impacts of CTP workshops and training include aiding towns to both complete energy audits of municipal energy use and to create Climate Action Plans; helping to establish new collaborations

between organizations on Cape Cod; and educating town managers and planners on wastewater treatment management strategies.

**Objective 2.1: CTP activities will deliver knowledge and skills appropriate to the needs of the target audiences.**

*WBNERR staff will:*

- a. Continue to work closely with the Steering Committee to plan and coordinate training activities of the three organizations.
- b. Maintain and use a CTP Advisory Committee.
- c. Seek appropriate partners for specific training activities and to expand the geographic scope of its activities.
- d. Maintain ongoing informal and formal assessments of the informational and training needs of the Commonwealth's coastal decision-makers.
- e. Provide post-workshop evaluations to all participants.
- f. Analyze evaluations and workshop discussions to assess the success of the workshop and to fine-tune future training efforts.

The Coastal Training Program works in partnership with a Steering Committee, Advisory Committee and selected partners to plan, coordinate and implement training programs. Training programs are continually improved and expanded through the combined experience and expertise of the partners.

The Massachusetts CTP is directed by the WBNERR-based CTP Coordinator in association with Steering Committee members from the Massachusetts Coastal Zone Management Program and the Woods Hole Oceanographic Institution's Sea Grant Program. These three institutions offer workshops and other training alone and in partnership with each other and several other private, public and non-profit organizations.

Assisting the CTP Steering Committee is the CTP Advisory Group, currently consisting of nine local coastal leaders in science, management, advocacy, and education. Advisory Group members serve two-year terms. The Advisory Group, which meets with the Steering Committee a few times a year, helps devise future workplans and set CTP priorities; identifies education and training needs in the Commonwealth; finds effective ways to publicize and promote coastal training opportunities; and collaborates on future CTP activities.

To strengthen the breadth and depth of CTP offerings throughout the Commonwealth, the CTP continually seeks to develop new strategic partnerships. The CTP works with partners to develop training courses and to expand the geographic reach of its training programs through partners' existing networks of coastal decision-makers. The intended geographic scope of the CTP includes the North Shore, Greater Boston, the South Shore, Buzzards Bay, Cape Cod, and the Islands. In reality, most of the training events have been held on Cape Cod. The CTP wants more people and organizations from outside of the Reserve's local geographic area to be aware of and participate in training events.

Within the local area, CTP wants to attract more participants from municipal boards that are charged with coastal management responsibilities.

The CTP uses assessments and evaluations to improve its ability to meet audience needs. Identifying the coastal management community's priority training needs is one of the CTP Coordinator's primary responsibilities. Toward this end, the CTP Coordinator is continually involved in informal needs assessments. The CTP Coordinator maintains open and regular dialog with the Steering and Advisory Committees and other key partners in the fields of coastal management, science, education, and advocacy. Furthermore, the CTP Coordinator is an active member of the coastal management community. As such, the Coordinator is aware of the pressing needs currently facing coastal decision-makers. Additionally, the CTP Coordinator works with Research and Stewardship staff and other contacts within the scientific community to stay abreast of emerging science and technology. The CTP is responsible for drawing the attention of coastal decision-makers to these emerging issues and their implications for resource management. For example, some CTP programs are built around restoration activities at the Reserve.

The CTP also undertakes formal needs assessments to help the program provide current and targeted information to coastal decision-makers. For example, the Steering Committee completed a market analysis to inventory coastal training providers and has conducted three separate formal audience assessments to determine the needs of particular groups of coastal decision-makers, *i.e.*, local government officials, non-profit organizations, and shellfish aquaculturists. Future needs assessments targeting different types of decision-makers will be performed.

Information gathered through both the informal and formal needs assessments is used to shape CTP activities. Following a workshop or event, Reserve staff evaluates the success with which the program satisfied audience needs. The program evaluations help the CTP to provide better training programs in the future and to identify new training topics. All workshop participants are asked to complete an evaluation form that incorporates the ERD system-wide evaluation criteria at the conclusion of each workshop. WBNERR staff also make note of significant discussion points raised during workshops. Later, WBNERR staff will consider workshop discussions and analyze all evaluations to learn which aspects of the workshop were most appreciated, which could be enhanced, and what other topics or formats should be considered.

**Objective 2.2: CTP activities will deliver science-based information relevant to local sustainable coastal management.**

*WBNERR staff will:*

- a. Coordinate several training events per year that will address training needs that are identified through needs assessments and/or are related to emerging resource management issues.
- b. Include coastal and estuarine scientific research or research information in training programs.
- c. Utilize the most effective training techniques to deliver information to the resource management, scientific, and governmental communities.
- d. Maintain a network of experts in relevant fields to draw upon as workshop presenters.
- e. Incorporate time for networking and discussion of barriers to effective coastal management into training events.

Coastal Training Programs are designed so that participating coastal decision-makers will gain the knowledge, tools and resources they need to make sustainable coastal management decisions. CTP workshops address the following topics:

- Training needs identified through informal needs assessments,
- Training needs prioritized in the formal CTP needs assessments (*i.e.*, wastewater/nitrogen loading, community training and outreach, and shoreline development planning and impacts), and
- Emerging issues identified through research at the Reserve and elsewhere that have not yet been widely recognized as having a bearing on local coastal management decisions.

In the course of addressing these topics, the CTP will accurately communicate coastal and estuarine scientific information, as well as coastal management research results, project results, new ideas, practical tools, and solutions to coastal management problems. Particular effort will be directed toward transferring resource management tools to all coastal Areas of Critical Environmental Concern (ACEC) communities.

The design of individual workshops is based on knowledge of educational techniques that effectively engage adult audiences. The CTP works in partnership with the Reserve's Education, Research, and Stewardship staff to continually improve the delivery of programs. The CTP also draws upon a network of experts in relevant fields as workshop presenters. The participation of recognized experts further enhances the value of CTP workshops and other events.

The fact that training programs bring coastal decision-makers together in the same room for a few hours is an important aspect of the CTP. Individuals have the opportunity to meet and share ideas with other people who are grappling with similar issues. This interaction may breed new partnerships or other opportunities to solve coastal problems. When appropriate, participants are also encouraged to discuss barriers they have

encountered in their efforts to implement effective coastal management techniques and policies. Removal of these obstacles may then become the subject of future WBNERR efforts.

## **Teacher Training and K-12**

The Reserve offers teacher training courses, in-service teacher training, classroom programs, and field work with students at the Reserve and other coastal locations. The purpose of each program is, essentially, to help adults and children learn the scientific concepts necessary to be able to make informed decisions about the coastal environment. Learning science is an active process; something students do, not something that is done to them. In learning science, students describe objects and events, ask questions, acquire knowledge, construct explanations of natural phenomena, test those explanations in many different ways, and communicate their ideas to others.

The primary intent of Waquoit Bay Reserve education programs is to increase the learner's understanding of estuarine systems, factors that influence them, and the learners' role as coastal stewards. A secondary purpose is to promote scientific literacy. Scientific literacy includes knowledge and understanding of scientific subject matter, as well as understanding the nature of science, the process of science, and the role of science in society and personal life. Learners should develop an understanding of what science is, what science is not, what science can and cannot do, and how science contributes to better management of resources.

Reserve programs incorporate an inquiry or constructivist approach. For scientists, inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. Inquiry also refers to the activities of students and other learners in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world. Inquiry is a multifaceted activity that involves:

- making observations,
- posing questions,
- examining books and other sources of information to see what is already known,
- planning investigations,
- reviewing what is already known in light of experimental evidence,
- using tools to gather, analyze, and interpret data,
- proposing answers, explanations, and predictions, and
- communicating results.

Reserve programs incorporate as many of these components as possible, including multiple visits by students and learning themes with projects that students complete over time. Waquoit Bay Research Reserve education programs also adhere to *Massachusetts Frameworks for Science Education* and link programs and lessons to key academic concepts identified by the State. Reserve staff strives to involve students and other learners in inquiry-oriented investigations where they interact with their teachers and



peers. Learners establish connections between their current knowledge of science and the scientific knowledge found in many sources; they apply science content to new questions; they engage in problem solving, planning, decision making, and group discussions; and they experience assessments that are consistent with an active approach to learning.

Research on cognition has supported the development of current conceptions of science learning. There is a considerable body of cognitive research (Lapointe et al. 1992) which has provided evidence that learners are not passive recipients of codified knowledge but rather active participants. As a result, national science education initiatives now emphasize the following:

- Instruction through presentation of real-world problems and applications rather than abstract knowledge; and
- Opportunities for students to investigate natural phenomena, often involving data.

Waquoit Bay Reserve education programs incorporate learning using real problems and interacting with natural phenomena, including regular comparisons between Waquoit Bay and learners' home ecosystems. For example, Reserve staff use topographic maps to introduce coastal habitats or to demonstrate the proper siting for a wind turbine, and train the learners to use topographic maps of their own areas. Staff are also increasing the use of data from the System-Wide Monitoring Program with both math and science classes. The time and preparation required for in-depth and ongoing programs for K-12 students and teachers has reduced the number of programs offered at Waquoit Bay Reserve. The effectiveness of each program, however, has increased.

For K-12 and teacher training, WBNERR's focal topics are geology and coastal processes, eutrophication of coastal waters, climate change, and renewable energy. These topics are very similar to the Reserve's Priority Research Areas (refer to Figure 6). For each focal topic, Waquoit Bay Reserve education staff schedule a variety of programs, classes, and presentations in order to reach teachers, students, and community members. Reserve staff strive to provide opportunities for learners to choose introductory, intermediate, or advanced sessions on selected topic, as well as offering an opportunity for ongoing partnerships and projects. While teachers are a major target audience for WBNERR programs, the Reserve also works with many classes of students from elementary through undergraduate level and offers a variety of ways community members can learn about coastal topics.

Technology education, including collecting, analyzing, and interpreting data, is an important aspect of WBNERR education programs. It is a link with the NERRS System-Wide Monitoring Program, a connection with the International Ocean Observing System (IOOS), an integral part of renewable energy education, and a content area that teachers in Massachusetts are required to present.

**Objective 2.3: An increasing number of pre-service teachers will participate in Reserve programs.**

*WBNERR staff will:*

- a. Identify colleges currently offering appropriate pre-service training.
- b. Explore possibilities for partnering with appropriate programs to provide training.
- c. Develop curriculum and provide training.

The Reserve will pursue a strategy of working to incorporate environmental issues into teacher training programs at the pre-service level (*i.e.*, while teachers are still pursuing their teaching degrees). Toward this end, WBNERR will identify Massachusetts colleges and universities that offer teacher preparation in the biological, physical and social sciences and will cultivate relationships with these institutions. WBNERR will then work with selected colleges and universities to develop pre-service curricula related to WBNERR's priority issues and to provide training on the same.

**Objective 2.4: An increasing number of teachers will teach about coastal ecology to their classes.**

*WBNERR staff will:*

- a. Examine current teacher training programs to see how they fit into the Reserve mission and objectives.
- b. Continue to provide selected teacher training offerings.
- c. Encourage teachers to work in cooperative teams.
- d. Develop a strategy to make sure teachers are teaching concepts correctly.

WBNERR currently offers a variety of teacher training opportunities, including graduate credit courses. The programs highlight topics such as renewable energy, climate change, coastal processes, eutrophication, and estuarine ecology. Reserve staff will strategically assess which of these are most appropriate to the Reserve's mission and whether there is a need to develop new courses. A selected program of teacher training opportunities will then be offered. The training will encourage teachers to work in cooperative teams. Reserve staff will also develop a strategy to make sure teachers are teaching concepts correctly.

**Objective 2.5: An increasing number of teachers can explain how to be a good coastal steward and are models for their students.**

*WBNERR staff will:*

- a. Develop more lessons based on stewardship behaviors.
- b. Design WBNERR programs to provide opportunities for real-world problem solving to enable teachers to involve students in community issues.
- c. Contact teacher advisors about undertaking more estuarine stewardship projects with their clubs.
- d. Create a local stewardship award for teachers and students.

Beyond teaching about coastal ecology, WBNERR wants teachers to understand and model good stewardship behavior. Toward this end, lessons for both the summer teacher training programs and in-service training will include an emphasis on stewardship behavior. Lessons will be built around local issues to make them more relevant and useful to teachers engaging students in real-world problem solving. Additionally, the Reserve will contact teacher advisors about undertaking more estuarine stewardship projects with their ecology clubs and will create a local stewardship award for teachers and students.

**Objective 2.6: An increasing number of students perform environmentally sustainable behaviors.**

*WBNERR staff will:*

- a. Engage some students in stewardship projects while they are visiting the Reserve.
- b. Assess which programs can expect behavioral changes.
- c. Develop a methodology for evaluating behavioral change.
- d. Work with the Summer Science School teachers to incorporate activities designed to lead to sustainable behavior into their lesson plans.
- e. Conduct follow-up with summer school students to evaluate the effectiveness of efforts to promote sustainable behavior.
- f. Ask students participating in Reserve educational programs to make a pledge to adopt environmentally sustainable behaviors.

The ultimate evidence that stewardship-oriented teacher training is working will be the adoption of environmentally-sustainable behaviors by students. To help students establish environmentally-sustainable behaviors, the Reserve will engage students in stewardship projects while visiting the Reserve. Potential projects include habitat restoration, invasive species removal, endangered species monitoring and access management.

Furthermore, Reserve staff will work with the Summer Science School teachers to incorporate activities designed to lead to sustainable behavior into their lesson plans. Reserve staff will then follow up with students before the next summer to learn whether or not behaviors have been maintained.

Students participating in WBNERR educational programs will be asked to make a written pledge that they will adopt specific environmentally sustainable behaviors. By eliciting this sort of commitment, WBNERR staff will further encourage students to incorporate the lessons they learn at the Reserve into their lives.

**Objective 2.7: Students who have attended WBNERR programs will be able to describe basic estuarine ecology and the major stressors on estuaries.**

*WBNERR staff will:*

- a. Increase the pre- and post- field trip instruction.
- b. Increase implementation of evaluations to track students' gains in knowledge following programs.
- c. Examine how well current programs meet this objective and may adjust numbers and types of programs in order to deliver the most effective programs possible.

Students who have participated in WBNERR programs should be able to describe basic estuarine ecology and the major pressures on estuaries. In order to evaluate the effectiveness of WBNERR offerings in achieving this objective, students in selected programs will be given pre- and post-tests to assess changes in knowledge. If evaluations show that desired levels of knowledge are not attained, programs will be refined to better communicate key concepts. As a result of the evaluations, Reserve staff could potentially deliver fewer, but more effective, programs.

## **Community Education**

The goal of the Community Education Program is to foster behavioral change that leads to resource conservation and advances the mission of the Reserve. Community Education focuses on audiences whose personal choices directly impact the integrity of our estuaries and their associated watersheds. Activities include events, like the Watershed Block Party, that are intended to raise awareness of environmental issues and values, as well as in-depth courses for community members such as *Cape-Friendly Landscaping* and *Green Home and Business: Focus on Energy* (a course on energy efficiency and renewable energy). Target audiences include, but are not limited to, watershed residents and recreational users of the Reserve. Over the course of the next five years, staff will explore options for expanding programs to underserved audiences.

During the past year, Reserve staff have attended and sponsored several training events on how to use a more targeted, results oriented, research-based approach to community education. During the next five years, staff will place an emphasis on putting this training into action by doing a more complete planning and follow-up process for each program. For example, Reserve staff intend to increase the use of community-based social marketing (CBSM) techniques such as those described by McKenzie-Mohr and Smith in *Fostering Sustainable Behavior* (1999). CBSM encourages behavior change through programs that 1) identify barriers, 2) apply the tools of behavior change: commitment, prompts, norms, communication, and incentives, and 3) remove external barriers. In all

community education programs, Reserve staff will strive to provide research-based information about impacts of human activities on coastal systems and suggestions for less harmful alternative behaviors.

**Objective 2.8: An increasing number of community members understand and/or perform environmentally sustainable behavior.**

*WBNERR staff will:*

- a. Determine priority target audiences.
- b. Describe the current state of environmental knowledge of target audiences and identify gaps and needs through needs assessment (survey, interview, focus group).
- c. Develop strategies to meet the needs of different audiences.
- d. Implement programs to fill gaps in knowledge.
- e. Evaluate programs to guide further actions.
- f. Implement long-term follow up to determine effectiveness of programs.
- g. Use more community-based social marketing tools.

WBNERR promotes the adoption of environmentally-sustainable behavior related to energy consumption, landscaping, and construction, among other topics. The Reserve will increasingly draw upon community-based social marketing to effect positive changes in people's behavior by instituting specifically targeted projects. Over the course of the next five years, Reserve staff will identify specific community-based social marketing projects. They will define and promote a set of desired behaviors, track over time, and look for responses in the environment (refer to Objective 4.4).

**Objective 2.9: Recreational users of the Reserve are increasingly aware of environmental issues and adopt environmentally-sustainable behaviors.**

*WBNERR staff will:*

- a. Use community-based social marketing, training from visitor use workshop and/or Project Design and Evaluation techniques to develop interventions and test results.
- b. Work with DCR to provide more emphasis on stewardship when training seasonal interpreters.
- c. Work with other staff to refine the definition of target audiences and behaviors that need to be changed.
- d. Continue to offer interpretive programming, along with "environmental entertainment."
- e. Continue to require seasonal interpreters at the Reserve to incorporate local coastal management issues and information about environmentally-sustainable behavior into their programs.
- f. Be more strategic about deploying roving interpreters.

The WBNERR Education Coordinator is responsible for training seasonal interpretive workers at the Reserve and is often involved in the training of seasonal staff at other DCR facilities, especially coastal parks. The seasonal interpretive staff training addresses interpretive techniques and provides opportunities to interface with researchers studying issues, such as coastal change and Cape Cod geology, estuarine ecology, and eutrophication. During the next five years, the Reserve will place an even greater emphasis on stewardship and will develop community-based social marketing (CBSM) approaches. Seasonal interpretive staff will be trained in CBSM, will observe results, collect data, and provide feedback to year-round staff who, in turn, will adaptively adjust programs.

Education staff will work with other Reserve staff members to refine the definition of target audiences and behaviors that need to be changed. For example, staff may identify trail bike impacts or the destruction of piping plover nests. Once education staff are made aware of these types of incidents, they can begin developing programs targeting specific audiences and behaviors that need to be changed.

The Reserve offers a variety of interpretive programs that presently include the Junior Ranger program, Creature Feature, and Saturday Open House, among other events. The Junior Ranger program is part of a statewide summer program for children aged eight to twelve years old. For Creature Feature, a table is set up at South Cape Beach to catch people coming to the beach who would not ordinarily come to the Reserve's headquarters. The Open House was instituted to bring families into the Reserve headquarters to learn about WBNERR's research, stewardship and educational activities. Stewardship elements are incorporated into all programs, as are local coastal management issues.

The Reserve's seasonal interpreters are sent to areas where there are the most visitors and, not surprisingly, the most problems. The interpreters employ roving interpretation techniques to deliver stewardship messages.

In addition to the Reserve's education and stewardship-oriented interpretive programs, WBNERR offers a variety of other events that are more appropriately classified as entertainment with an environmental flair. *Evenings on the Bluff* are one example. The programs, sponsored by CPWB, feature professional entertainers who typically use song, storytelling, and/or comedy to convey information about the environment, wildlife, and the role of people as stewards of the natural world. Generally, one program each season is presented by members of the Wampanoag tribe and may include traditional song and dance, as well as a discussion of their historic and modern relationship to the estuary.

**Objective 2.10: Under-served audiences will receive recreational and educational programming.**

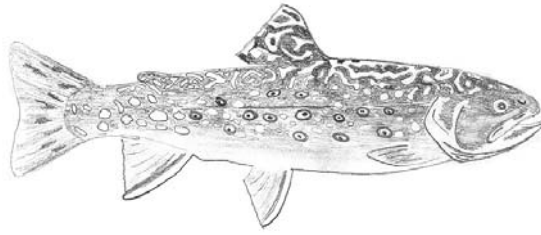
*WBNERR staff will:*

- a. Conduct an assessment to determine which audiences are being under-served.
- b. Determine whether resources are available to meet audience needs.
- c. Partner with organizations that have a record of working with the identified populations.
- d. Develop and deliver programs appropriate for various audiences.

Some people within the Waquoit Bay region do not have equal access to the Reserve's programs due to language barriers. These populations include the large Brazilian immigrant community and the deaf community. For other groups there may be other barriers. During the next five years, staff will focus more attention on outreach to these groups when doing so is compatible with the Reserve's mission.

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## Chapter 4: Demonstrating Sustainable Stewardship

*Goal 3: Demonstrate sustainable stewardship of the land and water ecosystems within the Reserve to serve as a model for community stewardship in the region.*

### Overview

This chapter describes WBNERR's activities to protect the land and water resources of the Waquoit Bay watershed through land stewardship zoning, regulatory mechanisms, land management techniques, the management of public access, restoration activities, efforts to acquire and protect additional lands, and strategies to exert influence over the management of waterbodies. Adaptive natural resource management on the Reserve is guided by results of research conducted at the Reserve and elsewhere and is shared throughout the region through education and training. This chapter also describes the Reserve's role as a model of resource management practices for similar coastal lands in the region. These practices are represented by Objectives 3.1 through 3.8. Together, they form the Reserve's **Resource Protection Plan** and generally fall under the purview of the Stewardship Program.

### Policies, Regulations, and Enforcement Mechanisms

**Objective 3.1: Reserve land and water resources are managed in accordance with this management plan, the Massachusetts Department of Conservation and Recreation's Land Stewardship Zoning Guidelines, applicable DCR policies and performance standards, and applicable local, state and Federal regulations.**

*WBNERR staff will:*

- a. Manage Reserve lands in conformance with the use restrictions defined within the Land Stewardship Zoning Guidelines.
- b. Remain cognizant of regulatory restrictions and management policies and enforce those for which the Reserve has authority to do so and will work with state and local law enforcement personnel to enforce others.

## Land Stewardship Zoning

WBNERR utilizes DCR's Land Stewardship Zoning Guidelines to consistently direct land management policy on Reserve lands. The three zone designations guide the level of activity allowed in various areas of the Reserve and assist Reserve staff with balancing research, education and recreation activities with resource protection by restricting inappropriate activities and directing higher impact activities away from more sensitive areas. Structures and activities associated with research, education, stewardship, facilities management and recreation are limited based on zone.

DCR defines the three zones as follows.

**Zone 1** is the most restrictive zone. This zone includes unique, exemplary and highly sensitive resources and landscapes that require special management approaches and practices to protect and preserve the special features and values identified in the specific Resource Management Plan. Examples of these resources include rare species habitat identified by the Natural Heritage and Endangered Species Program as being highly sensitive to human activities, fragile archaeological or cultural sites, and unique or exemplary natural communities. Management objectives emphasize protecting these areas from potentially adverse disturbances and impacts. Research and education activities are permitted in Zone 1 but with careful supervision from Reserve staff to ensure protection of sensitive resources.

**Zone 2** includes areas containing typical yet important natural and cultural resources on which common forestry practices and dispersed recreational activities<sup>1</sup> can be practiced at sustainable levels that do not degrade these resources and that hold potential for improving their ecological health, productivity and/or protection through active management. Examples include terrestrial and aquatic ecosystems characterized by a diversity of wildlife and plant habitats, rare species habitat that is compatible with sustainable forestry and dispersed recreation, agricultural resources, and resilient cultural sites and landscapes. Zone 2 areas may be actively managed provided that the management activities are consistent with the approved Resource Management Plan for the property.

**Zone 3** includes constructed or developed administrative, maintenance and recreation sites, structures and resilient landscapes which accommodate concentrated use by recreational visitors and require intensive maintenance by DCR staff. Examples include areas developed and deemed appropriate for park headquarters and maintenance areas, parking lots, swimming pools and skating rinks, paved bikeways, swimming beaches, campgrounds, playgrounds and athletic fields, parkways, golf courses, picnic areas and pavilions, concessions, and areas assessed to be suitable for those uses.

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<sup>1</sup> WBNERR considers research and education to also be appropriate activities for Zone 2.

**Significant Feature Overlays** supplement the three land stewardship zones to identify specific resource features. These significant features are generally identified through an inventory process or research and are formally designated. The purpose of these overlays is to provide more precise management guidance for identified resources and to recognize, maintain, protect or preserve unique and significant features, regardless of the zone in which they occur. Examples of significant feature overlays include Forest Reserves, areas subject to public drinking water regulations, or areas subject to historic preservation restrictions. The types of Significant Feature Overlays applied to the WBNERR lands include Protected Species Habitat Areas (which are based on the Massachusetts Natural Heritage and Endangered Species Program Priority Habitat maps) and Cultural Resource Areas (for historic and archaeological values).

The Protected Species Habitat Area Significant Feature Overlays apply to several different Reserve properties for protection of habitat of a variety of protected rare plant and animal species. Protected Species Habitat Overlays are designated at the Headquarters Area, Quashnet River Area, Abigail Brook Area, South Cape Beach Area, and Washburn Island. Management activities within these overlay areas are done with consultation from staff of the Massachusetts Natural Heritage and Endangered Species Program (NHESP). A Protected Species Habitat Overlay is located at the Headquarters Area because of the presence of the federally endangered plant *Agalinis Acuta*. Public access is limited from this area year round, a specific mowing regime (mowing only in December and June) is applied, and annual monitoring is performed. South Cape Beach and Washburn Island contain Protected Species Habitat Overlays for federally and state listed nesting shorebirds. Public access is limited from these locations with symbolic fencing and signage during the nesting season. Pets are restricted from the vicinity between April and September. Reserve staff and volunteers monitor nesting activity daily, educate visitors and recreational users and when appropriate set up predator enclosure devices to protect nest sites. Protected Species Habitat Overlays at the Abigail Brook Area and the Quashnet River Area are designated for an assemblage of moths and butterflies that are rare within Massachusetts. These species are dependent on early successional habitat in coastal pine barren and pine-oak woodland habitats. Management activities for these locations, such as selective cutting and prescribed burning, are being evaluated with input from NHESP.

The Cultural Resource Area Significant Feature Overlays apply to the entirety of the Headquarters Area, Childs River Area, and Washburn Island. This designation exists on Washburn Island because of documented prehistoric Native American sites and the historic remains on the island (including World War II era military remains). The designation exists at the Headquarters and Childs River Areas because of documented prehistoric Native American sites and the National Historic Register landmarks associated with the Sargent Estate (now the headquarters facilities) and the Waquoit Village National Historic District. Any proposed major projects and development activities will be reviewed by a DCR cultural resource expert.

The area of the Reserve that has been designated as the Waquoit Bay Area of Critical Environmental Concern (ACEC) should also be considered a Significant Feature Overlay. This overlay is not shown as such on the series of Figures 9-14 showing Land Stewardship Zoning. However, the boundary of the ACEC is shown on Figure 15, and the specific ACEC regulatory performance standards and requirements are described on pages 84 through 89.

General management guidelines for each of the three management zones are included in the Land Stewardship Zoning Guidelines (see Appendix D). WBNERR staff participated in the development of the guidelines and will manage Reserve lands accordingly. A brief description of how Land Stewardship Zoning is applied to Reserve lands and waters follows.

#### *Headquarters and Childs River Areas*

The Headquarters Area (Figure 9) includes all of the Reserve's buildings, including the visitor center, office, laboratory, classroom, meeting and maintenance space, as well as associated parking lots and boat and equipment storage areas. Because of the structures and facilities necessary to accommodate concentrated use by Reserve staff, these developed areas are classified Zone 3. The wooded area north and east of the carriage house is also listed as Zone 3 because it is a potential location for construction of the new Coastal Training Center building. This area is a relatively resilient landscape immediately adjacent to the concentrated intensive use area of the other facilities, but a thorough ecological and archaeological site assessment must be conducted prior to work activities for such development. The land immediately adjacent to the entrance road at the Headquarters property is managed for its rare coastal sandplain vegetation community and is, therefore, classified as Zone 1. This area contains several rare species of note including the Federally endangered sandplain gerardia (*Agalinis acuta*). All wetlands (salt and fresh) on the entire Reserve, as delineated by Massachusetts Department of Environmental Protection maps, are classified as Zone 1 because of their demonstrated importance to the value of the Waquoit Bay estuarine ecosystem. This designation includes the salt marsh and salt pond located in the southwest corner of the Headquarters property. The remainder of the Headquarters property, composed of mixed pine/oak woodland, and the mixed pine/oak woodland on the nearby Childs River property are classified as Zone 2. Wetlands along the Childs River are classified as Zone 1. The entire extent of both these areas is covered by a Significant Feature Overlay for Cultural Resources. Both areas are included within the federally designated Waquoit Village National Historic Register District and there are important documented prehistoric archeological sites in the vicinity. A Significant Feature Overlay for Protected Species Habitat covers part of the Zone 1 area of the Headquarters property. The overlay is based on MA NHESP 2005 Priority Habitat Maps.

#### *South Cape Beach Area*

The state beach parking lot and the beach immediately in front (south) of the parking lot are classified as Zone 3 because they are necessary to accommodate intense, concentrated use (Figure 10). With the exception of this Zone 3 area, all beach, dune, barrier habitat and wetland (fresh and salt as delineated by Massachusetts Department of Environmental

Protection maps) are classified as Zone 1 because of their value to protected species and demonstrated importance to the coastal and estuarine ecosystem. The Zone 1 area includes the extensive salt marshes around Sage Lot Pond, the extensive fresh marsh north of Flat Pond, and vernal pools. All other areas composed of mixed pine/oak woodland are classified as Zone 2. Paved access roads leading to both the state beach area and the town beach inholding fall within the Zone 2 area. Much of the South Cape Beach Area, including the land classified as Zone 3, is covered by a Significant Feature Overlay for Protected Species Habitat for shorebirds including piping plover (*Charadrius melodus*) and least tern (*Sterna antillarum*). This overlay is based on MA NHESP Priority Habitat maps.

#### *Washburn Island*

On Washburn Island (Figure 11), all beach, dune, barrier habitat and wetland (salt and fresh, including vernal pools, as delineated by Massachusetts Department of Environmental Protection maps) are classified as Zone 1 because of their value to protected species (including piping plover and least tern) and demonstrated importance to the coastal and estuarine ecosystem. All other lands, primarily composed of mixed pine/oak woodlands, are classified as Zone 2. This Zone 2 is subject to habitat management which includes activities such as selective thinning and prescribed burning. The Washburn Island camping area is located within this Zone 2 area. Despite its popularity and regular use during summer, the camping sites are limited in number, dispersed and primitive in nature. Portions of the southern part of the island are covered by a Significant Feature Overlay for Protected Species Habitat for shorebirds, including piping plover (*Charadrius melodus*) and least tern (*Sterna antillarum*). This overlay is based on MA NHESP Priority Habitat maps. The entirety of Washburn Island is covered by a Significant Feature Overlay for Cultural Resources due to its significant colonial and military history, as well as the presence of important prehistoric archaeological sites.

#### *Quashnet River Area (including the 10 acre satellite "Phinney Property")*

A 300 foot strip on either side of the Quashnet River (Figure 12) is classified as Zone 1 in recognition of the unique and valuable aquatic resources associated with the river. The Quashnet is home to one of the last remaining populations of native sea-run brook trout populations in the United States. It also contains runs of other important migratory fish including alewife and blueback herring and American eel. This stretch of river is the location of a long term habitat restoration project and all activities related to this effort are acceptable within the Zone 1 area (see "Current Restoration Projects," p. 99). Other wetlands and vernal pools dot this property and are classified as Zone 1. The remainder of the land, primarily composed of mixed pine/oak woodland is classified as Zone 2 and is subject to upland habitat management including selective thinning and prescribed fire. A small area in the northwest corner of this property is covered by a Significant Feature Overlay for Protected Species, based on MA NHESP maps. The southern boundary of this property abuts the Waquoit Village National Historic Register District at the former site of an historic mill dam.

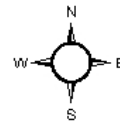
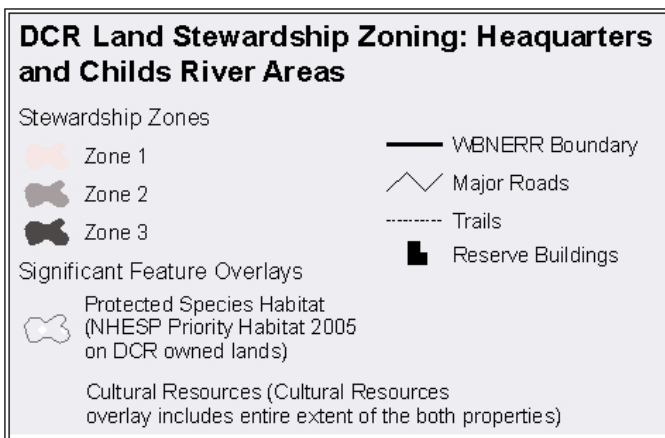
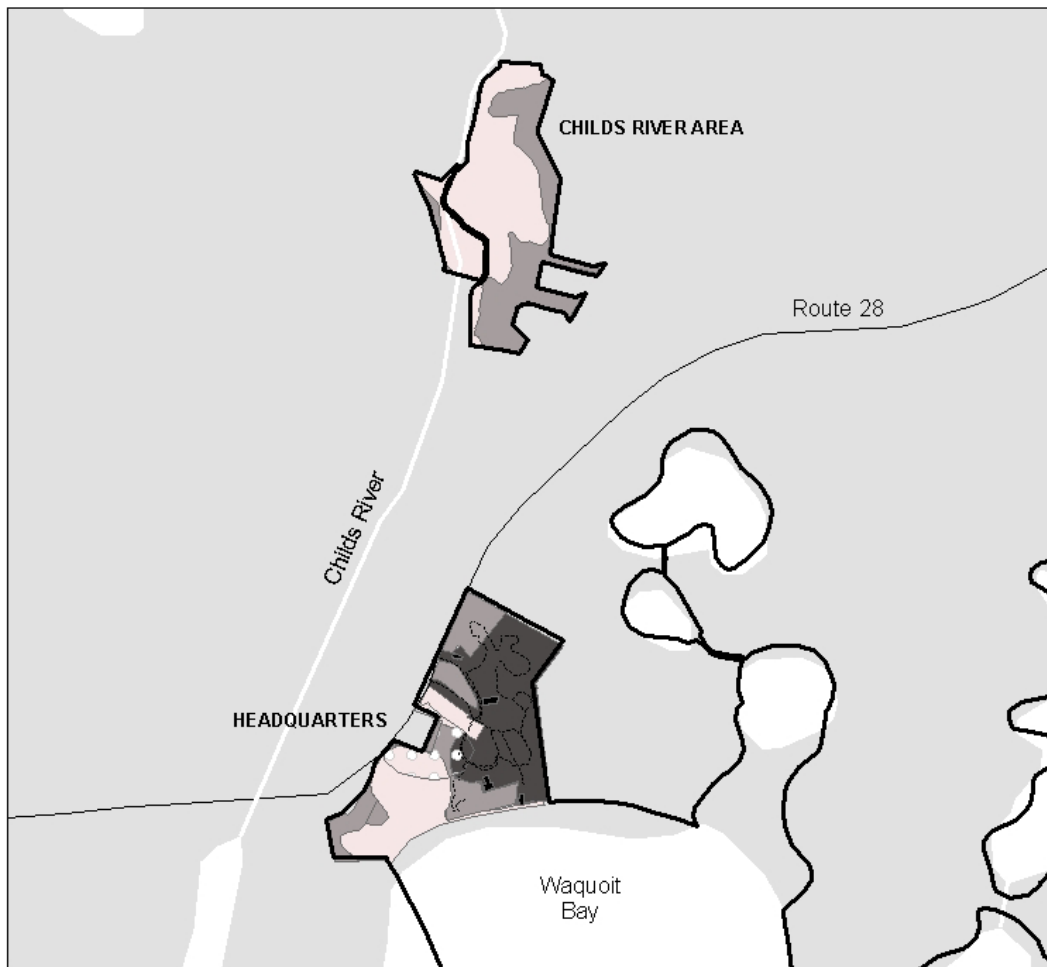
#### *Abigail Brook Area*

The entirety of the Abigail Brook property (Figure 13) is comprised of mixed pine/oak woodland and is classified as Zone 2. A small portion of the northern part of the property is covered by a Significant Feature Overlay for Protected Species, based on MA NHESP maps.

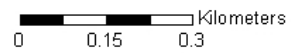
*North Quashnet Area*

The entirety of the North Quashnet property (Figure 14) is comprised of mixed pine/oak woodland and is classified as Zone 2. There are no Significant Feature Overlays covering this property.

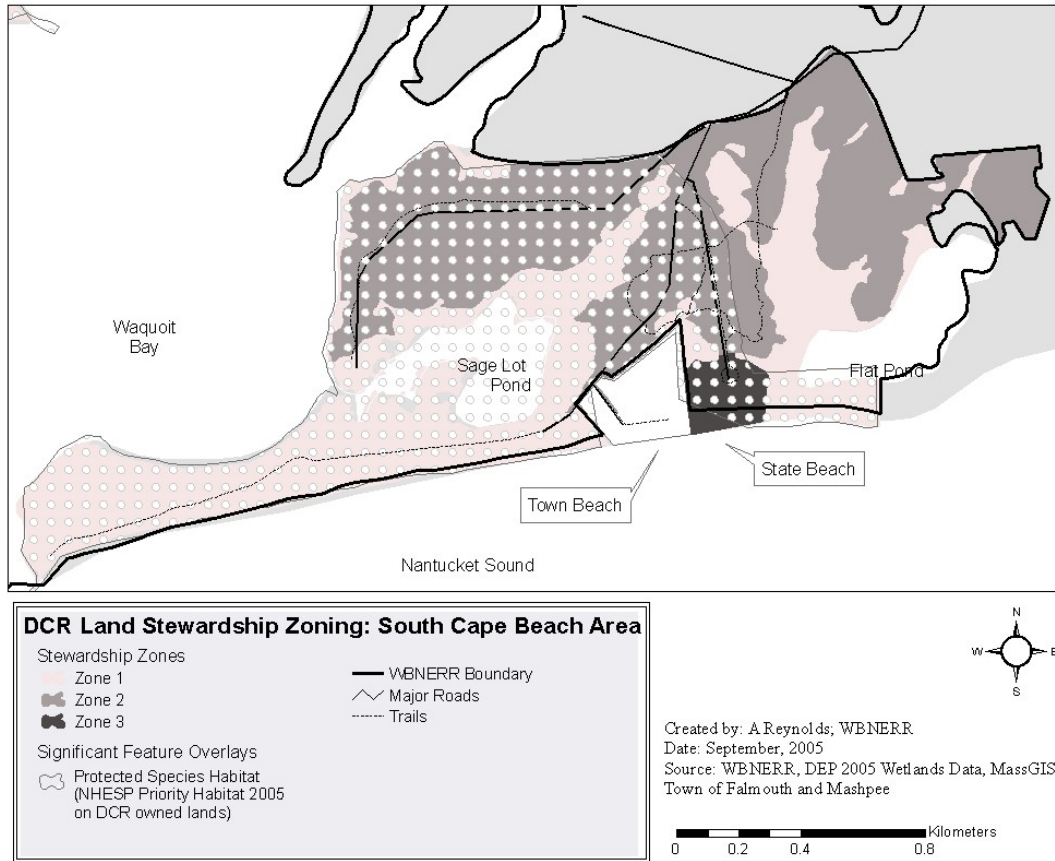
**Figure 9: Headquarters and Childs River Areas.**



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 Towns of Falmouth and Mashpee

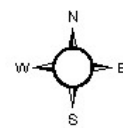
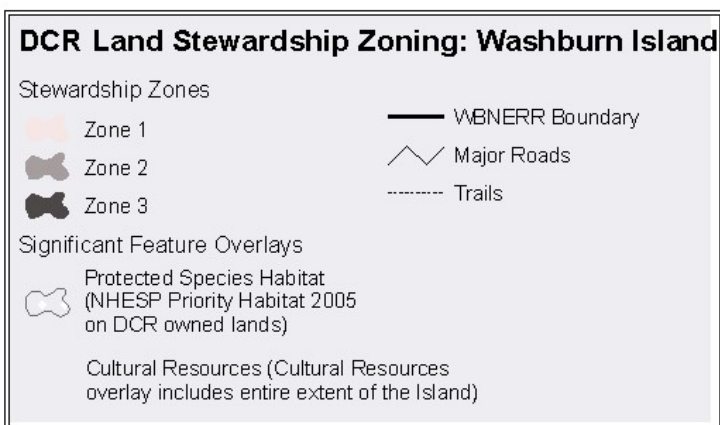
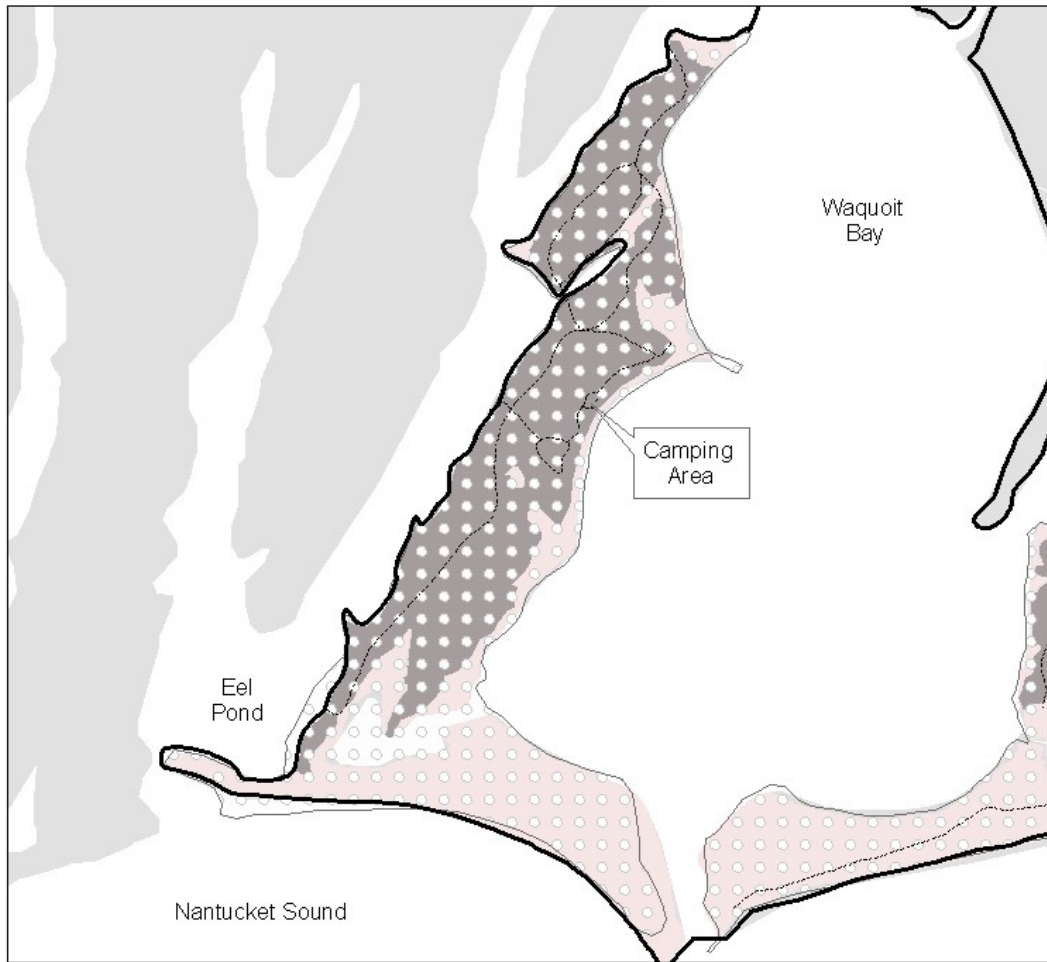


**Figure 10: South Cape Beach Area.**





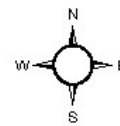
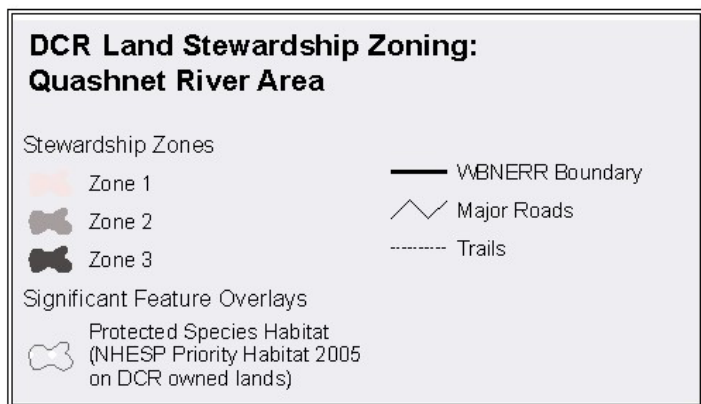
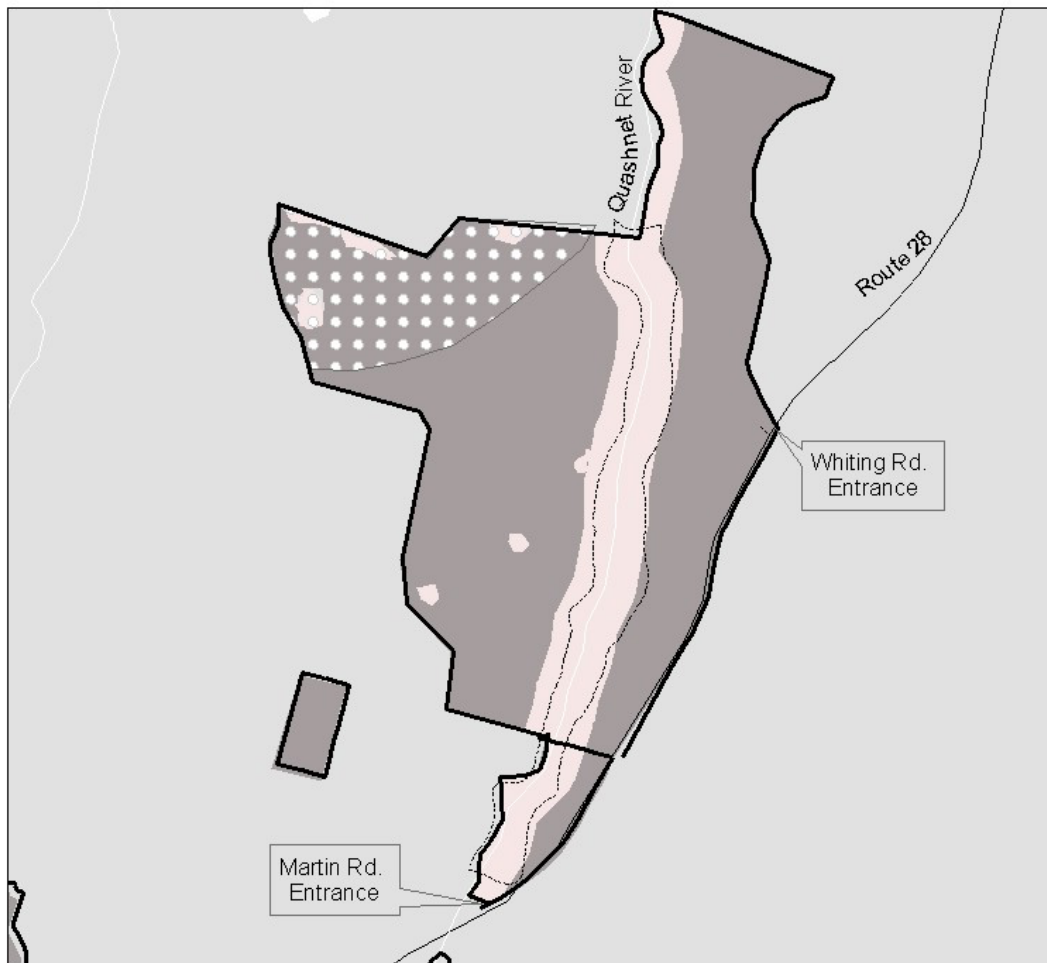
**Figure 11: Washburn Island Area.**



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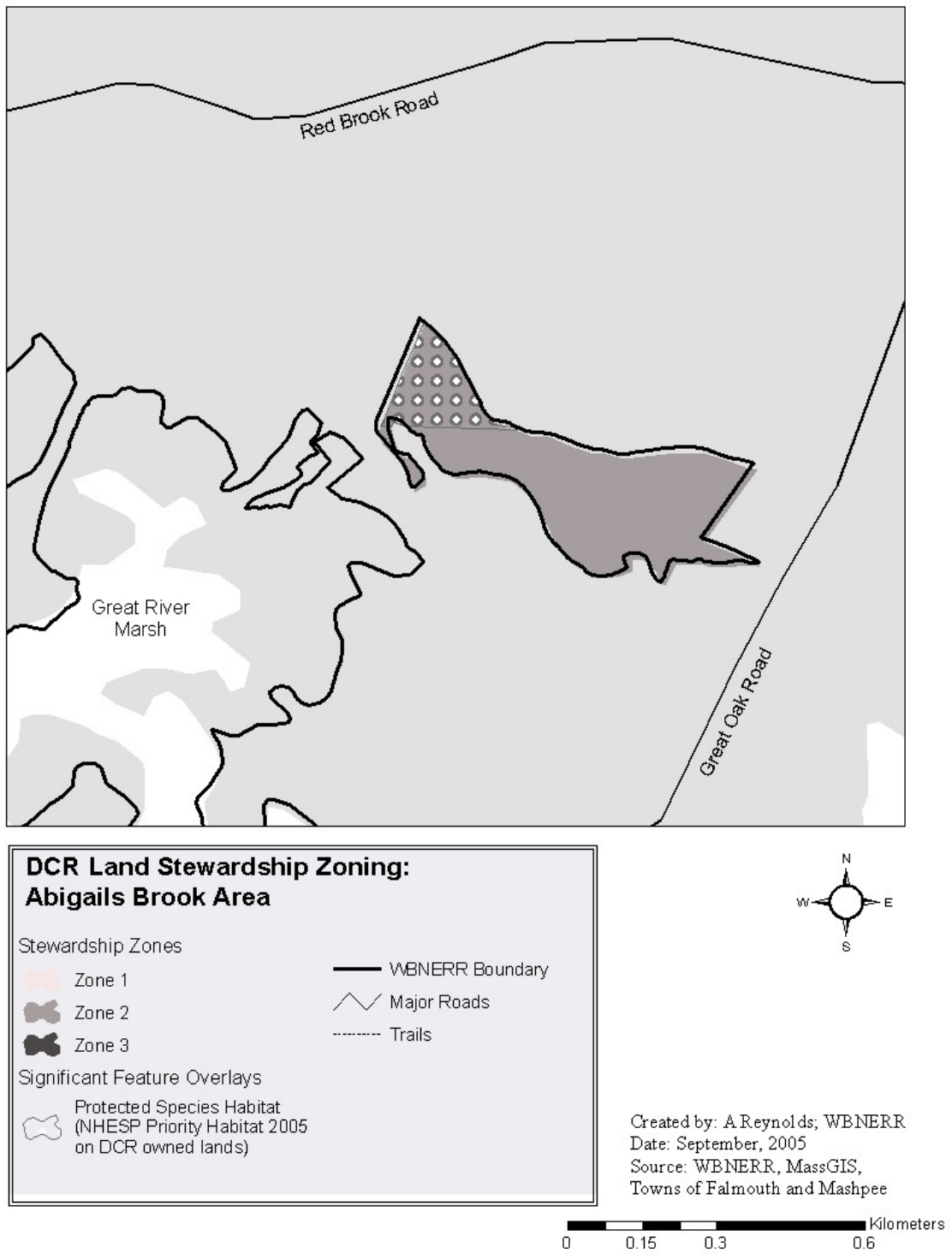
**Figure 12:** Quashnet River Area (including the satellite “Phinney Property”).



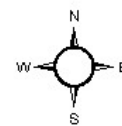
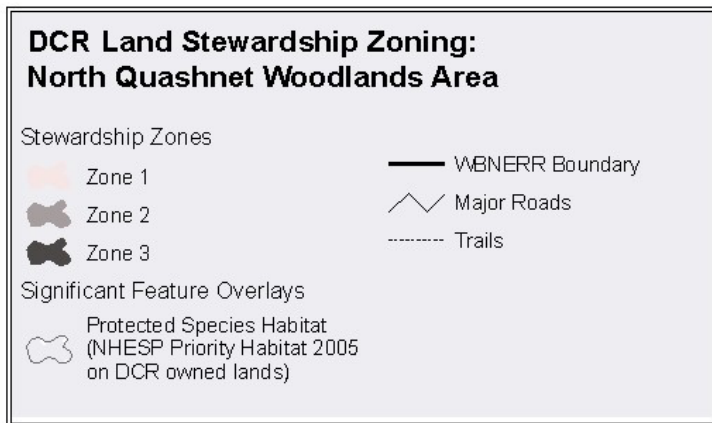
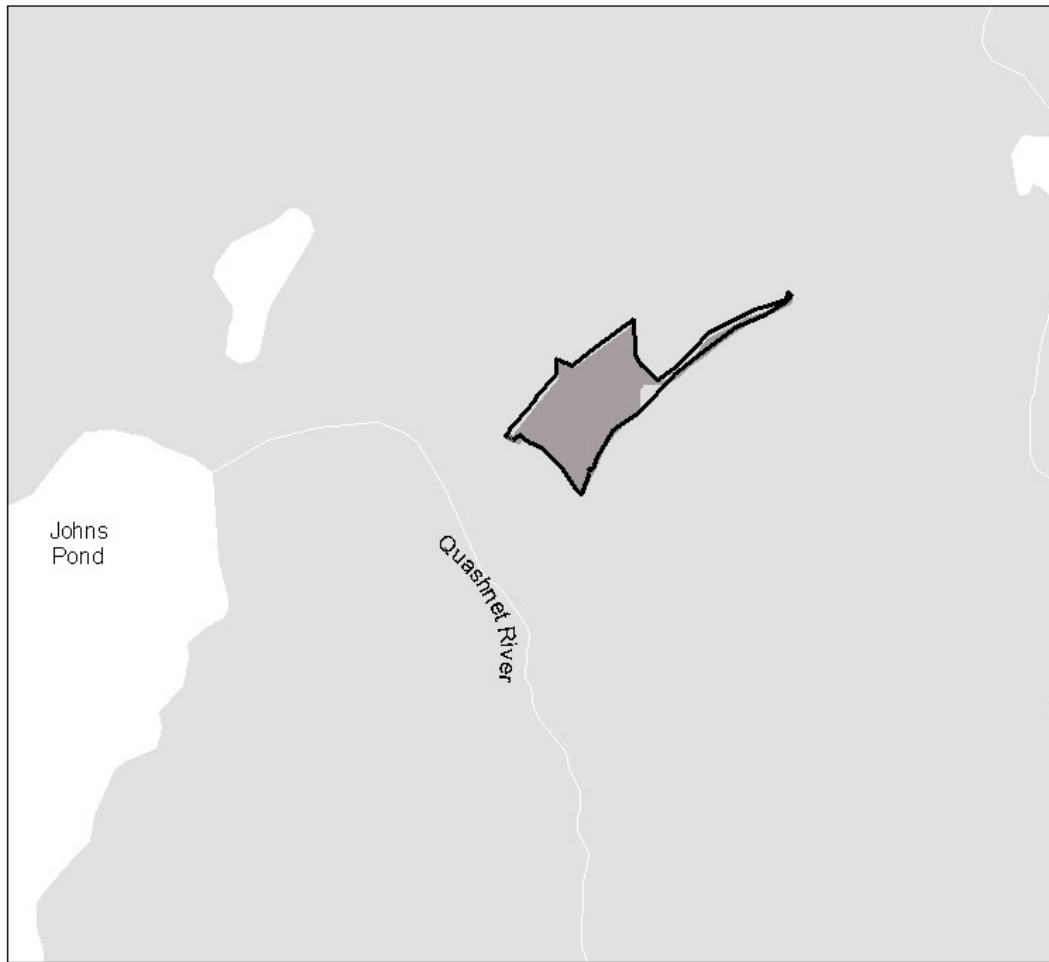
Created by: A Reynolds; WBNERR  
 Date: September, 2005  
 Source: WBNERR, MassGIS,  
 Towns of Falmouth and Mashpee



**Figure 13: Abigail Brook Area.**



**Figure 14:** North Quashnet Woods Area.



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 Date: September, 2005  
 Source: WBNERR, MassGIS,  
 Towns of Falmouth and Mashpee



## Laws and Regulations

A variety of existing local, state, and Federal laws and regulations protect natural resources within the Reserve. These policies are summarized below. Reserve staff remain cognizant of regulatory restrictions and management policies and enforce those for which the Reserve has authority to do so and work with state and local law enforcement personnel to enforce others, especially those regarding the Waquoit Bay Area of Critical Environmental Concern (ACEC).

### Areas of Critical Environmental Concern

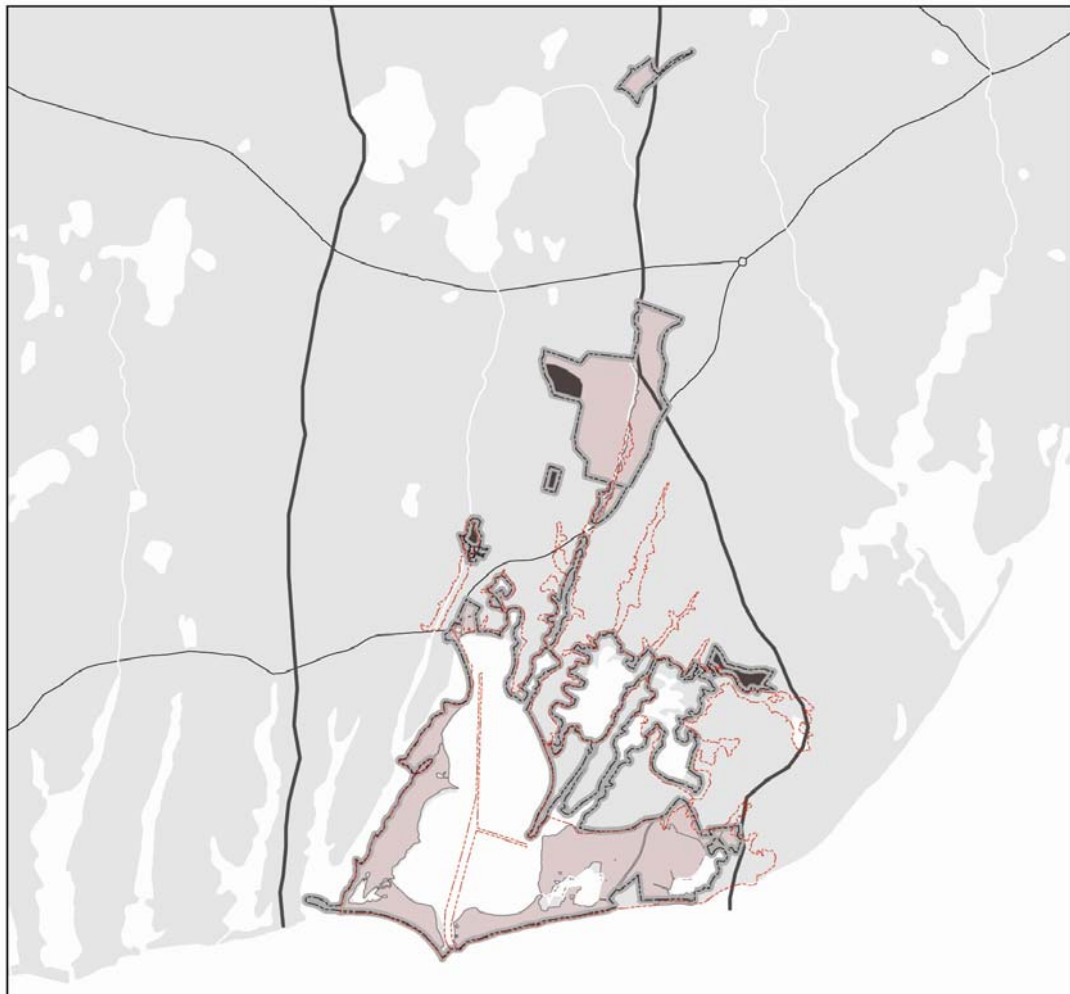
Waquoit Bay and some surrounding uplands were designated as an Area of Critical Environmental Concern (ACEC) in 1979 (Fig. 15). ACECs are places in Massachusetts that receive special recognition because of the quality, uniqueness, and significance of their natural and cultural resources. The State Department of Conservation and Recreation (DCR) administers the ACEC Program and closely coordinates with the Massachusetts Office of Coastal Zone Management (MCZM) regarding coastal ACECs.

The Waquoit Bay ACEC has boundaries nearly identical to the Reserve, mainly differing in extent of tidal river protection. In relation to the Reserve boundary, the ACEC includes greater extents of the Childs and Quashnet Rivers; Red Brook; Jim, Little, Flat and Witch ponds; and of a few tributaries. However, the Reserve boundary includes Great and Little Rivers and the ACEC boundary does not. See Appendices E-G for the Waquoit Bay ACEC designation document, resource summary, and legal boundary description.







The purpose of the ACEC designation is to preserve, restore, and enhance the natural and cultural resources of the area. The goals of the designation are achieved through the application of stricter standards under existing state regulations, through priority attention from state agencies for technical assistance, grants, or other programmatic means, and through cooperative stewardship efforts from citizens to Federal agencies. A synopsis of regulations that apply stricter standards within ACECs follows. It is important to note that ACEC designation does not create new regulations, nor does it supersede local regulations or zoning. For further information concerning regulatory effects of ACEC designation, see [www.mass.gov/dcr/stewardship/acec/regsum.htm](http://www.mass.gov/dcr/stewardship/acec/regsum.htm) for a quick summary or [www.mass.gov/dcr/stewardship/acec/acecGuide.pdf](http://www.mass.gov/dcr/stewardship/acec/acecGuide.pdf) for a complete guide.

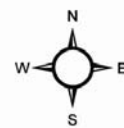
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**Figure 15: ACEC and WBNERR Boundaries.**



**Waquoit Bay NERR**

-  WBNERR
-  New WBNERR properties
-  Area of Critical Environmental Concern
-  WBNERR Boundary
-  Watershed
-  major\_roads



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Date: September, 2005  
Source: WBNERR, MassGIS, Town of Falmouth and Mashpee

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## *Regulations with Stricter Standards within ACECs*

### Massachusetts Environmental Policy Act (MGL c. 30, ss. 61-62H and 301 CMR 11.00)

MEPA ensures that proponents study alternatives to proposed actions and avoid, minimize, and mitigate environmental impacts of proposed actions. MEPA review is not a permitting process, but rather it is an information-gathering process that precedes final action by state permitting agencies. Projects located within ACECs subject to MEPA jurisdiction require closer scrutiny than projects located outside of ACECs (301 CMR 11.03(11)). That is, the review threshold of projects that require the filing of an Environmental Notification Form (ENF) is reduced for projects located within an ACEC.

### Public Waterfront Act (MGL c. 91 and 310 CMR 9.00)

Commonly known as Chapter 91 and administered by the Department of Environmental Protection, this law protects the public's rights to access the waterfront for use and enjoyment of waterways of the Commonwealth, and codifies the Massachusetts version of the Public Trust Doctrine into statute. The Waterways regulations do not allow new fill in ACECs and place increased limits on new structures within ACECs (sections 9.32(1)(e) and 9.32(2)(d)). Proposed, new, privately owned structures for water-dependent use below the high-water mark, such as private docks or piers, are only eligible for a license provided that such structures are consistent with an ACEC resource management plan adopted by the municipality and approved by the Secretary of Environmental Affairs. Improvement (new) dredging is prohibited within an ACEC, except for the sole purpose of fisheries and wildlife enhancement. Maintenance dredging remains eligible for a permit. The disposal of dredged material is prohibited within an ACEC except for the purposes of beach nourishment, dune construction or stabilization with proper vegetative cover, or the enhancement of fisheries or wildlife resources (section 9.40(1)(b)).

### Wetlands Protection Act (MGL c. 131, s. 40 and 310 CMR 10.00)

The Act is administered by local Conservation Commissions and DEP and ensures protection of wetland resources, including all coastal areas between Mean High Water and the limits of the Territorial Sea. The regulations require avoidance, minimization, and mitigation of impacts (including impacts to aquatic vegetation, flood control, and fisheries and wildlife habitat), and establish performance standards that define levels of impact that a project cannot exceed. For coastal resource areas within ACECs, the performance standard is "no adverse effect" on the interests of the Act, except for maintenance dredging for navigational purposes of "Land Under the Ocean" (sec. 10.24 (5) (b)). A higher performance standard also applies to the inland (freshwater) wetlands resource areas known as "Bordering Vegetated Wetland (BVW)." Within an ACEC, potential projects are prohibited that would result in the loss of up to 5,000 square feet or, in some cases, in the loss of up to 500 square feet of BVW (310 CMR 10.55(4)(c)). This standard for BVW applies to all ACECs. Work affecting BVW

may be permitted if it can be authorized under the "limited projects" section listed at 310 CMR 10.53(3).

Massachusetts Coastal Zone Management (MCZM) Program Regulations (310 CMR 21.00)

The MCZM regulations call for all appropriate EOEAs to preserve, restore and enhance complexes of coastal resources of regional or statewide significance through the ACEC Program. State and Federal coastal zone regulations stipulate that any Federal activity affecting the coastal zone must be consistent with MCZM's policies to the maximum extent practicable. As such, any project proposed in an ACEC that requires a Federal permit, is Federally funded or is a direct Federal action is subject to review by MCZM before the Federal activity can take place.

Solid Waste Facilities Site Assignment Regulations (310 CMR 16.00)

The Solid Waste Siting regulations prohibit the siting of new solid waste facilities within an ACEC (section 16.40(4)(d)). The regulations also prohibit the siting of such a facility located adjacent to an ACEC if such a siting "would fail to protect the outstanding resources of an ACEC."

State and Federal Endangered Species Act:

The state's Endangered Species Act (M.G.L. c. 131A and 321 CMR 8:00, 321 CMR 10:00) provides for listing endangered or threatened species or species of concern, and of their habitat. Once listed, the Act prohibits the taking, possession, transport, export, processing, sale or purchase of such species and any other species listed under the Federal Endangered Species Act. The Act prohibits any alteration of significant habitat of any protected species that may reduce the viability of the habitat. The Act is administered by NHESP within the Massachusetts Department of Fish and Game (DFG, formerly the Department of Fisheries, Wildlife and Environmental Law Enforcement). The NHESP publishes a map of estimated threatened and endangered species habitat, however, the resident species are not identified to prevent unauthorized takings. The Massachusetts program also coordinates with the Federal Endangered Species Act, administered by the U.S. Fish and Wildlife Service. The Federal Endangered Species Act of 1973 lists plants and animals as either Endangered or Threatened and designates areas of Critical Habitat for each listed species. The ESA prohibits the taking of a listed species, as well as any activity having a negative effect on a listed species or designated critical habitat. Furthermore, the ESA requires consultation with the U.S. Fish and Wildlife Service concerning proposed activities that may have an adverse effect on a listed species or critical habitat.

Ocean Sanctuaries Act

The Ocean Sanctuaries Act (MGL c. 132A, ss.12A-16F, 18 and 302 CMR 5.00) established five Ocean Sanctuaries in Massachusetts waters: the Cape Cod, Cape Cod Bay, Cape and Islands, North Shore, and South Essex Ocean Sanctuaries. The sanctuaries

include most state waters with the major exception of an area east of Boston Harbor. The Waquoit Bay Reserve is within the Cape and Islands Ocean Sanctuary. The landward boundary of the sanctuaries is the mean low water mark and the seaward boundary is the limit of state waters, generally three miles offshore.

The Department of Conservation and Recreation (DCR) administers the Ocean Sanctuaries Program. The Act prohibits activities that may significantly alter or endanger the ecology or appearance of the ocean, seabed, or subsoil of sanctuaries or the Cape Cod National Seashore. To accomplish this goal the Act prohibits (1) building structures on or under the seabed; (2) construction or operation of offshore or floating electrical generating stations; drilling or removal of sand, gravel (except for the purposes of beach nourishment), other minerals, gases, or oils; (3) dumping or discharge of commercial, municipal, domestic or industrial wastes; (4) commercial advertising; and (5) incineration of solid waste or refuse on vessels within sanctuary boundaries. These prohibitions may be waived if a finding of “public necessity and convenience” can be made for the proposed project or activity.

There is no separate Ocean Sanctuaries review process. Ocean Sanctuaries staff comment on MEPA filings and on DEP Chapter 91 license applications during the respective public comment periods. Proposals that are below MEPA thresholds are presumed to comply with the Ocean Sanctuaries Act. Likewise, a project that receives a Chapter 91 License is presumed to comply with the Ocean Sanctuaries Act.

#### Waquoit Bay No Discharge Zone

Waquoit Bay is a Federal No Discharge Zone, as designated by the US EPA. This designation prohibits discharge from any type of marine head to the waters of the Bay. Type I and Type II marine sanitation devices, designed to treat waste and discharge it overboard, cannot be discharged in the Bay. Any waste generated must be retained and either pumped out to a system that ultimately discharges to an approved land-based treatment system or taken out of the Bay for discharge. Type III marine sanitation devices include holding tanks, incinerating devices, and recirculating devices; none of these can legally discharge any material into the Bay. It is, of course, illegal to discharge raw sewage to the Territorial Sea or any inland waterbody.

Two pump-out facilities are available in waters connected to Waquoit Bay. Edwards Boatyard has a dock-based facility on the Childs River in Falmouth. The Town of Mashpee operates a boat-based pump-out. Boaters can contact the Mashpee Harbor Master on VHS Channel 9 on Sundays for free pumpouts in Waquoit and Popponesett Bays. It is available dockside at other times at the town dock on Little River. The pumpout boat is in the water until Columbus Day.

#### Waquoit National Historic District

The Waquoit National Historic District was listed in the National Register of Historic Places on February 26, 2004. The Reserve’s Headquarters Site is located within the

Historic District which is roughly bounded by the Childs River, Carriage Shop Rd., Waquoit Hwy., Moonakis River, Moonakis Rd., Waquoit Bay, and Waquoit Landing. Listing in the National Register provides formal recognition of a property's significance and makes the property eligible for preservation restrictions and provides limited protection from federally funded, licensed or assisted projects. The district is significant as an isolated Falmouth Village that reached the high point of its development in the 1850s with industrial, marine, agricultural, and summer tourism components.

Because of the National Historic District designation, the historic Shingle Style main house and boat house and other existing outbuildings must continue to look as they do. The Cape Cod Commission, a regional planning body, will review proposals for substantial and detrimental alterations to, or demolition of, existing structures. New buildings on site are not subject to Cape Cod Commission Review. They are, however, subject to review by the Falmouth Historical Commission. Any new construction must be located in places that do not obstruct the existing views of the ca. 1900 estate and its buildings.

#### Other State Regulatory Requirements Specific to DCR-Owned Lands

Rules governing all Forests and Parks and the public's use of these lands are regulated by 304 CMR 12, an outline of which follows.

#### **304 CMR 12.00: FORESTS AND PARKS RULES**

##### Section

- 12.01: General Provisions
- 12.02: Definitions
- 12.03: Hours of Operations
- 12.04: Public Behavior, Disorderly Conduct and Removal of Persons
- 12.05: Enforcement
- 12.06: Alcoholic Beverages Prohibited
- 12.07: Audio or Noise Producing Devices
- 12.08: Animals on Division Properties
- 12.09: Seeing Eye and Medical Support Dogs Allowed
- 12.10: Dumping, Littering, and Garbage
- 12.11: Damage to Buildings, Signs and Other Property; Metal Detectors; Geological Features and Artifacts
- 12.12: Solicitation and Commercial Use
- 12.13: Fires, Lighted Smoking Materials, Embers
- 12.14: Smoking in Department Buildings Prohibited
- 12.15: Technical Climbing
- 12.16: Free Flight Devices
- 12.17: Special Use Permits
- 12.18: Hunting Fishing and Trapping
- 12.19: Target Shooting
- 12.20: Field Trials
- 12.21: Use of Non-Motorized Vehicles
- 12.22: Facilities Fees
- 12.23: Traffic Rules and Parking
- 12.24: Designated Campsites: General Rules

- 12.25: Designated Campsite or Cabin Visitors
- 12.26: Campsite Overflow Areas
- 12.27: Group Campsites, Safari Sites and Day Use Sites
- 12.28: Trail Use, General Provisions
- 12.29: Snow Vehicle and Off-Road Vehicle Operation
- 12.30: Trail Use, Bicycle Paths and Rail Trails
- 12.31: Use of Appalachian Trail
- 12.32: Use of Division Water Bodies including Beaches
- 12.33: Swimming Pools
- 12.34: Boating/Watercraft
- 12.35: Windsurfing
- 12.36: Board Surfing
- 12.37: Towing Behind Boats
- 12.38: Private Use of Division Waters

To summarize a few points relevant to the Reserve:

- No person shall bring a dog, cat or other animal into any State Forest, Park or Reservation except in areas and under conditions determined by the Director of the Division of Forests and Parks (304 CMR 12.08). For WBNERR, this means that dogs are allowed on leashes in most areas. However, they are not permitted on the public swimming beaches at South Cape Beach State Park or on Washburn Island.
- Littering is prohibited (304 CMR 12.10).
- A person shall not damage or remove any Department property real or personal (304 CMR 12.11).
- The Director of DCR may designate parks and forests, including WBNERR, where fires shall be limited to manufactured fuels only (304 CMR 12.13).
- No person shall launch or use any internal combustion powered watercraft of any nature or type on Division waters were it is posted as prohibited (as it is on all Reserve Ponds) (304 CMR 12.34).

## **Enforcement**

Most permanent and seasonal staff are trained to educate visitors about relevant rules and regulations. They are not, however, trained in, nor authorized to carry out, law enforcement activities. Rather, they are expected to report unlawful behavior to the appropriate personnel or outside law enforcement officials.

The one WBNERR staff member with law enforcement authority is the current Forests and Parks Supervisor who has been trained as a DCR Park Ranger. Park rangers are responsible for enforcement of the Department's rules and regulations on DCR properties, searching for lost or missing persons, and assisting the Massachusetts Bureau of Forest Fire Control as needed. Park Rangers can invoke the non-criminal citation process as necessary. The citation process may involve issuing fines or tickets for various infractions of DCR rules.

The Forests and Parks Supervisor typically encounters incidents like illegal dumping, land encroachment, off-road vehicle use and illegal fire pits. Illegal dumping on Reserve property is a perennial problem. WBNERR staff will continue to identify illegal dumping during their routine patrols and, for both aesthetic and safety reasons, will collect the debris for proper disposal. An estimated eight to ten tons of refuse are removed annually. Staff on routine patrol may also encounter instances in which abutters to WBNERR property are using Reserve land for private or commercial use. When encroachment occurs, Reserve staff—generally the Stewardship Coordinator—contact the property owner and resolve the issue on a case-by-case basis. Staff also identify and report illegal all-terrain and off-road vehicle use and related damage. Approximately three to six illegal fire pits are found on Washburn Island each year. Fire pits are occasionally found in the Quashnet Woods and South Cape Beach areas, as well. Open fires are prohibited on Reserve property. Reserve staff dismantle and/or fill in the fire pits to discourage continued use.

Occasionally, an incident of a more serious nature occurs and restraint is used. Cooperation with police may result in an arrest at a DCR facility. The Reserve may call upon local police departments, Harbormasters, Natural Resource Officers, Massachusetts Environmental Police Officers and the U.S. Coast Guard for additional patrol, enforcement, and emergency response as necessary. All incidents must be reported to DCR through the formal incident reporting process.

## Land Management

**Objective 3.2: Reserve lands are effectively managed with an emphasis on conservation and sustainable uses of ecological resources while balancing the needs of research, education and recreation.**

*WBNERR staff will:*

- a. Monitor land based resources to gain a better understanding of their status and the need for active management.
- b. Manage land based resources for sustainability of ecological function, research, education and recreational uses.
- c. Develop and implement, in collaboration with appropriate partners, specific resource management plans, including:
  1. Washburn Island Fire Management Plan
  2. Road Access Management Plan
  3. Protected Species Plan
  4. Forest Management Plan
  5. Invasive Species Management Plan
- d. Work with DFW staff to ensure that wildlife management activities prevent or minimize impacts to ecological structure and function while allowing sustainable uses of wildlife resources.

WBNERR will maintain existing monitoring programs and develop new ones to inventory, evaluate the status of, and track changes in the valuable natural resources

within the Waquoit Bay watershed. Examples include long-term resource monitoring programs of birds, amphibians, insects, vernal pool habitats, emergent wetland habitats, and visitor use impacts to natural vegetation.

The monitoring efforts summarized above support decision-making at the Reserve. The Reserve responds to information regarding degradation of resources by implementing activities that protect natural values. The Reserve can implement activities directly (*e.g.*, close areas to public access, remove nuisance vegetation) or work with outside organizations to ensure that non-Reserve activities with the potential to impact Reserve resources (*e.g.*, disposal of dredge material, maintenance of roads) are conducted in a way that is as sensitive as is reasonably possible. Monitoring information also supports decisions about what type of research is needed, where certain types of research can be conducted, what type of educational materials or programs would be beneficial, and which recreational uses will be allowed where. For instance, there is a popular kayak portage between Eel Pond and Tim's Pond at the southwest corner of Washburn Island that has been getting increasing use in recent years. This area will be monitored over time and structural controls may be necessary to protect wetland and SAV resources in this area if recreational use becomes more intense.

WBNERR staff will work with appropriate partners—including DCR, CZM, and the ACEC program—to develop and implement resource management plans for several key resources at the Reserve that warrant specific consideration. For instance, the existing Washburn Island Prescribed Fire Plan needs to be updated to include a greater emphasis on ecological restoration. Controlled burns are conducted on Washburn Island for three reasons: to maintain a fire-dependent sandplain community; to maintain low forest fuel and, thereby, prevent a catastrophic fire; and to serve as a training site for fire response crews in southeastern Massachusetts. All three functions will be included in the revised plan. Experimental burns conducted in association with monitoring will be paramount, however. The studies will attempt to determine how the state-listed plant *Liatris borealis*—and the whole island community—respond to different types of fire events, *i.e.*, sustained hot fires vs. periodic, less intense fires.

Another plan that needs to be developed concerns access along dirt roads within the Reserve. A Road Access Management Plan will be developed based on recommendations developed with the Mashpee National Wildlife Refuge Conservation Partnership. The plan will address:

- types of allowable roads, *i.e.*, width and surface,
- maintenance frequency of roads, *i.e.*, surface grading and trimming adjacent to roads, and
- management of traffic, *i.e.*, installation of gates (or not) and schedules for opening and closing gates.

The Reserve currently has an organized approach, rather than a definitive plan, for monitoring and managing protected species. For example, competing plants are mowed or burned in order to allow rare plants to flourish. Shorebirds are protected by closing

areas to human activities and by artificially protecting nests from natural predation. During the process of developing a Protected Species Plan, these activities—and others—will be critically examined and, as appropriate, be strategically selected for continued application.

Finally, due to the maturation of forest lands within the Reserve and increasing impacts from the spread of non-native plants, issues such as Forest Management and Invasive Species Management will soon need to be addressed Reserve-wide with specific plans. In recognition of these impending needs, the Reserve will identify internal financial and staffing resources and will seek support through external grants and/or partnerships with other organizations to develop and implement appropriate strategies.

## Public Access Plan

### **Objective 3.3: The public will enjoy the recreational resources of the Reserve.**

*WBNERR staff will:*

- a. Maintain public recreation facilities and continue to offer interpretive programs at the Headquarters Site, South Cape Beach State Park, Washburn Island, and other Reserve properties.
- b. Maintain and, where appropriate, improve access to Reserve properties.

Each year thousands of people visit the Waquoit Bay National Estuarine Research Reserve Headquarters Site, South Cape Beach State Park, Washburn Island, Quashnet Woods, other parcels of WBNERR property and/or the open waters of the Bay and its tributaries. Some come for the unstructured recreational benefits that the Reserve provides, including swimming, fishing and shellfishing, hiking, boating, and birding. Others come for more structured activities that are related to the Reserve's research and education programs. Activities are held or allowed at all components of the Reserve. Some rules and regulations are common to all components and are summarized under Objective 3.1. Other rules are specific to particular components and are described below in association with a summary of public access opportunities at each site.

### **Headquarters Site**

The Reserve Headquarters Site is generally utilized as a “campus” with emphasis on research, education/outreach and administration. The Headquarters Site also provides access to a wide range of activities for the public. The Visitor Center, Boat House, and Carriage House host many structured educational and interpretive activities. Additionally, casual visitors can follow a short trail through the woods and around a scenic overlook of the Bay and coastal pond. A trail guide featuring the walking trails at the Headquarters Site, Washburn Island, and South Cape Beach State Park is available in the Visitors Center. Exhibits at the Visitor Center offer additional information to walk-in visitors.

Reserve policy concerning public access to the Headquarters Site includes the following guidelines:



- The Headquarters Site is limited to passive recreational activities that do not compromise the mission or objectives of the Reserve.
- Outside groups may use the Headquarters Site as long as their mission and objectives are consistent with the Reserve's or if the Reserve provides an educational program as an integral part of their program.
- Access to the beach through the Headquarters Site for recreational use is discouraged because of potential conflicts with research or education programs on the beach or in the water in front of the beach. As an attractive alternative, South Cape Beach State Park provides considerably more extensive beach facilities. Also, people with boats are welcome to use the beaches on Washburn Island.
- Limited access is provided to commercial and recreational shellfishers on a “straight to the resource” basis. That is, shellfishers are allowed to use some of the limited parking spaces at the Headquarters Site during regular operating hours as long as there are no large events going on and as long as they pass through to the shellfishing area without lingering on the Reserve’s or abutters’ beaches.
- Public access to the research laboratory is limited to tours guided by Reserve staff members or volunteers. This policy protects both visitors and the integrity of the research work being done.
- Access to the endangered species management area is limited to Reserve staff members, researchers and volunteers working with this program. This directive protects the fragile plants in this management area.

### **South Cape Beach State Park**

The South Cape Beach area includes South Cape Beach State Park and a beach owned and operated by the Town of Mashpee. The town beach is not part of the Reserve. South Cape Beach State Park provides a wide range of ocean-side recreational opportunities including access to beaches and trails. Several types of interpretive activities take place here, including regularly scheduled interpretive walks. Refer to Objective 2.10 for a fuller description of interpretive programs. Various research projects are also conducted at South Cape Beach.

Parking, requiring a fee or appropriate permit during the summer, is available at the State beach parking lot or the Town of Mashpee parking lot.<sup>2</sup> At the old state parking area, there is a boardwalk with a bicycle rack but no parking facilities for automobiles. Bicyclists are encouraged to use this area. Many bicyclists, however, choose to use the State beach's main parking lot even though there is no bike rack. WBNERR will, therefore, budget funds for a new bike rack. For visitors with limited mobility, a specially designed “sand chair” (a wide-tire wheelchair) is available at the State beach. Arrangements must be made in advance at Headquarters.

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<sup>2</sup> Seasonal passes to the State Beach are available at the contact station at South Cape Beach. Senior passes to the State Beach are available at the Visitor Center at the Headquarters Site of the Reserve and at the ticket booth at South Cape Beach.

The following policies and guidance balance the requirements of resource protection, research, and quality recreational experiences.

- Swimming, sunbathing, hiking and birdwatching are the primary recreational uses of the beach area.
- No motorized boating access is provided at South Cape Beach State Park. There is a state-funded boat ramp on Great River accessed from Great Oak Road.
- Access is allowed on a year-to-year basis for hunting in season. Access for hunting is reassessed annually by WBNERR and the South Cape Beach Advisory Committee.
- Off-road vehicles are prohibited.

### **Washburn Island**

Washburn Island, while accessible only by water, is very popular with day users and campers. Most visitors come by private boat: they either anchor and wade ashore or beach their boats. The Reserve provides limited boat access during the summer for scheduled interpretive programs and, occasionally, for other programs when prior arrangements have been made.

During the summer, the Reserve offers regularly scheduled interpretive walks, roving interpretation for boaters, and special programs. There is a hiking trail running down the center of the Island. Three Island Managers live on the island in the summer and are responsible for managing camping on the island and providing interpretive tours. Washburn Island has eleven campsites: nine family sites and two group sites that are limited to 25 people each. There are two composting toilets on the island. Camping permits (requiring a small fee) are available through an on-line reservation service, ReserveAmerica.com or by calling 1-877-422-6762. A limited number of permits are also available at Reserve headquarters. Permits are available May through mid-October (Columbus Day). State regulations restrict the length of stay at a campsite to no more than fourteen consecutive days (304 CMR 12:24(5)(a)) between Memorial Day and Labor Day.

### **Quashnet Woods Property**

Presently there is a 2.5 mile long trail running along the Quashnet River within this property. The trail is accessible through the Martin Road or the Whiting Road gates. An existing dirt road forms one side of the trail. The trail crosses over the river at a herring run and circles back as a path through the forest. The trail is not handicapped-accessible and parking at the trailhead is limited. Any overflow parking is forced onto the roadside. WBNERR has conducted a parking needs assessment for the property and is moving ahead with plans to install an interpretive kiosk, signage and a more formal parking area.

## Childs River

While there are no official trails on the Childs River property, the public is permitted to hike and explore. Regulations guiding usage are posted on signs at the property's boundaries. The property will be evaluated for the feasibility of public trails.

## Abigail Brook

The Abigail Brook property has an existing public trail that is maintained by volunteers. Regulations guiding usage are posted on signs at the property's boundaries.

**Objective 3.4: The public will use the Reserve's property and resources responsibly.**

*WBNERR staff will:*

- a. Continue to make information about regulations, Reserve policies, and appropriate behaviors readily available to users through signs, written materials, and staff.
- b. Improve trail signs and markers.

Applicable rules and regulations are posted throughout Reserve lands and described in literature available at Reserve facilities and from Reserve staff.

When appropriate, all WBNERR staff educate Reserve visitors about rules and regulations and appropriate behaviors and activities. In particular, the Island Managers and the Shorebird Manager are trained and are responsible for educating visitors to the heavily used Washburn Island and South Cape Beach areas of the Reserve, respectively.

Existing signage throughout the Reserve will be enhanced with more and better trail signs that depict the trails and, where appropriate, include additional information about such things as key ecological resources, actions individuals can take (or avoid) to protect natural resources, and the Reserve's mission to improve stewardship of the region's estuarine and coastal watershed ecosystems. Refer also to Objective 3.8.

## Ecological Restoration Activities

### **Objective 3.5: Ecological function is restored to humanly altered natural habitats within the watershed.**

*WBNERR staff will:*

- a. Create a WBNERR Restoration Science Program that is consistent with the NERRS-supported national Restoration Science Program
- b. Continue work on restoration projects:
  - Estuarine eelgrass and benthic communities
  - Quashnet River
  - South Cape Beach Saltmarsh
  - Coastal Sandplain
  - Abigail Brook
  - Sand Dunes
  - Threatened Birds

### **Restoration Science Program**

The National Estuarine Research Reserve System is in the process of developing implementation strategies for a Restoration Science Program (RSP). The national RSP implementation plan is being developed by NOAA/ERD and the NERRS. The goal of the RSP is to improve the effectiveness of habitat restoration practices by advancing the science of restoration. Two key aspects of the proposed program are the establishment of Restoration Demonstration Projects and Restoration Reference Sites. Restoration Demonstration Projects will be designed specifically to address pressing restoration issues and information gaps in regional habitat restoration needs. The NERRS Coastal Training Program (CTP) will disseminate lessons learned from these projects. Restoration Reference Sites are areas of significant ecological integrity within the Reserve that will be monitored over the long-term. They will be available for use as comparison sites for regional restoration projects outside of the Reserve. Monitoring of the Restoration Reference Sites will be integrated with the NERRS System-wide Monitoring Program (SWMP).

Habitat restoration at WBNERR is intended to improve the ecological integrity and biogeographical representative character of the Reserve, provide additional habitat for threatened and endangered species, and address information gaps in the science of habitat restoration. The Reserve's proposed Restoration Science Program will establish the need for habitat restoration at the Reserve, identify restoration sites, and describe a restoration strategy complete with priorities and a timeline. In establishing the need for restoration at the Reserve, the Restoration Science Program will outline the habitat attributes and natural processes significantly altered by human activities. The plan will describe the direct and indirect effects of those alterations on the physical and ecological processes within the Reserve and the Waquoit Bay watershed and on human health and the local and regional economy. A significant aspect of the WBNERR Restoration Science Program will be the development of a method to prioritize areas needing restoration

through ongoing inventories and monitoring of change and consultation with outside experts. Preliminarily, the WBNERR Restoration Science Program will include the following elements:

- Detailed characterizations of discreet restoration project sites.
- A restoration project planning process that includes the use of advisory groups.
- Project goals and objectives for individual projects and groups of projects.
- A list of the most appropriate restoration science questions to address for each project site.
- Baseline and post construction monitoring plans.
- Funding strategies for project construction, monitoring, and construction of access and educational programs and trails.
- Criteria for site prioritization and timelines for project implementation.
- Educational opportunities (*e.g.*, K-12, interested public, and professional teacher development) associated with restoration projects and restoration outreach plans.

Restoration strategies will be developed to integrate multiple levels of Reserve staff and community participation, where appropriate. The role of volunteers and AmeriCorps crews will be outlined for each project and opportunities for educational activities, public outreach and interpretation will be included in project planning.

## **Current Restoration Projects**

The Waquoit Bay watershed, like most coastal areas in the Northeast U.S., has a long history of human alteration. Even the lands and waters that are now protected within the Reserve and appear “natural” have been altered from their pre-colonial condition and may not be providing the full ecological functions that they once did (or could). Several projects have been implemented and/or are currently underway to restore ecological function to disturbed areas. It is expected that, during the term of this management plan, WBNERR habitat restoration activities will be organized into a NERRS-supported Restoration Science Program.

### *Estuarine Eelgrass and Benthic Communities*

Eutrophication is the most significant issue affecting the Waquoit Bay ecosystem. Continually increasing nitrogen loads from wastewater, fertilizer and atmospheric sources have led to drastic shifts in estuarine habitats. Eel grass habitat, critical to fish and shellfish communities, was once plentiful. It is now completely missing from the main Bay and is disappearing from the few subembayments where it remains. In addition to eelgrass loss, eutrophication has led to a variety of other changes that affect benthic communities throughout the estuary by changing dissolved oxygen conditions and bottom substrate.

The solution to eutrophication is to reduce the amount of nutrients getting to the Bay from its watershed and airshed. Success will require changes at the local, regional and even national level. Despite the daunting scale of the task, WBNERR

is actively engaged in activities to restore the health of Waquoit Bay's eelgrass and benthic communities.

Scientific research conducted at the Reserve beginning in the late 1980s helped to define the problem of eutrophication. More recently, monitoring data collected at the Reserve has been used in linked watershed-embayment models that are being used by the Massachusetts Estuaries Project (MEP) to calculate Total Daily Maximum Loads (TMDLs) for nitrogen. TMDLs represent the maximum amount of nitrogen a waterbody can assimilate and still accommodate its designated use(s), *e.g.*, drinkable, swimmable. The models and TMDLs are tools used at the State and local level to direct decisions regarding nitrogen-load-reducing management activities. In addition to providing monitoring data, WBNERR staff have contributed to the Massachusetts Estuaries Project by serving on the advisory committee, reviewing and commenting on reports, and offering technical input to the nitrogen loading models. WBNERR also promotes nutrient reduction through programs that educate watershed residents about the source of the problem and potential solutions. Additionally, the Reserve and its partners actively pursue opportunities to protect open space and to maintain vegetative cover that helps to intercept nitrogen by taking land out of potential development. WBNERR will remain determinedly engaged in these activities for the duration of this management plan.

#### *Quashnet River*

The Quashnet River is the largest tributary stream of Waquoit Bay and an example of the coastal cold-water, low-gradient streams unique to glacial outwash plains of the region. Historically, it was famous for its anadromous fish runs of river herring and native sea-run brook trout. It also supports a catadromous run of American eels. A combination of human impacts—including dam construction, over fishing and intense agricultural practices—had degraded the physical habitat in the Quashnet River. For more than 30 years, Trout Unlimited and the MA DFW have worked to reclaim the Quashnet as a trout stream and, coincidentally, improve habitat for a diverse community of fish, invertebrates, birds and other native animals and plants. WBNERR has contributed to the restoration effort by planting and monitoring experimental plots for different types of revegetation, providing technical advice about revegetation and habitat structures, coordinating AmeriCorp group project days, and assisting with restoration monitoring. The Reserve intends to continue to work with Trout Unlimited and the DFW to improve the habitat to restore the intertwined river-bay ecosystem.

#### *South Cape Beach Saltmarsh*

Road construction significantly limited the flow of salt water onto the salt marsh behind the now largely abandoned roadway to the “old” state beach and at the Mashpee town beach road at the southeast corner of Waquoit Bay. The altered flow may have caused a loss of salt marsh cordgrass, *Spartina alterniflora*, and

salt marsh hay, *Spartina patens*. These desirable marsh grasses have been replaced by *Phragmites* sp. which is considered less desirable than the marsh grasses as wildlife habitat. *Phragmites* also produces less material for the detrital food chain and is thought by some to be a fire hazard because it dries at the end of the growing season. In addition, there is some evidence that panne areas in the healthy wetlands are increasing. The Reserve has worked with MA CZM and the Town of Mashpee to assess the problem and consider alternative restorative actions. The Reserve, in partnership with these organizations, is currently moving forward with final construction designs to implement actions that will restore tidal flow to the constricted marsh area. Specifically, two narrow culverts will be removed and replaced with one bridge and one larger culvert. An ongoing pre-project monitoring program will continue into the future to assess the success of the restoration activities.

### *Coastal Sandplain*

The Reserve contains several small areas of remnant coastal sandplain grassland. This once common natural community is now rare because it has been replaced by coastal development or the wildfire disturbances that once maintained it are now arrested. The Reserve uses mechanical methods and prescribed fire to control natural succession and restore sandplain grassland habitat on Washburn Island and at the headquarters site. These activities promote the rare natural community and species that comprise it, including *Agalinis acuta* (sandplain gerardia) and *Liatris borealis* (New England blazing star). *Agalinis* is on the Federal endangered species list and *Liatris* is a state-listed plant of special concern.

### *Abigail Brook*

Abigail Brook is a small, wetland-fringed tributary on the east side of Waquoit Bay. The *Cape Cod Atlas of Tidally Restricted Saltmarshes*, prepared by the Cape Cod Commission, describes the culvert under Great Hay Road as a tidal restriction. Replacement of this culvert with a larger structure will allow natural tidal flows to return to this altered wetland with positive effects on the plant and animal community. This project is currently being considered for future implementation by the Reserve with partner organizations: MA CZM Wetland Restoration Program, Natural Resources Conservation Service, and U.S. Fish and Wildlife Service.

### *Sand Dunes*

Foot passage through the dune areas of South Cape Beach State Park has damaged the dune grasses and the dunes. Dune restoration will be accomplished through a combination of boardwalk construction, fencing, dune planting, signage, and outreach.

### *Threatened Shorebirds*

There are two species of concern on Reserve property; the piping plover and the least tern. The Federal government lists the piping plover as a threatened species of shore bird. Piping plovers presently nest in limited numbers on South Cape Beach and the beach at the southern end of Washburn Island. Because their eggs are laid on the ground and are well camouflaged, they are often accidentally damaged or destroyed by human actions. Nests on the ground also make the eggs easily accessible to predators. The Reserve's Seasonal Shorebird Manager works in cooperation with the Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement (DFWELE) and the Massachusetts Audubon Society. The Reserve trains volunteers to 1) recognize signs of mating and nesting activity and 2) to erect predator exclusion fences to protect eggs and hatchlings. Volunteers inform beach-goers about risks to the birds' nests and chicks from dogs, flying kites, and other human activities on the beach. The seasonal shorebird manager tallies adult bird pairs and egg and fledgling numbers.

Least terns (*Sterna antillarum*), a state species of special concern, are present at South Cape Beach and have historically nested there. Roseate terns, common terns, willets, and American oyster catchers also feed at South Cape Beach and may nest there as well. Reserve staff monitor the activities of all five species.

## **Land Acquisition**

**Objective 3.6: DCR will acquire real estate rights to key parcels in the Waquoit Bay Watershed area to expand the Reserve.**

*WBNERR staff will:*

- a. Work with MNWR partners to prioritize land for acquisition.
- b. Seek funds for land acquisition.
- c. Work closely with DCR land acquisition staff on land acquisition process.

Research at WBNERR has shown that land use change, particularly residential development, in the Waquoit Bay watershed has resulted in drastic impacts to estuarine resources. A key component of WBNERR's efforts to protect the quality of the land and water ecosystems within the Reserve is the preservation of undeveloped land in and around the Waquoit Bay watershed. Land acquisition by the Reserve provides increased opportunities for research and education activities. Such protection of undeveloped land also provides many tangential benefits to coastal communities in the form of aesthetic values, controlled recreational access, limitations to increases in traffic, and protection of drinking water resources. Land acquisition activities are implemented in conjunction with the Reserve's participation in the Mashpee National Wildlife Refuge Conservation Partnership. The Reserve's strategy for land acquisition is detailed in Appendix H: Acquisition Plan.



### *Boundary Change*

Lands purchased since the last management plan was prepared are incorporated into the Reserve boundary with this management plan. Over the past five years, the Reserve has gained title to the five properties described below.

- The two Childs River properties total 19 acres and straddle the Childs River (the second largest tributary to the Bay) just upstream of tidal influence. The property includes coastal pine/oak woodland habitat and unique coastal low gradient stream habitat important to multiple migratory fish species.
- The 35 acre Abigail Brook parcel is located immediately adjacent to the easternmost portion of the Reserve in the vicinity of Upper Great River. This property includes coastal upland pine/oak woodland and important riparian buffer to the adjacent Abigail Brook and its associated wetlands.
- The 10 acre Phinney parcel is located near the Quashnet River in the central portion of the Bay's watershed. The property includes pine oak woodland characteristic of coastal uplands in the area.
- The 35 acre NStar parcel is also located near the Quashnet River in the central portion of the Bay's watershed. It is immediately adjacent to the Reserve's Quashnet River Area property and includes a variety of coastal upland and wetland habitats, including some vernal pool and freshwater wetland habitats not previously represented in the Reserve.

The Reserve has also acquired a conservation easement on about seven acres of Town of Mashpee open space land which is not being incorporated into the Reserve boundary at this time.

All of the new lands are within the land acquisition boundary of the U.S. Fish and Wildlife Service's (USFWS) Mashpee National Wildlife Refuge. A Final Environmental Assessment of the MNWR (USFWS 1995) found "no significant impact" would result from the proposal to cooperatively preserve, protect, and manage lands within the towns of Mashpee and Falmouth. The proposal was developed by USFWS after extensive public input from citizens, elected officials, government agencies, and interested organizations.

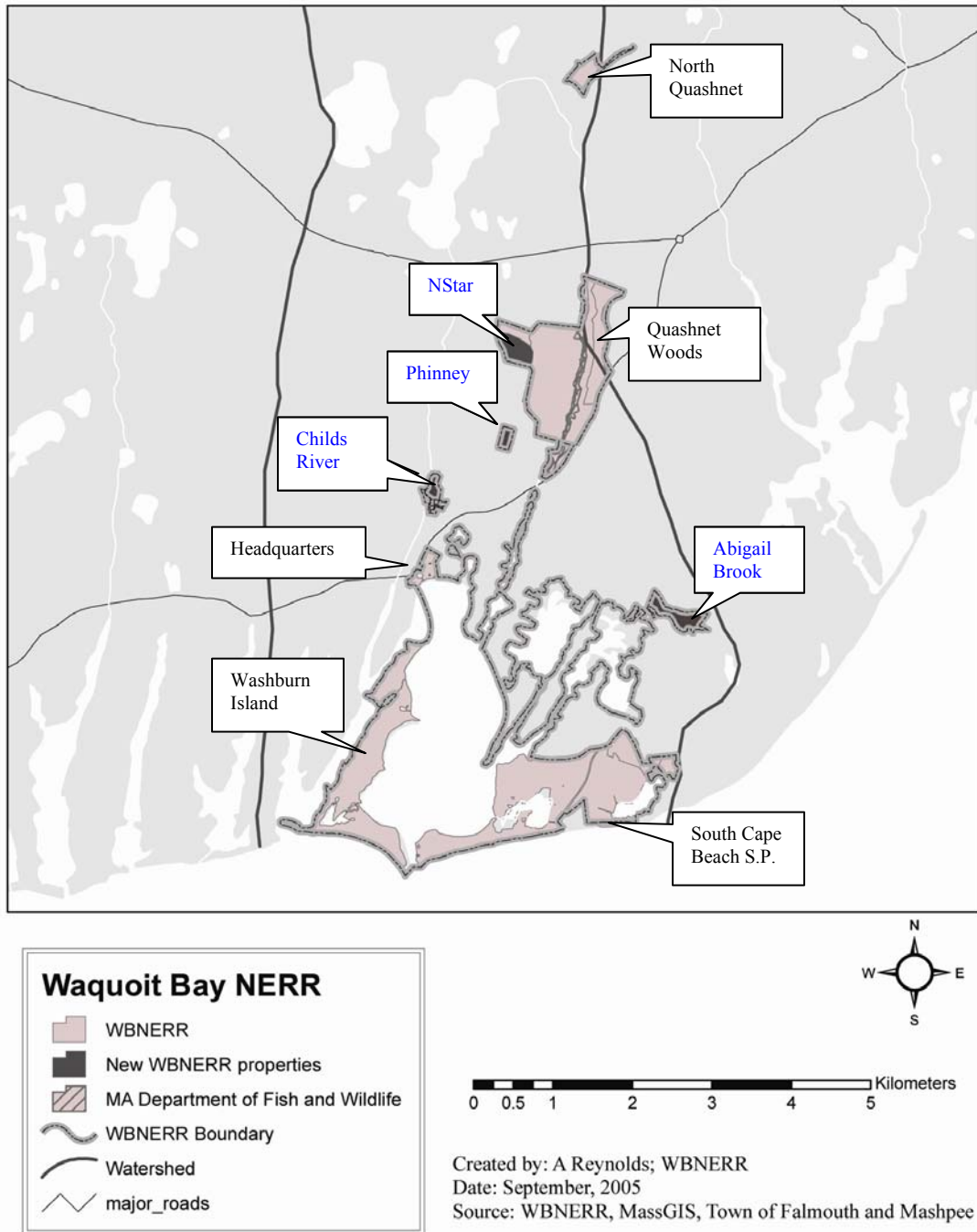
Protection of the five properties listed above prevents their future development and, thus, eliminates potential new sources of nitrogen in the Waquoit Bay estuarine ecosystem. Inclusion of these properties within the Reserve boundary adds underrepresented habitats typical of the biogeographic province, including various migratory fish runs, coastal forested uplands and freshwater wetlands. These properties also provide previously non-existing access and further opportunities for the Reserve's research and education programs.

All of these parcels have a history of rural agricultural land use. Cranberry operations existed at the Childs River and Abigail Brook parcels, while grazing was the likely historic land use at the other parcels. Agricultural operations at all sites have been

abandoned for at least 30 years and vegetation succession is occurring on all of the properties. With the inclusion of these properties into the NERR boundary, they are subject to all land and water resource management, signage and public information, law enforcement and other site control activities outlined in this Management Plan. Reserve led biological monitoring, including vegetation and rare species, has already begun in these areas. The habitats represented on these properties are currently being made available to research, education and stewardship demonstration activities. For example, an invasive species control project is currently underway at the Childs River property, vernal pool monitoring is occurring at the NStar property and restoration of tidal restrictions is in planning at the Abigail Brook property.

These most recent additions are identified in Figure 16. As new lands identified within the Stewardship Focus Area (refer to Appendix H) are acquired, they will also be incorporated into the Reserve boundary through a formal review and approval process.

**Figure 16: WBNERR Boundaries.**



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## Marine and Freshwater Resources

**Objective 3.7: Reserve waters and wetlands are effectively managed with a prioritization on ecological needs while balancing the needs of research, education, recreation, and sustainable use of natural resources.**

*WBNERR staff will:*

- a. Continue to inventory significant resources and monitor changes.
- b. Continue to work with town and state officials to improve management of aquatic resources.

The Reserve includes approximately 1,359 acres of estuarine waters, several freshwater ponds, tributary streams, vernal pools and substantial groundwater resources beneath its lands. Freshwater resources in tributary streams, ponds and vernal pools support unique vegetation and animal communities including amphibian and anadromous fish populations. The open waters of the bay once supported one of the most diverse estuarine fish communities in the state (Curley *et al*, 1971). These waters are still significantly important to commercial and recreational shellfish and fin fish fisheries. The Bay waters also enhance the value of the surrounding real estate and provide valuable recreational activities, including swimming, boating, windsurfing and kiteboarding.

The watershed's fresh water resources, as well as Waquoit Bay itself, are impacted by eutrophication resulting from excessive nutrient loading. This problem seriously threatens water quality in the Bay and is expected to continue to worsen until alternatives to wastewater disposal can be implemented on a large scale in the watershed. Additionally, freshwater resources are threatened by toxic contamination moving through groundwater from the nearby Superfund site at the Massachusetts Military Reservation. In addition to threats to the quality of water resources, future population growth on Cape Cod threatens the quantity of freshwater resources. Groundwater withdrawal from the Waquoit Bay watershed's sole source aquifer could potentially lead to drops in water levels that could seriously impact habitats in streams, ponds and vernal pools.

WBNERR is committed to continuing existing monitoring programs and developing new ones to inventory, evaluate the status of, and track changes in the valuable aquatic, estuarine and marine resources in the Reserve and its vicinity. Examples of this include SWMP, the submerged and emergent vegetation monitoring project, vernal pool monitoring, aquatic insect monitoring and stream fish monitoring. Monitoring results will continue to inform management decisions at the Reserve.

The Reserve has no management authority over the open waters of the Bay or upstream freshwater resources. However, the Reserve influences water resource protection via research, education, stewardship demonstrations, and the translation of research for policy-makers. Since marine and freshwater resource problems and their solutions are complicated and go beyond the scale and jurisdiction of the Reserve, the Reserve cooperates with outside groups, including municipalities and other state and Federal agencies, to address them. The Reserve works to make science-based information

available to policy-makers and decision-makers through workshops and direct communication. WBNERR also comments on reports, proposed projects and proposed policy changes that could affect the Reserve's water resources. Additionally, Reserve staff participate on local and regional planning committees that make decisions that affect marine and freshwater resource management in the Reserve and the surrounding area.

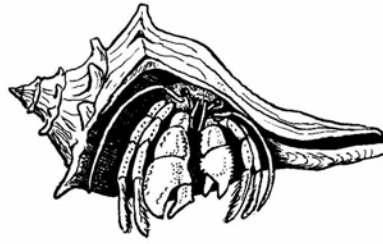
## Modeling Conservation Practices

**Objective 3.8: Reserve resource management practices are used as a demonstration and teaching resource for similar coastal habitats in the region.**

*WBNERR staff will:*

- a. Incorporate examples of resource management practices into training and education programs.
- b. Include descriptions of resource management activities on the Reserve's web site and in publications.
- c. Provide signage that explains the type and purpose of resource management activities being implemented.

A primary function of Waquoit Bay NERR is to transfer information about sound resource management practices to other land managers. This objective is accomplished by incorporating examples of resource management practices into training and education programs. For instance, participants in the *Cape Friendly Landscaping* course learn from the Reserve's own landscaping practices. Descriptions of resource management activities at the Reserve are included on WBNERR's web site and in publications to further increase awareness of environmentally sustainable land and water management techniques. Additionally, signage at the Reserve helps to interpret management activities for Reserve visitors. For example, signs at boardwalks that cross sand dunes explain the fragile nature of these features and briefly describe their function in the coastal landscape.



## Chapter 5: Sustaining Community Engagement

*Goal 4: Foster dialogue and development of coastal ecosystem management solutions through sustained community engagement.*

Activities in support of the preceding three goals—understanding coastal ecosystems, improving environmental literacy, and demonstrating sustainable stewardship—will ultimately be judged successful if they motivate local communities to increasingly take responsibility for the development of solutions to coastal ecosystem management issues. WBNERR's role in this context is to foster community action that is consistent with—and may even shape—state and Federal coastal management priorities. Toward this end, WBNERR remains engaged with coastal management agencies, leverages training and education activities, and makes direct assistance available to communities and organizations.

### National Context for Local Action

**Objective 4.1: State and national ocean management priorities will be advanced because of the successful implementation of WBNERR research, stewardship and educational activities.**

*WBNERR staff will:*

- a. Contribute to the development of new coastal and ocean management paradigms.
- b. Help to establish an ocean ethic and motivate citizens and political leaders to support national priorities identified by the Pew Oceans Commission and the U.S. Commission on Ocean Policy.
- c. Make known where the Reserve's priorities converge with those of State and national systems.

Research, stewardship and educational efforts undertaken by the Reserve foster the development of solutions to local coastal ecosystem management issues. The Reserve's influence, however, is not strictly local. WBNERR contributes to the understanding of coastal management issues and solutions at the regional and national levels. Thus, the

Reserve serves as an important link between local coastal management challenges and state and national priorities.

Much, if not all, of the Reserve's work is consistent with the principles and goals detailed in the reports of the Massachusetts Ocean Management Task Force, the Pew Oceans Commission, and the U.S. Commission on Ocean Policy. The scientific research conducted at WBNERR, along with the monitoring data collected by the Reserve, contributes to the body of knowledge on critical topics identified in the reports, including climate change, nutrient loading, shoreline change, and ecosystem responses. Stewardship activities protect and enhance valuable habitats and, likewise, contribute to the knowledge base of ecosystem function and management approaches. This type of sound, scientific information is needed to support the development of new coastal and ocean management paradigms.

WBNERR is improving environmental literacy through training and educational programs directed at coastal decision-makers, students and the broader community. Environmental literacy, in turn, is the foundation for a strong ocean ethic and the collective will to adopt environmentally sustainable behaviors and policies.

WBNERR will remain cognizant of areas where its priorities converge with State and national priorities. When appropriate—for instance, when applying for grant funding or reporting to NOAA—these areas of convergence will be documented to strengthen both the Reserve's and NERRS's position.

#### *Massachusetts Ocean Management Task Force*

The Governor-appointed Ocean Management Task Force was established in June 2003. The Task Force was asked to develop statewide ocean management principles to guide future ocean management in the Commonwealth. Such a task force was necessary because of increasing conflicts between traditional and emerging uses of ocean resources (e.g., fishing and laying of fiber optic cable) and the absence of a legal framework to address the following questions:

Which uses should be allowed in which areas? Who should decide? How do we ensure that individual and collective uses do not harm the environment? Do we have the right information to make these decisions? Do public agencies that are authorized to make these decisions have the right tools? Given that the ocean is a public trust resource, how should the Commonwealth effectively manage the "assets of the trust" it owns on behalf of the public to best protect and use them for the benefit of the citizens today and in the future? (MOMTF 2004, 5)

In response to this challenge, the Task Force developed six principles for ocean management and fifteen recommendations. The principles state that managing activities above, below and on the ocean surface should "embody an ethic of ocean stewardship that (1) protects the public trust; (2) values biodiversity; (3) respects the interdependence of ecosystems; (4) fosters sustainable uses; (5) makes use of the best available



information; and (6) encourages public participation in decision-making" (MOMTF 2004, 6). Of the fifteen recommendations, four relate to the work conducted at the Waquoit Bay Reserve:

- **Climate Change:** The Task Force recommends the collection of information about trends relating to climate change impacts in Massachusetts and supports policies that decrease reliance on energy resources that emit greenhouse gases.
- **Marine and Ocean Resource Trends:** The Task Force recommends that an advisory group evaluate and estimate baseline marine species population levels, habitat conditions, and contaminant levels to evaluate changes in ocean resources through time, identify emerging threats to ocean resources, and determine appropriate management goals.
- **Ocean Monitoring and Research:** The Task Force recommends the development of a comprehensive ocean resources monitoring and research plan. The monitoring and research plan should encompass living and non-living estuarine and marine resources; water and sediment quality; physical oceanographic, wind, and weather patterns; as well as studies of the economic and other uses of these resources.
- **Ocean Literacy and Stewardship:** The Task Force recommends a formal commitment to developing a new ocean literacy and stewardship ethic among all citizens of Massachusetts. The initiative should target a multigenerational audience, and include the private and public sectors, academic institutions, politicians, advocates, the media, and the general public.

#### *Pew Oceans Commission*

The Pew Ocean Commission is an independent body formed in June 2000 for the first national review of ocean policies in more than 30 years. The Pew Oceans Commission developed a plan of action to protect, maintain and restore ocean assets. The Pew Report's recommendations are divided into five sections: Ocean Governance for the 21<sup>st</sup> Century, Restoring America's Fisheries, Confronting Coastal Sprawl, Cleaning Coastal Waters, and Sustainable Marine Aquaculture.

The Pew Report, through analogy, defines the tools the nation needs to reverse the declining health of our ocean and coastal ecosystems: a compass, a chart and the wind in our sails. "That compass is a strong ocean ethic, the chart is a new legal framework, and the wind is our national will (POC 2003, 29).

#### *U.S. Commission on Ocean Policy*

The U.S. Commission on Ocean Policy was established pursuant to the Oceans Act of 2000. The sixteen Commission members were directed to establish findings and develop recommendations for a coordinated and comprehensive national ocean policy. An outline of the Commission's detailed report is included in Appendix I. The Commission also developed an overarching set of principles to guide national ocean policy. The themes of the principles are:

- Sustainability
- Stewardship
- Ocean-Land-Atmosphere Connections
- Ecosystem-based Management
- Multiple Use Management
- Preservation of Marine Biodiversity
- Best Available Science and Information
- Adaptive Management
- Understandable Laws and Clear Decisions
- Participatory Governance
- Timeliness
- Accountability
- International Responsibilities

## Regional Involvement

**Objective 4.2: The Reserve will coordinate activities with MCZM to ensure that science conducted at the Reserve supports management and improved decision-making statewide.**

*WBNERR staff will:*

- a. Continue to work with MCZM on the Coastal Training Program.
- b. Encourage, participate in, and, if necessary, convene state-wide meetings of coastal program managers.
- c. Increase involvement and communication with MCZM in appropriate program areas.
- d. Work with MCZM to have high staff participation in needs assessments for research and training.

Both the MCZM and the NERRS program were established under the Federal Coastal Zone Management Act. The Reserve system is intended to provide technical support and education to coastal decision-makers and managers. As such, it is expected that both programs work closely together.

The Massachusetts Office of Coastal Zone Management (MCZM) is a part of the Executive Office of Environmental Affairs. MCZM's mission is to balance the impacts of human activity with the protection of coastal and marine resources. As a networked program, MCZM was specifically established to work with other state agencies, Federal agencies, local governments, academic institutions, nonprofit groups, and the general public to promote sound management of the Massachusetts coast.

Over the years, WBNERR and MCZM have worked together in varying degrees of intimacy. For instance, MCZM and WBNERR work together in an ad hoc manner on many projects (*e.g.*, staff from both entities participate in coastal pond monitoring activities). They work very closely on the Coastal Training Program and ecological restoration activities (see Objectives 2.1-2.3 and 3.5). In addition, the Reserve manager

meets a few times a year with the other managers of coastal programs in Massachusetts, including the MCZM program, the Stellwagen Bank Marine Sanctuary, the two Sea Grant Programs and the two National Estuary Programs. The meetings provide an opportunity for information sharing and collaboration. The Reserve manager will encourage these meetings and, when appropriate, convene them. Additionally, the MCZM Director will participate, in an advisory role, in quarterly WBNERR/DCR Administrative Committee meetings. The WBNERR manager will participate in monthly MCZM senior staff meetings as well as in MCZM bi-weekly staff meetings when appropriate. DCR, WBNERR and MCZM are currently assessing additional opportunities to enhance formal mechanisms for involvement and communication between the programs, *e.g.*, the Waquoit Bay NERR Advisory and Administrative Committees (refer to Objective 5.5.b).

WBNERR will further enhance its relationship with MCZM by facilitating a high level of MCZM staff involvement in needs assessments for research and for training. Input from MCZM could lead, as it has in the past, to collaboration on research or monitoring projects. Additionally, WBNERR may be in a position to make recommendations to visiting researchers or graduate students on research projects relevant to MCZM needs.

**Objective 4.3: Reserve staff will provide sustained support of community coastal decision making**

*WBNERR staff will:*

- a. Represent the Reserve and DCR in local and regional planning efforts.
- b. Participate in community efforts that further the Reserve's mission and objectives.
- c. Serve on committees and boards relevant to coastal management.
- d. Facilitate the formation of committees and working groups by providing staffing, facilities, and leadership.
- e. Respond to requests for assistance and provide one-to-one consulting services when possible and appropriate to the Reserve's mission.

Ultimately, local communities must take initiative and provide leadership for managing coastal resources. The Reserve provides encouragement and technical and administrative support to communities to facilitate their efforts. In some cases, Reserve staff directly participates on local or regional committees and boards that deal with coastal management issues. WBNERR staff participates in the Falmouth Coastal Resources Working Group, Falmouth Salt Ponds Management Committee, Falmouth Energy Committee, the Barnstable County Wastewater Implementation Committee, the Massachusetts Estuaries Project Advisory Committee and numerous other boards and committees.

Reserve staff has also provided the incentive and leadership that encourages people with common concerns to convene. For example, Reserve staff continues to support the Waters Around Us and the Seacoast Shores Association as they work with the town of Falmouth to address nitrogen loading from their community.

Staff also works with disparate interests from multiple communities on common causes, including those communities with ACECs. An example is the work on renewable energy education that targets homebuilders, vocational technical schools, college students and homeowners and brings together the Cape Cod Community College, the Cape Cod Economic Development program, Cape and Islands Self Reliance, and several others.

When it is appropriate to the Reserve's mission and assuming resources are available, the staff will respond to requests for support from towns and community groups. This support includes the identification and provision of project-specific, science-based information, training activities, and one-to-one consultation, especially if it is determined that such help will launch sustainable projects. The Reserve communicates the availability of this type of information and support to local towns and community groups (see objectives 5.15-19).

**Objective 4.4: Decisions about the management of non-Reserve land in the Waquoit Bay watershed are beneficial to—or at least minimize impacts to—the Waquoit Bay ecosystem.**

*WBNERR staff will:*

- a. Monitor, research and comment on proposed developments and activities with potential to affect Reserve resources.
- b. Review and comment on reports, regulations, by-laws, and policies that affect the Reserve.
- c. Participate in and, where appropriate, provide leadership in the MNWR land conservation partnership.
- d. Implement a Stewardship/Education program targeting those whose cooperation is needed for long-term protection of the Reserve's resources.

WBNERR resources are affected by activities on all watershed lands and adjacent waters, including areas not owned by the Reserve. Groundwater and rivers from portions of Falmouth, Mashpee and Sandwich interconnect throughout the watershed and eventually with the Bay. As such, all watershed residents and decision-makers have the ability to affect the quality of the Waquoit Bay ecosystem for better or worse. The Reserve works to direct these people toward behaviors and projects that make them "good" watershed stewards and minimize their impacts on the Reserve's resources.

Toward this end, Reserve staff track, investigate, and comment on proposed developments and activities that could potentially impact watershed resources and, therefore, Waquoit Bay. In addition staff review and comment on regulatory and policy initiatives and changes that affect the Reserve's, DCR's and NOAA's interests. The Reserve takes such public comments very seriously and insists that decision-makers seriously consider the Reserve's view point in light of the regional, state and national significance of the Waquoit Bay ecosystem.

The Mashpee National Wildlife Refuge conservation partnership, involving eight local, state, Federal, tribal, and non-profit agencies, was established in order to coordinate land

protection efforts within the Waquoit Bay watershed (see Objective 5.5). WBNERR staff chair partnership meetings and have been instrumental in leading the group's conservation and management planning efforts. The Reserve also provides meeting space and GIS mapping support. WBNERR staff will continue to be actively involved and will take a leadership role as necessary.

Activities of individuals at home, at work and while recreating can have significant impacts on the watershed. The WBNERR Stewardship Program is currently working with the Education Program to enhance outreach directly to watershed stakeholders to better inform their decision-making and lessen their impact on the resources managed by the Reserve. WBNERR is developing a community education initiative based on research and stewardship principles, including the Reserve's own stewardship practices. The initiative will incorporate principles of community-based social marketing and especially target watershed residents. Reserve staff will define and promote a set of desired behaviors, track over time, and look for responses in the environment (refer to Objective 2.9). The goal is to make residents and businesses good stewards of Waquoit Bay by helping them to understand that they and their activities are connected to the health of the natural environment.

## Leverage Training and Education Activities

**Objective 4.5: Workshops and other training activities will be the springboard for further support to coastal decision-makers.**

*WBNERR staff will:*

- a. Provide organized workshop follow-up, including the placement of workshop agendas, presentations, proceedings, reference material, and contact information for presenters on the WBNERR and CTP web sites.
- b. Implement measures to address barriers to effective coastal management as identified under Objective 2.3.e.
- c. CTP partners will look for ways to sustain the involvement of audience members through the formation of working groups or committees that would continue implementation of workshop outcomes.

As part of CTP's support to coastal decision-makers after they have participated in a training event—and to provide information to coastal decision-makers who were not able to attend—workshop materials, presentations, and reference materials are made available on the WBNERR web sites ([www.waquoitbayreserve.org](http://www.waquoitbayreserve.org) and [www.coastaltraining.org](http://www.coastaltraining.org)). Overtime, the on-line “library” of information relating to WBNERR's priority topics will grow and remain readily available. Other materials to be posted include workshop agendas, proceedings, and contact information for presenters.

As described under Objective 2.3.e, workshop participants may be asked to identify obstacles to implementation of sustainable coastal management practices highlighted in the training. WBNERR can then use this information to guide its own research and to take an active role in barrier removal. For instance, professional landscapers who resisted

the use of native plants in landscaping (to reduce nitrogen loading) are obstacles to homeowner's use of these plants. The Reserve staff, therefore, targeted landscapers for training. This effort identified another obstacle: the lack of availability and knowledge of native plants by the nurseries. By working with the Falmouth Friendly Lawns Committee, the Reserve is involved in an assessment of nurseries and will work with them to increase the knowledge of their staff and make information on native plants available to their clients.

The Falmouth Friendly Lawn Committee is an example of the formation of an organized effort by a group of people interested in reducing nitrogen loading to the estuaries from residential fertilizer use. Reserve staff provided initial information and training and continues to serve on this town-appointed committee.

**Objective 4.6: Coordination and information-sharing among coastal decision-makers will improve as a result of networking opportunities provided by the Reserve.**

*WBNERR staff will:*

- a. Bring coastal decision-makers and scientists together for focused round-table discussions on specific issues.
- b. Act as referral service connecting coastal decision-makers and community groups with relevant information and contacts.
- c. Expand its role as a neutral facilitator and information provider for decision-makers in coastal Massachusetts.

As noted in Objective 2.3.e, networking opportunities are incorporated into CTP training events. The CTP also fosters networking by coordinating roundtable discussions between decision-makers and scientists. The discussions address priority issues, including those that affect coastal ACECs. Participants bring the perspective of their profession and learn how individuals from other fields perceive and address the particular topic under discussion. This helps raise the awareness of the researchers about coastal management information needs and helps the coastal decision-makers understand the culture of science which has a different time-frame and need for accuracy. It provides a mechanism for these groups, both important contributors to coastal management, to question and learn from each other directly. Often the managers can learn information important to coastal management from the scientists prior to its publication in papers.

The CTP is a hub of information about sustainable coastal management and training. Likewise, the Education, Research and Stewardship programs are repositories of information related to their areas of expertise. As such, each program acts as a clearing house and referral service, connecting those in need of information with those who can provide it. The Reserve also acts as a matchmaker connecting groups with common goals. The Reserve staff has often found that they can provide an important service by simply bringing together communities who are working on similar issues for an informal discussion.

As an additional service to the coastal management community, WBNERR will expand its role as a neutral facilitator and information provider for decision-makers in coastal Massachusetts. Currently the Reserve's audience and geographic influence is primarily the Cape and Islands and southeastern Massachusetts. Through the CTP, the Teacher Training Program, and the Community Education Program, the Reserve will expand the area from which it draws participants and to which it offers its services.

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## Chapter 6: Improving Operations, Infrastructure and Stature

*Goal 5: Improve the operations, infrastructure and stature of the Reserve.*

The administration of the Waquoit Bay National Estuarine Research Reserve supports and enables the implementation of the Reserve's principal functions: research and monitoring, education and training, and stewardship. The term "administration" is used here to include Reserve activities in response to agency mandates and in accordance with agency procedures. Administration includes support of employees and volunteers, maintenance of all Reserve assets, and the adoption and support of appropriate computer technologies. Administration also includes the Reserve's efforts to publicize its activities to a variety of audiences. This chapter is divided into sections to address these topics: Management Environment; Human Resources; Facilities, Grounds and Equipment; Construction Plan; Public Access Plan; Technology; and Communications Plan. Taken together, these sections form the Reserve's *Administrative Plan*.

### Management Environment

#### Self-Evaluation

**Objective 5.1: WBNERR will develop an internal strategic performance monitoring process that will enable timely strategic assessment of program results.**

*WBNERR staff will:*

- a. Generate a performance monitoring plan.
- b. Monitor and evaluate implementation of the management plan to ensure all guidelines and requirements are met.
- c. Meet annually to review progress toward achieving goals, objectives and selected, measurable milestones in the management plan.

The operation of the Reserve will be guided by this document, *Waquoit Bay National Estuarine Research Reserve Management Plan 2006-2011*. To enable staff to strategically assess program results, a performance monitoring plan that details key

results and indicators to be measured under each goal and objective will be generated. Staff will monitor and evaluate implementation of the management plan to ensure that all requirements are met and all guidelines (e.g., Land Stewardship Zoning Guidelines) are incorporated into management decisions. Furthermore, the staff will meet annually, during the winter, to review progress toward completing action items in support of achieving the objectives described in this management plan. This annual performance review will allow staff an opportunity to reflect upon what has worked well (or not so well) in the past and to incorporate that knowledge into future work plans. Many of the objectives and action items described in this management plan are not easily quantifiable, particularly those that deal with changing attitudes and behavior. As such, while progress toward the achievement of all objectives will be examined, only progress toward selected, measurable milestones will be documented initially (Figure 17). Performance monitoring will be an iterative process. Over time, partners will be invited to contribute their own observations and assessments of WBNERR's performance.

**Figure 17:** Selected Measurable Milestones.

| <b>Relevant Objective</b>                           | <b>Milestones</b>   |
|---|---|
| <b><i>Understanding Coastal Ecosystems</i></b>      |   |
| 1.1   | A list of prioritized research topics is published on the Reserve's web site.   |
| 1.1   | Prioritized research topics are advertised through brochures to the research community.   |
| 1.3   | Summarized water quality data from 8 Baywatcher sites is published annually on WBNERR web-site.   |
| 1.3   | Shoreline change data is published annually on WBNERR web-site.   |
| 1.3   | Final report for 2004-2006 SAV and salt marsh bio-mapping baseline study is submitted to NERRS by January 1, 2007.                                  |
| 1.3   | Quality checked nutrient, meteorological and water quality data from long-term SWMP sites and weather stations is submitted annually to NERRS CDMO. |
| 1.4   | One SWMP water quality and meteorological station are each supplied with telemetry and data from these sites is available online by 2007.           |
| 1.5   | Updated research and monitoring databases available online.   |
| <b><i>Improving Environmental Literacy</i></b>      |   |
| 2.1   | Regular meetings of CTP Steering Committee and Advisory Committees are instituted   |
| 2.1   | CTP activities that involve broad geographic coverage are convened annually.  |
| 2.2   | Evaluations are developed according to the NERRS CTP Performance Monitoring Manual and conducted following all CTP events.                          |
| 2.2   | CTP performance reports are prepared and submitted to NOAA ERD every six months.  |
| 2.3   | Coastal decision-makers increase their scientific understanding of WBNERR priority issues.  |
| 2.3   | Coastal decision-makers improve their abilities to access science-based resources.  |
| 2.3   | Coastal decision-makers gain increased skills related to technologies and/or best management practices  |
| 2.5   | Increased number of teachers are trained.   |
| 2.5   | Increased number of teacher workshops are offered.  |
| 2.5   | Increased number of teachers are provided consulting services by Reserve staff.   |
| 2.7   | Increased number of students pledge to adopt environmentally sustainable behaviors.   |
| 2.8   | Increased number of students attend Reserve programs covering basic estuarine ecology.  |
| <b><i>Demonstrating Sustainable Stewardship</i></b> |   |
| 3.1   | Reserve boundaries are marked and visitor use signage is install at newly acquired properties.  |
| 3.2   | Volunteers are trained to monitor nesting shorebirds on all Reserve beaches five days per week between the months of April and August.              |

|  |  |
|--|--|
| 3.2  | Applications for state certification of two vernal pools is submitted.   |
| 3.2  | Inventories of two priority invasive plants are completed.   |
| 3.3  | Identification signage is installed at four public access locations.   |
| 3.4  | Gates and barriers are installed to limit motor vehicle access to three roads within the Reserve boundary.                 |
| 3.5  | Two tidal restrictions are removed within the Reserve boundary.  |
| 3.7  | Water quality monitoring data is provided to town and state programs engaged in water quality management.                  |
| 3.8  | Two CTP workshops on habitat restoration are offered annually.   |
| <b><i>Sustaining Community Engagement</i></b>                  |  |
| 4.3  | Increased WBNERR representation on key coastal management related committees and boards in the Region.                     |
| 4.5  | All CTP workshop materials will be posted on WBNERR and CTP websites.  |
| 4.5  | Working groups will be established to continue work on key areas focused on in CTP workshops.                              |
| 4.6  | Several formal focus group discussions on coastal management issues will be convened annually with coastal decision-makers |
| <b><i>Improving Operations, Infrastructure and Stature</i></b> |  |
| 5.1  | Annual performance review process is institutionalized within WBNERR.  |
| 5.1  | WBNERR consistently participates in the NERRS Annual Meeting.  |
| 5.7  | Emergency response plans are developed and tested for different hazards (e.g. hurricanes, storms etc).                     |
| 5.8  | Increased number of volunteers are participating in WBNERR programs.   |
| 5.14   | WBNERR database of key contacts is improved.   |
| 5.15   | WBNERR Newsletter is produced quarterly.   |
| 5.15   | At least (2) <i>Science to Management Bulletins</i> are produced each year.  |
| 5.15   | Brochure describing Education Department programs is developed.  |
| 5.15   | Brochure outlining CTP activities is produced annually.  |
| 5.19   | WBNERR web site is regularly updated and contains detailed information on each major program area.                         |

WBNERR's ability to function efficiently is, in part, based upon internal management tools and routines. Appendix J contains a collection of forms that WBNERR staff use to track everything from reservations for special events, to moorings, to volunteer hours.

## Agency Partners

### *National Oceanic and Atmospheric Administration*

**Objective 5.2: NOAA will consider WBNERR an exemplary reserve.**

*WBNERR staff will:*

- a. Maintain regular and open communication with NOAA.
- b. Submit reports on time.
- c. Submit annual award proposal on time.
- d. Continue to incorporate and report the ERD system-wide evaluation criteria in its CTP evaluations.
- e. Participate in national meetings, serve on system-wide committees, and provide leadership.
- f. Make materials and program templates available to other reserves and respond to inquiries for assistance and information.
- g. Represent the NERR System at national and regional workshops and conferences.
- h. When appropriate, WBNERR will serve as a pilot test site for grant-related improvements and other initiatives.

Since its inception, the Waquoit Bay NERR has enjoyed excellent relations with its Federal partner, NOAA. This has been due, in large part, to a shared vision for both the Reserve and the NERR System. It is a mutually supportive relationship in which NOAA funds and guides the Reserve and the Reserve implements overall NERR System policies and guidelines (see Chapter 1) as set by the Estuarine Reserve Division (ERD) within the Office of Coastal Resource Management (OCRM). In support of this relationship, WBNERR maintains regular communication with ERD and OCRM and submits reports and annual award applications in a timely manner. WBNERR also works within the System to advance the NERRS mission and goals beyond the Reserve's boundaries. WBNERR staff participate in national meetings and system-wide committees, collaborate with other reserves on a variety of projects, and represent the NERR System at national and regional workshops and conferences. WBNERR will further advance the operation of the NERR System by making itself available as a beta test site for new initiatives, including improvements to grant administration.

**Objective 5.3: DCR will consider WBNERR a unique and valuable asset and will fully support the Reserve administratively.**

*WBNERR staff will:*

- a. Communicate and promote the unique role and mission of the Reserve to DCR and State government.
- b. Promote the assessment of the Reserve's placement within the State government.
- c. Maintain open and regular communication with DCR.
- d. Respond to requests for information.
- e. Participate in DCR activities.
- f. Support improved coastal management on DCR properties by making research and stewardship information readily available through the Coastal Training Program and other mechanisms.
- g. Work with DCR to establish a better system to acquire computer hardware and software and other research and communication equipment.
- h. Work with DCR to expedite the processing of contracts and grants and hiring people.

The Reserve also operates within the administrative structure of its state partner: the Department of Conservation and Recreation (DCR). NOAA evaluates the Commonwealth's management of the Reserve every five years during a "312 Evaluation."

The name refers to Section 312 of the Coastal Zone Management Act. Reviews are conducted regularly by OCRM/NOAA to ensure that a state is complying with Federal NERRS goals, approved work plans, and Reserve-specific management plans. The reviews identify Reserve accomplishments and deficiencies. If deficiencies are found in a Reserve's operation, OCRM provides recommendations for improvement. In severe instances, OCRM may redirect Federal resources, withdraw financial assistance, or withdraw National Estuarine Research Reserve designation.

The latest 312 Report for Massachusetts was issued in November 2004 for the period February 1999 to August 2003. The evaluation addresses both the State's coastal zone management program, administered by the Massachusetts Executive Office of Environmental Affairs (EOEA), and the Waquoit Bay NERR administered by the Massachusetts Department of Conservation and Recreation. It offers eleven Program Suggestions to strengthen both programs (Appendix K). Five of the recommendations are specific to the relationship between WBNERR and DCR.

1. DCR and WBNERR should develop a plan to address issues that have been problematic in the past, specifically: Reserve placement within the agency, staffing, equipment and supply needs, communication and visibility, and overall support and recognition from parent agency. A plan should be submitted to NOAA within six months of receiving final findings.

2. DCR should modify the approval process to ensure timely acquisition of equipment and supplies, especially since such equipment and supplies requests have already been approved through the annual NOAA grants process. Within three months of receiving the final Findings, DCR should submit a strategy to NOAA for addressing this issue.
3. The DCR should consider funding other WBNERR positions or utilities and maintenance costs so that NOAA award funding could be used for programs and projects.
4. DCR should provide WBNERR with the necessary means to fill seasonal positions in an expedient manner so that the Reserve can take advantage of hiring the best and brightest summer interns.
5. WBNERR and DCR should agree on a staffing and hiring plan (based on needs identified in WBNERR's management plan) to address deficiencies in personnel needs. WBNERR and DCR Human Resources should explore opportunities to increase interaction between staff and increase effectiveness of communication.

This Management Plan is required to address these 312 recommendations. The unique nature of the Reserve explains, in part, why the Reserve's business has often "fallen through the cracks" as noted above (and highlighted in past 312 reports).

As a member of the NERRS, WBNERR is required to provide opportunities for long-term research and monitoring, education, training, interpretation, and stewardship. The Reserve is a living laboratory where research and monitoring increase understanding of estuarine ecosystems and where education and outreach disseminate the results of research to the public and policy-makers in support of informed coastal management. The expectations and requirements of the national system make Waquoit NERR unique within the DCR which focuses primarily on the provision of outdoor recreation and resource protection.

WBNERR is, nonetheless, considered a "park" by DCR with regard to its placement within the agency. The Waquoit Bay NERR is administered by Region 1 of the Division of State Parks and Recreation. This placement makes it difficult for DCR to adequately support WBNERR's mission which is much broader and more complex than that of a typical park. In order to investigate alternative arrangements that are more mutually supportive—and to address the first 312 Recommendation listed above—WBNERR staff will work with representatives of state entities to assess the most advantageous placement of the Reserve within DCR or another state agency. Discussions could involve DCR, the university system, and the Massachusetts Office of Coastal Zone Management.

To continue to address concerns raised by the 312 Evaluation, WBNERR will maintain open and regular communication with DCR, will respond promptly and thoroughly to requests for information and will participate in DCR activities as appropriate. WBNERR will seek out ways it can provide its services to DCR. For example, WBNERR will support the mission of DCR by identifying and promoting opportunities to improve coastal management on DCR properties. WBNERR's research program is undoubtedly a center of coastal expertise (refer to list of current research in Appendix C). The Reserve

hopes that DCR will take greater advantage of this in-house resource in the future. The Reserve will, therefore, explore and develop ways for the results of the science conducted at the Reserve and elsewhere to be incorporated into management decisions on DCR's coastal properties. Meetings, research summaries, contributions to daily reports, and monthly emails are all potential methods the Reserve will consider. Also, WBNERR Coastal Training Program activities provide DCR managers with an opportunity to learn from the coastal ecosystem research and environmental stewardship experience developed at the Reserve and elsewhere. The Reserve's CTP Coordinator will actively work with DCR's training program coordinator in Boston and at the regions to explore how CTP can provide training to DCR staff.

The Reserve's reliance on grant funding is a hindrance when it comes to working within a large bureaucratic structure. Grants have finite time periods during which staff needs to be hired, equipment needs to be purchased, and the project needs to be completed. As referenced in the second 312 Recommendation, there have been long-standing issues between DCR and the Reserve related to procurement and grant management. For instance, equipment and technology needs at the Reserve (*e.g.*, research equipment and computer equipment and software) are different from other DCR facilities. Because these purchases fall outside of routine operations for DCR, there are often delays in approvals and maintenance. As an example, an order for MIS computer equipment took over a year to fill and resulted in the delay of critical research activities. Also, grants that the Reserve receives from outside agencies often include activities that challenge established DCR procedures or straddle fiscal years, thus hampering the expeditious completion of the necessary paper work for the project.

To resolve these issues, Reserve staff will continue to work with DCR's procurement and contracts staff to insure that they submit the right forms to the right people in a timely manner. Reserve staff will follow up to make sure the paperwork was received, answer any questions, and clarify any points of confusion. Reserve staff will continue to educate the Boston staff regarding the unique nature of the Reserve, its requirement to participate in national programs that mandate specific equipment and positions, and the realities of grant requirements. The Department will be responsible for reviewing how it handles Reserve business to see if there are ways to facilitate procurement, contracts, etc. as recommended in the 312 evaluation.

**Objective 5.4: WBNERR will encourage DCR to fund existing staff positions when resources are available and other more highly prioritized statewide DCR staffing needs have been met. And WBNERR will work with DCR to increase the efficiency with which vacancies are filled.**

*WBNERR staff will:*

- a. Seek increased state fiscal support for staff positions and/or utilities and maintenance, currently supported by NOAA funds, if resources become available.
- b. Work with DCR to increase the efficiency of DCR in filling all staff positions, most especially seasonal staff positions and positions funded under limited term grant awards.
- c. Work with DCR to ensure that all authorized Forest and Parks positions are filled.
- d. Maintain adequate staff, resources, and equipment to fulfill obligations under SWMP and other NERRS mandates.

DCR currently maintains a prioritized list of critical statewide staffing needs and the agency is making strides to direct its limited appropriation to fill those diverse needs. WBNERR programs will benefit if staffing needs are considered on this DCR list. If the more highly prioritized statewide staffing needs are met, then DCR would consider funding existing staff positions at the Reserve, allowing more of the NOAA grant funds to be invested into Reserve education and research programs.

NOAA's Estuarine Reserves Division provides operating funds to WBNERR annually. The amount is determined each year through the appropriation process. DCR, as the state partner, is required to provide a 30 percent match. It is expected that the Federal funds will be used for program activities related to research, education, and stewardship. At WBNERR, 67 percent of Federal funds are allocated to personnel costs, leaving little for programs and activities. For instance, two core positions—the Coastal Training Program Coordinator and the Stewardship Coordinator—are entirely supported with Federal funds (although the CTP position, then known as the Research Translator, was state-supported until October 2002). Similarly, some of the three Island Manager positions have historically been funded through NOAA. The Island Managers fill a recognized Forest and Parks role similar to that of Boston Harbor Island Managers. As such, it can be argued that state seasonal employee funds should be used to support all three Washburn Island Manager positions. Fully funding the salaries and benefits of additional WBNERR employees would be one way of satisfying the 312 Program Suggestion, "The DCR should consider funding other WBNERR positions or utilities and maintenance costs so that NOAA award funding could be used for programs and projects."

Programs and projects would also benefit from a more efficient hiring process. Delays often arise from the fact that job descriptions for tasks required under Federal mandates (e.g., research, stewardship, and science-to-management functions) often do not mesh with existing state-defined positions. Frequent delays related to lost paperwork and other administrative errors further complicate the hiring process. A four to six month delay between the time a job offer is extended and authorization to begin work is granted is not



atypical. Many job candidates simply cannot afford to wait for this inexplicably lengthy period and accept job offers from other employers. WBNERR must then begin the hiring process all over again. In addition, many positions are funded through grants with specific start and end dates. Hiring delays make it difficult to accomplish tasks required of the award, leave the Reserve and the Department open to criticism, and possibly jeopardize the funding.

Also, the state hiring process does not allow for the timely start of seasonal staff. To be most effective, the following seasonal positions should start on the dates listed.

- **Seasonal Shorebird Manager (1):** start mid-March to comply with a State Natural Heritage Program request.
- **Long-term Seasonal Laborer (1):** start April 15 and extend through October 15.
- **Interpretive Naturalist (1):** start April 15<sup>th</sup> and extend through October.
- **Island Managers (3):** start mid-May.
- **Summer Workers (4):** start two on the third Sunday in May; start two additional workers mid-June.
- **South Cape Beach State Park Life Guards (4):** start the second week of June.

Understaffing has also been a problem at the Reserve because several key positions are presently vacant and have been so for a period of years. For example, in recent years there have been no lifeguards assigned to the popular ocean beach at South Cape Beach State Park. The absence of trained life saving personnel is clearly a safety and liability issue. Also, there is an expectation among the public that when they pay for beach access (there is a \$7/day parking fee) that there will be lifeguards monitoring the beach and adjacent waters. The year-round Facilities Repair and Long-Term Seasonal Laborer positions at the Reserve, likewise, need to be filled. These positions are especially needed in the spring to help get ready for the busy summer research, education, and recreation season (*e.g.*, prepare boats, moorings, trails, parking areas, signs, camp sites, etc.) and in the fall to prepare equipment and facilities for the winter. Similarly, it is imperative that the research program remain fully staffed. The Reserve is obligated by Federal regulation (15 C.F.R. Part 921.50) to collect standardized data on national estuarine environmental trends. In order to support this task and to assure the quality of the data, the Reserve must have adequate staff with appropriate expertise and the proper supplies and equipment.

WBNERR also desires a more efficient hiring process. State hiring processes are established through the Human Resources Division in the Executive Office of Administration and Finance. As such, the process for hiring new WBNERR employees is not fully controlled by DCR. Nonetheless, WBNERR is committed to working with DCR's Human Resources staff to enhance the hiring process. Specifically, WBNERR will work with DCR to implement aspects of the *Commonwealth of Massachusetts Human Resources Division Model Hiring Plan* and, thereby, reduce the time it takes to hire new employees. For instance, WBNERR staff will work with DCR to:

- Reduce the amount of time it takes to post a job.
- Ensure that complete application packages—with each applicant’s cover letter, resume and references stapled or clipped together—are forwarded to WBNERR for review very soon after the close of the posting period.
- Complete interviews as soon as possible following the close of the posting period.
- Reduce the time it takes for selected candidates to be approved for hire.
- Support the agency’s attempts to have seasonal staff positions filled in sufficient time to satisfy the start dates listed above.

## Management Agreements

**Objective 5.5: Partners and WBNERR will clearly understand their respective roles and responsibilities.**

*WBNERR staff will:*

- Maintain and honor management agreements defining partner relationships.
- Establish and administer advisory groups in such a manner as to secure their guidance.
- Seek new agreements when appropriate.

A number of Memoranda of Agreement (MOAs) or Memoranda of Understanding (MOUs) have been developed to clarify coordination between various entities regarding the acquisition and operation of the Waquoit Bay National Estuarine Research Reserve and its component parts. These are discussed briefly below and appear in the Appendices. Many of the agreements refer to the Department of Environmental Management (DEM). Since these agreements were written, DEM was merged with the Metropolitan District Commission to form the Department of Conservation and Recreation (DCR). DCR assumed responsibility for all contracts previously entered into by DEM. The descriptions below refer to the agency—either DEM or DCR—that is referenced in the actual agreement. It is DCR and, more specifically, WBNERR, that is responsible for meeting the terms of the agreements, however.

***MOU between NOAA and Massachusetts Department of Conservation and Recreation (Appendix L)***

This MOU states the provisions for the cooperative management of the Waquoit Bay National Estuarine Research Reserve in Massachusetts, between the Massachusetts Department of Conservation and Recreation and the National Oceanic and Atmospheric Administration’s Office of Ocean and Coastal Resources Management.

***MOU between the Town of Mashpee and the Commonwealth of Massachusetts regarding South Cape Beach (Appendix M)***

This MOU, dated June 29, 1981, describes the terms of the transfer of South Cape Beach to the Massachusetts Department of Environmental Management. The agreement outlines allowable uses on the property; describes criteria for

designing, siting, and maintaining facilities; and defines DEM's responsibility to prevent erosion and preserve critical habitat. Through the MOU, the Department agrees to "at all times continue to recognize a South Cape Beach State Park Advisory Committee" comprised of local representatives. The Department also agrees to reserve a 10-acre parcel off of Wills Work Road for the potential development of a boat launch/pier facility by the town of Mashpee. It is the Reserve's position that if and when there is a transfer of land, any usage would be limited to passive recreation. The infrastructure to support this passive recreation should be limited and should incorporate principles of Low Impact Development. In the event of a land transfer, DCR/WBNERR would continue to manage the access road to the 10-acre parcel, *i.e.*, Wills Work Road. Furthermore, WBNERR would encourage Mashpee to continue to consider the land as part of the Waquoit Bay Reserve.

***MOU Concerning Cooperation and Coordination with Regard to the Mashpee National Wildlife Refuge (Appendix N)***

In 1995, the U.S. Fish and Wildlife Service established the Mashpee National Wildlife Refuge (MNWR). The boundaries of the MNWR encompass pre-existing protection efforts by a variety of entities within the Waquoit Bay watershed. This MOU, therefore, provides a formal basis for cooperation and coordination between the U.S. Fish and Wildlife Service, the Massachusetts Division of Fisheries and Wildlife, the Massachusetts Department of Environmental Management/Waquoit Bay National Estuarine Research Reserve, the Town of Mashpee/Mashpee Conservation Commission, the Town of Falmouth/Falmouth Conservation Commission, the Falmouth Rod and Gun Club Inc., the Orenda Wildlife Land Trust, and the Mashpee Wampanoag Indian Tribal Council for matters pertaining to the Mashpee National Wildlife Refuge in Mashpee and Falmouth. Although the responsibilities of the parties involved in the Mashpee NWR management partnership are different, there are complimentary functions and areas of common interest that permit and benefit from cooperation, coordination, and joint endeavors.

***Letter of Agreement between the Massachusetts Department of Fisheries and Wildlife (DFW) and the Massachusetts Department of Environmental Management (DEM) to add the Quashnet Woods Property to the Boundary of the Waquoit Bay NERR (Appendix O)***

There is a parcel of land within the bounds of the Mashpee National Wildlife Refuge known as the Quashnet Woods Property. The land is jointly owned and managed by two state agencies: DFW and DEM. DFW has primary responsibility for the DFW-owned river banks. DEM's Waquoit Bay NERR has primary responsibility for the rest of the property. Through this agreement, the entire Quashnet Woods Property is added to the boundary of DEM's Waquoit Bay NERR. Under this agreement the property will continue to be managed in the

same manner subject to the provision that all activities must be in accordance with the Federal National Estuarine Research Reserve regulations.

***Memorandum of Agreement between Massachusetts Department of Conservation and Recreation Waquoit Bay National Estuarine Research Reserve and Town of Mashpee Regarding South Cape Beach Salt Marsh Restoration Project (Appendix P)***

This agreement sets the parameters for the South Cape Beach Salt Marsh Restoration Project. WBNERR agrees to continue its efforts to lead the team of partners to implement the project. The Town of Mashpee authorizes the WBNERR-led project team to implement this project, including replacement of the culvert under South Cape Beach road and deepening of the salt marsh channel, on property owned by the Town.

***MOU between WBNERR and Citizens for the Protection of Waquoit Bay (Appendix Q)***

The Reserve has established a Memorandum of Understanding with the Citizens for the Protection of Waquoit Bay (CPWB) for this group to function as a “friends group” for the Reserve. CPWB sponsors some programs, including the Summer Science Camp and Evenings on the Bluff, and raises money for others. The original agreement was signed in 1991 and calls for renewal every three years. It was renewed in 1994, 1998, 2001, and 2004.

***Agreement of Cooperation and Exchange between the Massachusetts Department of Environmental Management (Waquoit Bay National Estuarine Research Reserve) and the University Of Massachusetts, Boston (Department of Environmental, Coastal and Ocean Sciences, and Urban Harbors Institute) (Appendix R)***

By the terms of this agreement the Massachusetts Department of Environmental Management (DEM) and the University of Massachusetts, Boston (UMB) hereby agree to establish a framework for the development of cooperative initiatives based on the principle of equality and mutual benefit that will include staff/faculty and student exchanges, collaborative research activities, joint curriculum and course development, administration of funds, and special programs to address the research, education, and outreach needs of the National Estuarine Research Reserve System (NERRS) and the University of Massachusetts, Boston.

***Interdepartmental Service Agreement between Executive Office of Environmental Affairs (DCR) and the University of Massachusetts, Boston (Appendix S)***

Through the terms of this Interdepartmental Service Agreement, UMass Boston agrees to carry out basic nutrient analysis on approximately 20 water samples

collected every month (about 250 per year) at the Reserve. The water samples are mandated under the NERR System-wide Monitoring Program (SWMP). The SWMP-approved protocols require that these water samples be analyzed for ammonium, nitrate, nitrite and ortho-phosphate. The Reserve may request analysis of the following parameters, as well: total dissolved nitrogen, particulate nitrogen, and silica. This agreement is being renewed for a three-year period beginning July 1, 2005.

***Agreement between Framingham State College, Division of Graduate and Continuing Education (DGCE), and Waquoit Bay National Estuarine Research Reserve (Appendix T)***

This is an agreement between Framingham State College Division of Graduate and Continuing Education and Waquoit Bay National Estuarine Research Reserve to provide graduate credit for professional development courses offered by Waquoit Bay National Estuarine Research Reserve instructional staff.

## **Advisory Groups**

Several advisory and administrative oversight groups provide input on matters of policy and operations.

### ***Waquoit Bay NERR Advisory Committee***

In the past, WBNERR worked with an Advisory Committee. The original committee was composed of individuals with an interest in the preservation of Waquoit Bay and its watershed. The committee was especially useful during the Reserve's initial, formative years. Over time, the needs of the Reserve changed to reflect its maturation. During this same period, the committee became less involved with Reserve activities. After a three-year period during which the Advisory Committee did not meet, the Reserve manager initiated a process to re-establish an Advisory Committee with a broader composition of members and new objectives. The Reserve Manager has submitted a list of nominees to the Commissioner for approval.

### ***Waquoit Bay NERR Administrative Committee***

The Commissioner of the then Department of Environmental Management established the Committee in 1995 in recognition of the fact that the role and interests of the Waquoit Bay NERR extend beyond traditional forests and parks activities. The Committee's role is to improve communications and coordination among those involved in the operation of the Reserve and its wide-ranging programs and to expedite financial and administrative matters. The group includes managers from numerous divisions within DCR including parks and resource protection and, on an as-needed basis, administrators and staff from management information services, Federal grant administration, human resources, and

engineering. Representatives from the Office of Coastal Zone Management, the Division of Marine Fisheries, and other agencies of the Executive Office of Environmental Affairs are also invited to discuss specific issues.

### ***South Cape Beach Advisory Committee***

The South Cape Beach Advisory Committee was established as part of the MOU between the Town of Mashpee and the Commonwealth (Appendix M) that established South Cape Beach State Park. Article 18 of the agreement establishes the South Cape Beach Advisory Committee with the following membership:

- 8 residents or representatives of the Town of Mashpee,
- 1 resident or representative of the Town of Sandwich,
- 1 resident or representative of the Town of Falmouth,
- 1 resident or representative of the Town of Barnstable,
- 1 non-voting representative of the Massachusetts Office of Coastal Zone Management,
- 1 non-voting representative of the Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement,
- The sitting State Representative for the Mashpee area as a non-voting member, and
- The sitting State Senator for the Mashpee area as a non-voting member.

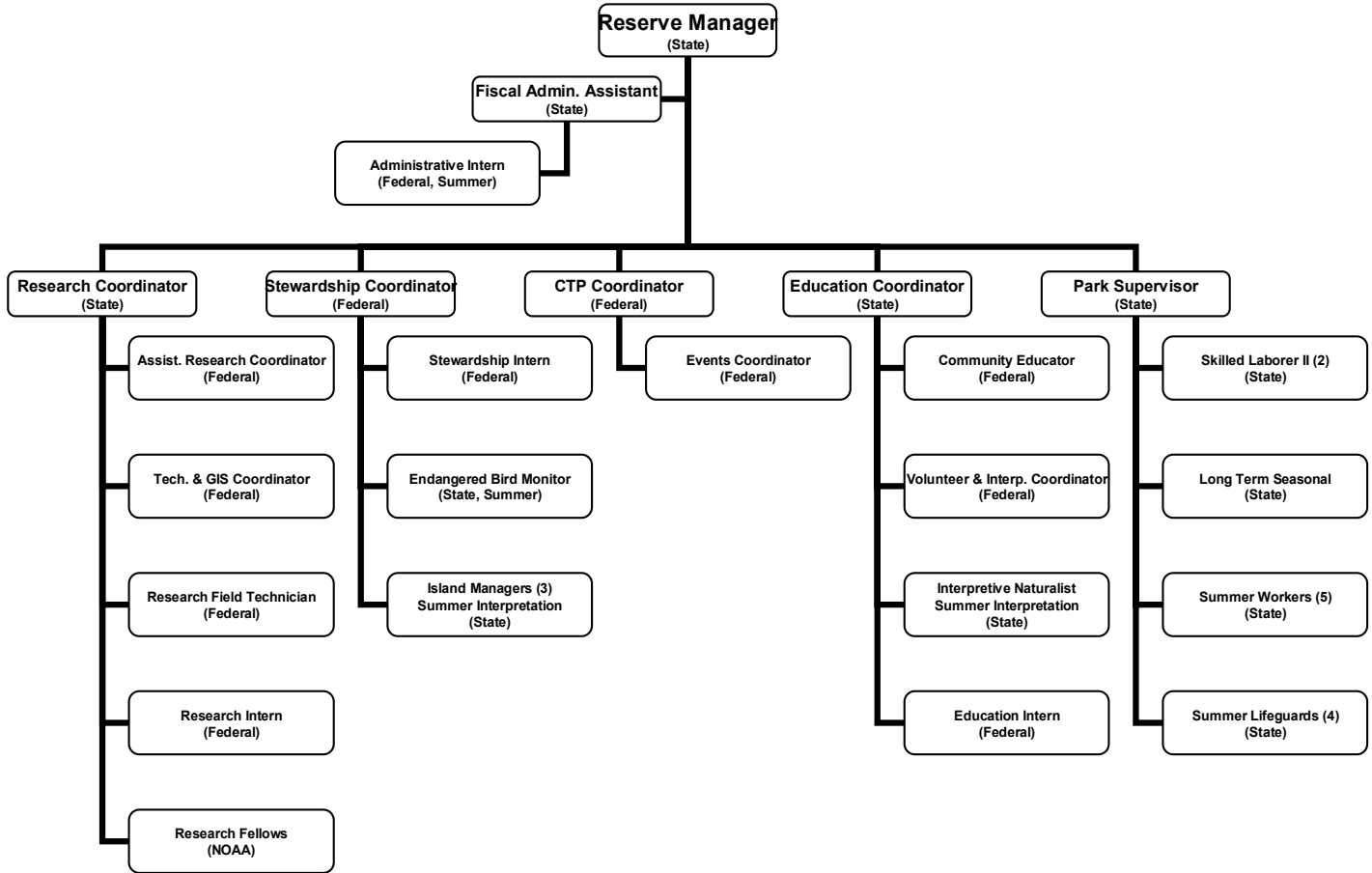
The South Cape Beach Advisory Committee is responsible for making recommendations to the DCR on park management and operations, rules and regulations, and design and plan review. The committee held a seat on the Reserve Advisory Committee as it was previously structured and will retain a seat if the Reserve Advisory Committee is reconstituted

## **Staffing**

### **Reserve Staff Roles and Responsibilities**

At WBNERR, in 2005, there are thirteen full-time, year-round staff positions and two job-sharing positions that are the equivalent of one full-time position. There are six additional categories of seasonal staff. The number and type of seasonal staff changes annually depending on available state funding and priorities. Refer to Figure 18: WBNERR Organizational Chart. The chart indicates which positions are Federally funded and which are state funded. Two science school directors are also part of the WBNERR team during the summer months. Since they are hired and paid by the Citizens for the Protection of Waquoit Bay, however, they are not considered WBNERR employees. Their salary is paid with funds collected through tuition fees.

**Figure 18: Waquoit Bay NERR Organizational Chart with Position Funding Source**  
(November 2005).



***Year-Round Reserve Staff Job Descriptions***

Reserve Manager

The Reserve Manager is the principal administrator of the Reserve and is responsible for ensuring that the policies in the Reserve management plan are followed and that Reserve programs successfully meet the mandates of the national and state programs responsible for the Reserve. The Reserve Manager has overall responsibility for all activities, lands, and facilities within the Reserve boundaries—including those at South Cape Beach Recreational Area and Washburn Island. The Reserve Manager has ultimate responsibility for the research, education and stewardship programs and is also the principal point of contact at the Reserve for DCR, NERRS and outside agencies.

### Research Coordinator

The Research Coordinator is responsible for coordinating all Reserve research and monitoring efforts. This includes coordinating the use of Reserve resources and facilities by visiting researchers; developing funding sources for research; developing, implementing, and evaluating in-house research and monitoring efforts; supervising those working on in-house research and monitoring projects; and representing the Reserve on matters related to research and monitoring. The Research Coordinator also represents the research interests of the Reserve to the NERRS and implements NERRS research program objectives at the Waquoit Bay Reserve.

### Assistant Research Coordinator

The Assistant Research Coordinator assists the Reserve's Research Coordinator by coordinating the technical aspects of the Reserve's System-Wide Monitoring Program (SWMP) and other ecological monitoring programs, including citizen volunteer programs. Responsibilities include carrying out all water quality, meteorological, and biological monitoring components of SWMP; maintaining all SWMP-related field and laboratory equipment; and performing laboratory analysis for SWMP. The Assistant Research Coordinator also supports research-related activities by providing field and laboratory support and maintaining research-related facilities and equipment. This position also provides technical support for, and participates in, educational activities related to Reserve research and monitoring.

### Research Technician

The Research Technician works with the Research Coordinator to implement the Reserve's research and monitoring programs.

### Coastal Training Program Coordinator

The Coastal Training Program (CTP) Coordinator directs, provides, and organizes training and other educational opportunities concerning coastal management issues and estuarine research for resource managers, local and state government officials, environmental planning organizations and other coastal decision-makers throughout coastal Massachusetts, and communicates coastal management research needs to members of the scientific community. In this role, the CTP Coordinator prepares and updates training strategy and program implementation documents; conducts and/or supervises needs assessments of regional coastal decision-makers to determine their scientific information and training needs; works to identify upcoming coastal and estuarine science and management issues that may yield opportunities for coastal decision-maker training; represents the Reserve regarding CTP issues in interactions with the NERRS system, including all other CTP programs, and NOAA's Estuarine Reserves Division (ERD); develops partnerships and coordinates with other training providers and users; and collaborates with the Reserve's education, research and stewardship staff to develop and evaluate the means to transfer scientific information to the resource management, scientific and governmental communities.



### Education Coordinator

The Education Coordinator is the principal link between the research efforts of the Reserve and the general public and develops and carries out various types of programs for schools, volunteer groups, and the public-at-large. Particularly important is the development and implementation of Teacher Training Programs and Community Education Programs. The Education Coordinator is responsible for supervision of the Community Educator and Interpretive Services staff. The Education Coordinator also provides coastal expertise and represents the interpretive and educational interests of the Reserve to the DCR Bureau of Ranger Services. Furthermore, the incumbent represents the education program interests of the Reserve to the NERRS and implements NERRS education program objectives at the Waquoit Bay Reserve.

### Community Educator

The Community Educator works in the schools and with others to train teachers how to reach curriculum objectives through lessons in coastal ecology and management. The Community Educator also works with school children and youth groups. Specifically, the Community Educator

- Conducts teacher training sessions on topics in coastal ecology and climate science;
- Recruits, trains, and supervises teachers and volunteers for education programs;
- Develops teaching materials based on research and monitoring from Waquoit Bay Reserve, the Reserve system, and other relevant research;
- Provides information, consulting services, and teaching materials about coastal ecology to teachers, researchers, and students;
- Serves on committees to carry out the mission of Waquoit Bay Reserve; and
- Provides field-based educational experiences for students, such as pond monitoring and beach profiling.

### Stewardship Coordinator

The Stewardship Coordinator is responsible for leading long-term protection and management of the Reserve's natural resources. This includes natural resource inventory and management, habitat/ecosystem restoration, regional environmental planning, development and policy review and coordination with stewardship activities in the NOAA national reserve system. Stewardship activities involve aspects of research, monitoring, education, policy and traditional forest and parks management, thus, the Stewardship Coordinator works as part of a team with the Reserve's Manager, Research Coordinator, CTP Coordinator, Education Coordinator, Forest and Parks Supervisor and other agency resource management staff. Since the long-term health of the Reserve's resources are dependent on land use in the entire watershed, and since the Reserve has regulatory jurisdiction only on DCR owned land and not on the open water within the Reserve, the person in this position must work closely with local, state and Federal officials, as well as

with local land owners, to manage natural resources affected by activities outside of DCR lands.

#### Fiscal Administrative Assistant

The Fiscal Administrative Assistant is responsible for processing all financial materials, all grants and contracts (personnel and otherwise), all purchases and contributions for the state and Federal program partners. This staff person functions as office manager. The Administrative Assistant also schedules facilities and provides administrative support to all Reserve programs and the numerous projects within each program area.

#### Events Coordinator

The Events Coordinator is a part-time position that assists the CTP, Education, Stewardship and Research departments in the coordination of workshops, volunteer training, adult education opportunities, and other events. This position is responsible for program logistics, marketing and outreach, registration, and follow-up. This position also serves as a liaison with the Reserve's Friends Group: Citizens for the Protection of Waquoit Bay. The Events Coordinator and the Volunteer and Interpretive Coordinator positions are job sharing positions. As such, both positions are eligible for benefits.

#### Volunteer and Interpretive Coordinator

The Volunteer and Interpretive Coordinator is also a part-time position and is responsible for overseeing volunteer activities at the Reserve, including recruitment, training and supervision of Visitor Center Greeters. This position, in consultation with the Education Coordinator, oversees the interpretive program at the Reserve. This position also supports the Fiscal Administrative Assistant when needed.

#### Technology Coordinator

The Technology Coordinator provides Geographic Information System (GIS) coordination, web page management, library database management, and technical assistance for the Waquoit Bay Research Reserve. This position is responsible for maintenance of the Geographic Information System database for the Research, Education, Stewardship and Management programs. GIS projects include, but are not limited to, habitat mapping, endangered species monitoring, land acquisition strategies, and shoreline change. This position is responsible for the design and maintenance of two web pages for the Reserve: the primary Reserve web page ([www.waquoitbayreserve.org](http://www.waquoitbayreserve.org)) and the Coastal Training Program web page ([www.coastaltraining.org](http://www.coastaltraining.org)). This position also creates, implements, and manages an image library database and works with the Reserve's Technology Committee to formulate short and long-term technology plans including technology purchases. Additionally, this position is responsible for all equipment with a computer chip.

### Forests and Parks Supervisor

The Forests and Parks Supervisor has day-to-day responsibilities for the Reserve's facilities, lands, and equipment. The Supervisor also oversees the operation of South Cape Beach State Park and supervises summer workers. The Park Supervisor works with the Stewardship Coordinator and Reserve staff to apply research information to management of Reserve property. The Forests and Parks Supervisor is also responsible for enforcing DCR policies on WBNERR property.

### Skilled Laborer

The Skilled Laborer assists the Park Supervisor in the completion of assigned tasks related to facilities, lands, equipment, and operations of the Reserve.

### Facilities Repair

Working with the Forests and Parks Supervisor and the Skilled Laborer, the Facilities Repair person maintains the buildings, land and equipment and is able to perform basic plumbing and carpentry.

## ***Seasonal Staff Job Descriptions***

### Endangered Species Monitor

The Endangered Species Monitor coordinates the endangered species program, including oversight of the volunteer Piping Plover Patrol. The Endangered Species Monitor also offers regularly scheduled interpretive programs at South Cape Beach.

### Interpretive Naturalist

The Interpretive Naturalist offers regularly scheduled interpretive programs at Reserve Headquarters, South Cape Beach State Park, the Quashnet Woods Property, and off-site. The Interpretive naturalist also offers special programs to visiting groups, as well as at off-site locations.

### Island Managers

Island Managers are responsible for managing camping on Washburn Island, including checking camping permits, patrolling the Island, and providing regularly scheduled interpretive tours.

### Long-Term Seasonal Staff

This position assists the Forests and Parks Supervisor in maintaining buildings and grounds at the Reserve.

### Summer Workers

The Summer Workers assist the Forest and Parks Supervisor in maintaining facilities and managing visitor usage of Reserve lands, including South Cape Beach State Park.

### Life Guards

Life guards stationed at South Cape Beach are responsible for swimmer safety. One life guard is designated as a Head Life Guard and given supervisory authority over Life Guards and Summer Workers at South Cape Beach. The Head Life Guard is responsible for daily training and position rotation. The Head Life Guard also coordinates with Town of Mashpee life guards at the Town beach within South Cape Beach State Park. There have been no life guards assigned to South Cape Beach for the past three years.

## **Staff Training and Emergency Response**

### **Objective 5.6 WBNERR staff will augment their expertise with appropriate training.**

- a. WBNERR management will facilitate and support staff training opportunities when possible and appropriate.

WBNERR staff are encouraged to pursue training that will assist them to better perform their jobs. Training may take the form of conferences, workshops, courses related to their job functions, and lectures. WBNERR also provides training to seasonal staff that covers the following topics:

- Interpretive techniques
- First aid/safety
- Wampanoag history and culture
- Coastal plants
- Salt marsh and estuarine ecology
- Groundwater and watersheds
- Cape Cod coastal geology
- Solutions to coastal environmental problems
- Publicity

### **Objective 5.7: WBNERR staff is prepared to respond appropriately to a variety of emergency situations.**

*WBNERR staff will:*

- a. Review existing emergency response procedures annually and update as necessary.
- b. Develop Emergency Response Plans for incidents that occur on parcels for which a plan does not already exist.
- c. Be trained in emergency response procedures.
- d. Place copies of Emergency Response Plans in key locations.
- e. Continue to include emergency planning in seasonal training.

Because of the wide range of activities undertaken by Reserve staff members, visiting researchers, educators, users of recreational facilities, and others on Reserve property or under its auspices, there is a strong need to develop and implement emergency response procedures. WBNERR has written emergency response protocols for lab accidents and incidents on Washburn Island. There are also standard operating procedures for emergency incidents that occur on any DCR property. These plans will be reviewed annually to ensure their continued relevance and accuracy (*e.g.*, phone numbers will be confirmed).

There is a need to develop an Emergency Response Plan specifically for incidents that occur on lands that are separate from the Headquarters Site, *e.g.*, Quashnet Woods. The Stewardship Coordinator is working with the MNWR conservation partnership and the towns of Falmouth and Mashpee to develop such a plan.

A portion of the seasonal staff's formal training at the start of each season is dedicated to emergency response procedures. New research staffers are introduced to safety protocols and equipment in the lab. Emergency response procedures will be reviewed with all existing staff members. New employees will be given copies of the protocols as part of their orientation. Additionally, copies of all emergency response plans will be inserted in brightly-colored binders and placed in key locations: administrative office, lab, maintenance shop, and boat house.

## Volunteers

**Objective 5.8: Volunteers will support implementation of Reserve programs.**

*WBNERR staff will:*

- a. Enhance volunteer retention and recruitment strategy.
- b. Expand ongoing training and educational opportunities and increase the focus on stewardship.
- c. Enhance volunteer recognition.
- d. Encourage cross participation of volunteers with Citizens for the Protection of Waquoit Bay (*i.e.*, the Reserve's Friends Group).
- e. Encourage a subset of volunteers to assume leadership roles in coordinating and taking ownership of projects.

Volunteers support many Reserve programs. They participate in water quality and shorebird monitoring programs and act as trail stewards and visitor greeters. Volunteers also help organize events, provide administrative support, and assist with maintenance activities. Because of the critical importance of volunteers to the successful implementation of Reserve programs, WBNERR is dedicated to attracting new, and retaining existing, volunteers. The Reserve actively recruits volunteers in the spring through press releases, articles in local publications, recruiting events, open houses and community education events.

WBNERR provides numerous training opportunities to ensure, to the greatest extent possible, that volunteers fully and accurately represent the Reserve to the public. Volunteers are, after all, the "face" of the Reserve to many visitors. Volunteers are also likely to share their enthusiasm for the Reserve (or lack thereof) with their friends and family. They have the potential, therefore, to play another important role for the Reserve: that of a stewardship "advocate." With this in mind, a wide variety of training opportunities are available to volunteers. Training activities include informational sessions with staff, courses on some of the Reserve's priority issues, and workshops outlining WBNERR's research, educational programs, and stewardship activities.

The Reserve expresses its appreciation to volunteers through several events each year. The annual potluck dinner affords volunteers the opportunity to meet like-minded individuals within the community. There is also an annual recognition event or field trip where staff and volunteers gather to celebrate the commitment and dedication of the volunteers. The "Volunteer of the Year" award is presented during this educational and festive event.

Citizens for the Protection of Waquoit Bay (CPWB) is another volunteer group that supports the Reserve and its programs. Reserve volunteers are encouraged to join this "friends group" and to regularly participate in events organized by CPWB, including clean-up efforts and fund-raising.

To further enhance the support volunteers provide to the Reserve, staff will identify individuals to assume leadership roles. For instance, a volunteer leader may be assigned to organize the other CoastWatchers, thus relieving the Research Coordinator of this responsibility. Individuals who are inclined to accept this sort of responsibility will derive satisfaction from the knowledge that their time and effort is supporting the Reserve's mission in a substantial and meaningful way.

## Facilities, Grounds and Equipment

**Objective 5.9: Reserve structures and equipment will be maintained in a safe, clean manner that is mindful of the environmental and cultural values of the site.**

*WBNERR staff will:*

- a. Ensure, to the greatest extent possible, that all buildings, vehicles, vessels, and other equipment are safe for their designated uses.
- b. Ensure that WBNERR facilities are cleaned to publicly acceptable standards.
- c. Use environmentally-sensitive products and practices to the greatest extent possible/practical.
- d. Design improvements or modifications to the Sargent Estate, including its buildings and grounds, in accordance with the *Secretary of the Interior's Standards and Guidelines for Historic Preservation Projects*.

The Reserve's Forest and Park Supervisor oversees the regular maintenance of all buildings, vehicles, vessels, and other non-research equipment. Through regular

maintenance, these assets are kept in good working order. Additionally, all facilities are kept clean. The care with which the Reserve maintains its assets prolongs the useful life of the structures and equipment. It also helps to convey to visitors that they have entered a special place: one that is valued and cared for. Toward this end, all maintenance activities are carried out in a professional manner.

The Reserve demonstrates environmentally-sustainable operations through its selection of products and adoption of best management practices. For instance, the Reserve has replaced many incandescent light bulbs with compact fluorescent bulbs and installed exterior solar-powered lighting at the Headquarters Site. Additionally, Energy Star-rated equipment is used when possible, as are environmentally-sensitive cleaning products, paints and other compounds. Staff also regulate their own behavior as part of the Reserve's effort to model good environmental stewardship. For example, the heat is turned down when buildings are not in use. Lights and computers are, likewise, turned off when not in use. Additional measures include reusing scrap paper, composting food scraps, and combining vehicle trips. The Reserve will continue—and, where possible, will expand—these measures into the future.

Because the Reserve's headquarters are within the Waquoit National Historic District, any modifications to the buildings or grounds will be conducted in accordance with accepted standards for historic preservation.

**Objective 5.10: Reserve lands will be managed to balance resource protection and recreational uses.**

*WBNERR staff will:*

- a. Continue to actively apply new information and the latest research findings to land management practices.
- b. Ensure that trails, roads, boardwalks, symbolic fencing and campsites are well marked and maintained.
- c. Design trails so as to minimize user impacts.
- d. Continue to protect cultural resources.

WBNERR staff must routinely balance the need for resource protection with the public's recreational use of Reserve property. The Stewardship Coordinator and Forests and Parks Supervisor work closely together to define and implement the most appropriate land management practices. For instance, mowing of and access to certain lawn areas at the Headquarters Site is restricted in order to allow an endangered plant species to flourish. Quite nearby, however, the public is invited to attend events, hike, and picnic.

To clearly identify areas where the public are and are not allowed, WBNERR staff will ensure that trails, roads, boardwalks, symbolic fencing and campsites are well marked and maintained.

New hiking trails are developed periodically. Staff are mindful of potential user impacts and design trails to minimize impacts to the greatest extent possible.

The cultural resources of WBNERR, including archaeological remains and significant historic buildings, are finite resources. They represent unique events in time and space that are part of our communal heritage. Typically, prehistoric sites resulted from short term, sporadic occupation. There is seldom much material left behind, and under the best of circumstances they are difficult to excavate and interpret properly. They are extremely fragile and easily damaged. Archaeological sites cannot be repaired or fixed; their loss is analogous to the extinction of a plant or animal—once they are gone, they are gone forever. In order to protect these resources, Reserve staff consider and minimize the potential effects of projects—both capital and everyday operations—on historic and archaeological resources. They report discoveries of artifacts, soil anomalies, and looting and observed soil erosion at known sites to DCR's Office of Cultural Resources. They also keep information about the specific locations of prehistoric sites strictly confidential.

## Construction Plan

**Objective 5.11: The Reserve will explore the feasibility of new construction to support research, education, and maintenance programs.**

*WBNERR staff will:*

- a. Pursue the feasibility of constructing a new "green" conference center for education and training programs and to serve as a model of sustainable building practices.
- b. Explore the possibility of constructing or acquiring dock and pier facilities for boat and research use. (same as 1.6.c)
- c. Explore the feasibility of building a new garage to include a large, heated maintenance shop for boats.

Per the 312 Report (Appendix K), WBNERR has analyzed future facility needs. Based on this analysis, WBNERR will pursue three major construction projects over the term of this management plan: a conference center, a dock, and a maintenance shop. Phase I of each project will be a feasibility study complete with designs, permit identification, and cost estimates for construction. Phase II of each project will be to secure funding and Phase III will be construction. The need for both the conference center and dock is documented in the 312 Evaluation.

If funding is secured, the conference center, designed as a "green building," will be used to augment the Reserve's existing facilities. Currently WBNERR has two meeting spaces: the Boat House and the Main House. Both have limited capacity. Twenty-five people can be accommodated sitting around tables and a maximum of sixty people can be accommodated with stadium-style seating. There are several times a year when WBNERR events draw more than 60 people, however. It is anticipated that, with the success of the Massachusetts Coastal Training Program, the Reserve will increasingly be unable to accommodate everybody that wants to attend its training programs. WBNERR's



solution is to add a conference center that will include meeting space for at least 125 people, a kitchen, storage, plus some additional office space. Most importantly, it will be constructed according to "green building" principles. That is, it will incorporate environmentally-sustainable features such as bamboo flooring, solar heating, and energy efficient appliances. The building will also feature educational plaques throughout, in order to help visitors to the conference center learn about the green design elements.

A fixed or floating dock in front of the Boat House would serve as an access way to vessels and as a research platform. Currently, both in-house and visiting researchers have to maneuver a dinghy from the beach into the water, row out to their moored boats, attach the dinghy to the boat, and bring the boat and dinghy to the shore to pull the dinghy on the beach again. These steps are necessary before the researchers can start loading their equipment into the boats. A dock would be a much more efficient way to access the boats and load equipment so that researchers can get to their research sites more quickly. The dock could also serve as a research platform from which scientific instruments are suspended or are otherwise attached.

Gaining regulatory approval for such a dock may be difficult. As noted in Chapter 4, new private docks and piers are prohibited within an ACEC without an approved resource management plan (there is no such plan for the Waquoit Bay ACEC). The towns of Falmouth and Mashpee must take the lead in developing an ACEC resource management plan. If the towns decide to develop a plan, WBNERR staff will work with the towns to create a plan that is protective of the area's critical resources and which also allows for a research dock.

Because the categorical restriction on new docks does not apply to public water-dependent structures, another option is to seek approval for a public dock. Realistically, however, public access is in conflict with protecting the integrity of ongoing research and would create problems related to parking and the provision of landside access (the only access to the waterfront area is down a steep and narrow staircase from the boat house). Other options include seeking a variance from the Massachusetts Department of Environmental Protection (the permitting agency) or obtaining a Section 10A permit for a floating dock.

The third construction project that WBNERR will pursue is an expanded maintenance shop that can accommodate the Reserve's larger vessels. Currently, there is no indoor space in which to scrape and paint hulls or maintain outboard motors (Reserve staff maintains four boats). Also, trucks are kept outside year-round making winter maintenance and the attachment and removal of plows difficult.

## Technology

### **Objective 5.12: Reserve programs are fully supported with state-of-the-art technology.**

*WBNERR staff will:*

- a. Continue to keep up-to-date on the latest technologies necessary for all departments.
- b. Continue to set aside a portion of the budget to meet the growing technology needs of staff for items such as computers, software, other equipment (*e.g.*, digital camera), and training.
- c. Work with the DCR Information Technology department to continue modifying acquisition strategies to streamline technology purchases and support existing networks, wireless technology, and SWMP.
- d. Provide the training necessary for utilizing these technologies.

Technology supports and, in many cases, enables the work of all Reserve staff. For example, all staff have access to networked computers for production and electronic communications. The System-wide Monitoring Program relies upon wireless transfer of data. In order to continue to fully support the Reserve's departments, the Technology Coordinator will continue to stay informed about the latest technologies appropriate for each department. Furthermore, if possible, WBNERR will budget the funds necessary to obtain new technologies and will work with the DCR Information Technology department to continue modifying acquisition strategies to streamline technology purchases (refer to Objective 5.2.c) and support WBNERR programs, including wireless network and SWMP. Once new technologies are obtained, WBNERR staff will provide training (or will arrange for training by a third party) to insure that the new equipment is used appropriately and to its full capacity.

### **Objective 5.13: All Reserve programs benefit from the Reserve's Geographic Information Systems (GIS), as do selected community partnerships.**

*GIS staff will:*

- a. Accurately maintain GIS data produced by the Reserve.
- b. Support Reserve programs directly or by coordinating outside expertise.
- c. Support GIS partnerships by coordinating periodic Upper Cape GIS meetings.
- d. Provide GIS support to local organizations that complement the Reserve's mission, when possible and appropriate.
- e. Submit data to MassGIS or DCR/GIS for availability to ACEC resource management and project review.

The Technology Coordinator is responsible for accurately maintaining GIS data produced by the Reserve. Data is in a variety of formats and is documented according to Federal Content Standards for Digital Geospatial Metadata. The data—collected through geographic positioning systems (GPS), remote sensing and collaboration—is used in-

house and by local towns and State agencies. In addition to maintaining data, the Technology Coordinator assists staff from all departments to use the data by producing maps that are used for planning purposes, in education programs, and in publications. When necessary, the Technology Coordinator will draw upon the expertise of outside GIS specialists in support of Reserve activities. Reserve staff also support local GIS users by coordinating periodic Upper Cape GIS meetings that promote discussion, data exchange, and problem solving between town governments and other organizations, such as USGS. The Technology Coordinator also provides GIS support to local organizations that complement the Reserve's mission. For example, the Technology Coordinator produced maps in support of the Falmouth Coastal Resources Working Group, a body formed by Town Selectmen in response to growing concern about beach erosion and shoreline maintenance costs.

**Objective 5.14: The Reserve's communications strategy will be supported by an enhanced database.**

*WBNERR staff will:*

- a. Maintain and improve a database that allows staff to contact appropriate people and to accurately track individual involvement with the Reserve.
- b. Update existing mailing lists, including town officials and board members, on an ongoing basis.

The Reserve has an existing database that is used to track volunteers, to identify CTP and educational program participants, and to generate mailing lists. The database can be made more useful to the CTP by coding each entry when invitations or materials are mailed from WBNERR and when individuals participate in a WBNERR training event or workshop. Over time, this sort of tracking will produce an individual profile that highlights which of the Reserve's offerings are most attractive to people in certain positions. This information will help CTP to plan for future events. For example, the CTP will be able to design workshops for selected audiences with a common set of past training experiences. Contact information in the database is updated on an ongoing basis.

## Communications Plan

**Objective 5.15: Individuals, organizations and communities in coastal Massachusetts recognize WBNERR as a center of excellence for research, training, education, and stewardship.**

*WBNERR staff will:*

- a. Continue to produce and distribute publications including the newsletter, *Science to Management Bulletins*, and brochures.
- b. Ensure that all publications are professionally produced with a consistent look and feel.
- c. Continue to write articles for magazines and e-newsletters.
- d. Continue to make presentations to organizations and at workshops and conferences regarding Reserve programs.
- e. Further promote the availability of Reserve staff to speak to civic groups and other organizations.
- f. Enhance relationships with local media outlets: newspapers, radio and television.

WBNERR's communication plan supports and advances work in all program areas. Through effective communications, WBNERR enhances the visibility and reputation of its core programs, attracts participants to Reserve events, and provides information about specific services available to key audiences. Communication efforts help define the relevance of WBNERR for scientists, coastal decision-makers, educators, the general public, and DCR. All communication pieces—newsletters, press releases, presentations, etc.—emphasize the Reserve's leadership role in addressing current estuarine and coastal management issues through science and monitoring, training and education, and stewardship.

A significant component of the Reserve's communication plan relies upon the written word in the form of publications, such as the newsletter, *Science to Policy Bulletins*, submissions to magazines and newsletters, and brochures. The newsletter is printed three times a year and is directed toward a general audience. It features articles describing the Reserve's activities and the relationship of these activities to coastal management issues. WBNERR events, programs and training opportunities are also announced in the newsletter. Each *Science to Policy Bulletin* explores a current subject of concern in depth. The *Bulletin* is written in an accessible style and is intended for coastal management professionals, as well as interested lay people. News about Reserve activities is further spread through staff contributions to a variety of magazines and e-newsletters that reach audiences ranging from local church groups to coastal managers nationally.

Coastal decision-makers, researchers, and teachers must be aware of the Reserve's services and programs in order to take advantage of them. Toward this end, WBNERR has a brochure that summarizes the Reserve's activities and facilities and includes a map depicting the Reserve's land holdings and hiking trails. The Reserve also has an information packet that describes the Coastal Training Program. It contains a brochure and other materials that summarize how the CTP provides up-to-date scientific

information and skill building opportunities to coastal decision-makers. The Reserve will continue to produce and distribute these materials and will strive to deliver the CTP brochure to all new town officials and board members on Cape Cod with coastal management responsibilities (refer to Objective 5.16.b).

WBNERR will develop new materials targeting other key audiences. For instance, in order to attract more scientists to the Reserve (refer to Objective 1.2.c) a brochure will be developed that highlights current research needs and the types of support available through the Reserve.

A brochure directed toward educators will also be developed. The Education brochure will describe programs and resources available to teachers and students. Furthermore, since Massachusetts teachers are expected to cover State-defined "frameworks" (*e.g.*, the biological framework) in their teaching, the brochure will highlight connections between WBNERR's offerings and the State frameworks. The brochure will be distributed to science department heads at all Cape schools, to all teachers in the Reserve's database and to other key educators and administrators.

To help support WBNERR's image as a credible source of information on a variety of coastal management issues, Reserve staff will develop all publications with a consistent look and tone. Whenever possible, publications will be professionally produced.

WBNERR conveys its messages through direct interaction with people as well. WBNERR staff make presentations on a regular basis to professional and lay audiences. For example, the Reserve Manager recently addressed the Martha's Vineyard Water Alliance about the Reserve's activities vis a vis nitrogen loading. Non-professional audiences are also very important to the realization of the Reserve's goal of promoting environmental literacy. Toward this end, Reserve staff are available to speak to civic groups and other parties about WBNERR's priority issues. Information about the availability of Reserve staff for speaking engagements is generally spread through informal, word-of-mouth mechanisms.

WBNERR presently enjoys good coverage in the local press as a result of media releases issued by the Reserve and general media coverage. To garner further or more in-depth coverage of WBNERR activities and events, the Reserve will host an annual press day to introduce reporters to the Reserve's current research, discuss coastal management implications and solutions, highlight stewardship activities, and identify resources available through the Reserve. A press day will also serve to increase awareness of the Reserve's priority issues: water quality/eutrophication, climate change/renewable energy, and coastal ecosystem management.

**Objective 5.16: Appropriate professional audiences will attend WBNERR training and education events.**

*WBNERR staff will:*

- a. Identify appropriate audiences for each event.
- b. Improve their understanding of town structures on Cape Cod and the Islands with respect to coastal management responsibilities.
- c. Develop a strategy to attract more teachers to WBNERR programs.
- d. Contact superintendents and/or science coordinators and engage them in discussions about in-service program opportunities.
- e. Partner with organizations representing target audiences as a way to increase attendance.

WBNERR staff gives careful attention to the identification of appropriate audiences when they are planning training and education events, particularly when a new subject is the focus of the event (*e.g.*, the health implications of climate change). Information about who should be invited to events is gathered through networking and by contacting professional organizations. Announcements are then targeted toward appropriate professional audiences. For instance, educators receive mailings about teacher training opportunities and home builders are invited to energy efficiency workshops. Contact information for a variety of audiences is maintained within the Reserve's database (refer to Objective 5.14). This information is used to target direct mailings and is updated on an ongoing basis.

Reaching out to members of volunteer boards and commissions, such as local conservation commissions, is a more challenging issue. Membership changes regularly, members typically have other jobs and responsibilities during the day, and the most direct communication channels are not always apparent. Despite the inherent difficulty in reaching this audience, it is imperative that the Coastal Training Program do so. Conservation commissions, waterways committees, and other similar entities are charged with making decisions that, directly or indirectly, impact the health of the Commonwealth's coasts. Furthermore, members of volunteer boards are not necessarily environmentally-literate. The number and variety of boards is likely to be different from town to town and, also, the responsibilities of particular departments (*e.g.*, Health) are likely to vary, as well. WBNERR will, therefore, identify relevant town departments, commissions and committees on Cape Cod, their responsibilities, and their membership. A mailing list of town officials and board members is incorporated within the Reserve's database and will be updated regularly so that CTP events can be strategically promoted.

Teachers are another key audience with whom the Reserve wants to enhance relations. The Reserve offers many well-attended teacher training programs throughout the year. To further increase participation, WBNERR staff will identify barriers to teacher participation in Reserve programs and develop strategies to overcome them. Staff will also contact superintendents and/or science coordinators and engage them in discussions about in-service program opportunities.

To further increase participation in WBNERR events, Reserve staff will continue partnerships with organizations representing target audiences, *e.g.*, Cape and Islands Board of Realtors, and will strive to form new relationships.

**Objective 5.17: Local lay audiences are aware of and participate in WBNERR events.**

*WBNERR staff will:*

- a. Continue to promote upcoming events, workshops and training through the Reserve's own publications, news releases, and other channels.
- b. Advertise upcoming public events during interpretive programs.
- c. Partner with selected organizations to host events.

In addition to programs directed toward key professional audiences, the Reserve delivers numerous education and interpretive programs to the general public. Events include workshops on Cape-friendly landscaping, Evenings on the Bluff, and interpretive walks. These types of events are advertised through the newsletter, web site, news releases, and other mechanisms. Seasonal staff promote upcoming events during their interpretive walks. Events are also promoted by partner organizations such as Citizens for the Protection of Waquoit Bay.

**Objective 5.18: An increasing number of community members are aware of WBNERR's research, stewardship or monitoring programs.**

*WBNERR staff will:*

- a. Create more lessons and activities based on the Reserve's research, monitoring and stewardship programs.
- b. Actively foster links and partnerships between educators and researchers.
- c. Ensure that individual research projects are described in the newsletter, on the web site, and in the *Science to Policy Bulletin*.
- d. Garner greater press coverage of research activities.
- e. Work with outside researchers to ensure that they credit the Reserve and NOAA when giving presentations or submitting journal articles.

Many people, while familiar with some aspect of WBNERR, are unaware of the full breadth of activities conducted at and supported by the Reserve. For example, teachers are likely to know about educational offerings but may be unfamiliar with the Reserve's research and stewardship activities. By making teachers—and all audiences—more aware of the comprehensive nature of its commitment to estuarine health, WBNERR will gain credibility and stature among community members. Toward this end, lesson plans based on the Reserve's research, monitoring, and stewardship programs will be developed and made available on the Reserve's web site. Additionally, the Reserve actively fosters links and partnerships between educators and researchers in order to involve students at the elementary, secondary, and collegiate levels in science, whether it be in the field or in the

classroom. Through this technique, the results of research and monitoring at the Reserve are made readily available to students and teachers.

Descriptions of research projects conducted at the Reserve are included in the newsletter and on the web site. As part of the effort to increase awareness of WBNERR's research activities, Reserve staff may produce an annual “research summary” issue of the *Science to Policy Bulletin* that features one season’s research and its implications for management. Reserve staff will also prepare press releases and draw upon relationships with members of the media to expand press coverage of WBNERR’s research activities (see objective 5.15.f). They will also work with researchers that use WBNERR as a study site to insure that the Reserve and NOAA are properly credited in publications and presentations.

**Objective 5.19: Citizens, educators, researchers, and coastal decision-makers rely on the Reserve and CTP web sites as valuable tools.**

*WBNERR staff will:*

- a. Ensure that the WBNERR web site consistently provides dynamic information to the public about the Reserve's purpose, core programs, and events.
- b. Maintain current information about educational resources and programs on the WBNERR web site.
- c. Continue to host monitoring data and downloadable GIS layers on the WBNERR web site.
- d. Update and maintain other information about research studies and publications.
- e. Improve the placement of CTP information on the WBNERR web site and enhance the CTP web site.

The Waquoit Bay NERR hosts two web sites: [www.waquoitbayreserve.org](http://www.waquoitbayreserve.org) is the Reserve's primary web site and [www.coastaltraining.org](http://www.coastaltraining.org) is the Coastal Training Program's web site. The primary WBNERR site hosts general information about the Reserve, lists news and publications, provides camping information, and includes additional content areas for education, monitoring, GIS, research, and workshops and events.

The Education content area contains a wealth of information including descriptions of teacher training programs, lesson plans, resources for teachers, and the Massachusetts Curriculum Frameworks. Reserve education and technology staff will continue to work together to maintain this area of the web site.

Monitoring data and downloadable GIS maps of Waquoit Bay and the vicinity will also be maintained on the web site as aids to both researchers and educators. To improve the level of support to researchers, the Research content area will be updated to include titles



and abstracts of current research projects and publications and will incorporate the additional data described in Objective 1.5.

Reserve staff will make information about the Coastal Training Program on the WBNERR site more readily apparent. Presently, there is no general description of the CTP on the WBNERR site; just a link to the CTP web site. And, on the CTP web site, there is no link to information about past workshops. This information is hosted on the WBNERR site. This confusing situation will be rectified by adding a statement about the CTP within the "Workshops and Events" content area and by adding links to information about past workshops to the CTP web site. As part of planning and implementing future workshops, WBNERR staff will arrange for workshop materials—including agendas, presentations, reference material, and contact information for presenters—to be added to the CTP web site (refer to Objective 4.5.a).

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# Waquoit Bay National Estuarine Research Reserve Management Plan 2006-2011

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## A: Summary of Public Review Process

Prior to development of this document, citizens and public officials attended a public meeting in December 2004 to help focus the Reserve's priorities for the next five years. Meeting participants included Rick York; Mashpee Shellfish Constable; Steve Tucker, Cape Cod Commission; and WBNERR volunteers George Harrison and Don Root.

A thirty-day public comment period for the Draft WBNERR Management Plan was formally initiated with a notice in the April 10, 2006 online edition of the Massachusetts Environmental Monitor (<http://www.mass.gov/envir/mepa>). Press releases were also issued to all Cape Cod regional media outlets. The announcements summarized the purpose and content of the Draft Management Plan; noted the availability of copies online and at the Falmouth and Mashpee public libraries; stated the end date of the comment period (May 12, 2006), announced a public meeting scheduled for May 3, 2006 and described how to submit comments.

The Reserve, ultimately, received a limited number of comments. Comments were discussed at the public meeting, submitted through the U.S. mail, and left as a voice mail message.

### Public Meeting

The Acting Reserve Manager began the meeting with a presentation describing the Reserve's activities and highlighting selected objectives related to each of the five goals contained in the Draft Management Plan. Three citizens attended the public meeting. Because of the small number of attendees, the tone was casual and conversational. Many of the attendees' questions were points of clarification. For instance:

- How many researchers use the Reserve annually?  
**Answer:** Dozens.
- What is the Reserve's annual budget?  
**Answer:** \$560,000 grant from NOAA for operations and staff plus additional funding from DCR for about half of the staff positions.
- Is dredging of the Mashpee River an issue the Reserve would get involved with?  
**Answer:** The Coastal Training Program could potentially host a workshop or other appropriate event if, through its assessments of informational and training needs, it determined that there was a need for information about dredging issues.
- How do the Reserve's K-12 educational programs relate to standardized State requirements (e.g., the MCAS test)?  
**Answer:** WBNERR education programs adhere to *Massachusetts Frameworks for Science Education*. Also, programs and lessons are linked to key academic concepts identified by the State.

Participants in the public meeting also offered general comments:

- The series of workshops on renewable energy is a good program.
- It would be nice to offer a series of classes on the geology of Cape Cod, with particular emphasis on spring sapping valleys.
- WBNERR is filling a niche for a “natural history center” on the Upper Cape.

## Written Comments

Written comments were submitted by the Massachusetts Office of Coastal Zone Management (MCZM). The text of the letter is included below in italicized text. WBNERR’s response to MCZM’s comments are in bold text.

*April 18, 2006*

*Brendan Annett  
Acting Reserve Manager  
Waquoit Bay NERR  
PO Box 3092  
Waquoit, MA 02536*

*Dear Brendan—*

*The Massachusetts Office of Coastal Zone Management (CZM) has reviewed the Waquoit Bay National Estuarine Research Reserve (WBNERR) Draft Management Plan 2006-2011 and offers the following comments.*

*We commend WBNERR for the production and dissemination of a comprehensive management planning document. It is well-organized, well-written, and provides clear Goals and Objectives. While we do offer comments on other Objectives of the Draft Plan, the crux of our comments pertain to improved coordination and integration of our respective programs (Objectives 1.7, 4.2).*

*As noted in the document, the CZM and WBNERR programs have had varying types and levels of coordination since WBNERR’s inception in 1988. The National Oceanic and Atmospheric Administration’s (NOAA) joint §312 review in 2004 found that while the two programs work well together, “...CZM and WBNERR are encouraged to take a more strategic approach to coordination and continue to ensure that the science meets the managers’ needs and research supports management and improved decision-making statewide.” The Draft Plan accurately reflects recent efforts to address this improved inter-program coordination, including CZM’s involvement in the WBNERR Administrative Committee and WBNERR participation in CZM staff and coordination meetings. CZM affirms our commitment to coordination and integration and we welcome any additional thoughts that you or your staff may have to address this.*

*In the Plan Highlights section of the Executive Summary, we note several new initiatives—including more emphasis on invasive species management, expansion of the biomonitoring program, and development of an integrated restoration science program—which intersect with current CZM program areas and efforts. The initiatives are described in more detail later in the Draft Plan and our comments are organized according to the Objectives they fall under. We do note that it is only through the review of the Draft Plan that CZM is first learning of these new initiatives.*

*In regards to Objective 1.1, while not cited in the Draft Plan, CZM and WBNERR have recently agreed that in WBNERR’s effort to identify gaps in knowledge and publish a prioritized list of research topics and critical coastal*

resource concerns annually, the input of CZM (as an important set of coastal decision-makers) should be invited and considered. Discussions have begun to establish a way to best implement this.

**The text under Objective 1.1 now specifically mentions CZM as a participant in the process to identify, refine and prioritize research topics and critical coastal resource management concerns.**

The focus of Objective 1.3 is on WBNERR's environmental monitoring, and CZM is interested to note an emphasis on transitioning an initial bio-monitoring program into a permanent one, with resources being directed to tracking the status and trends of submerged aquatic vegetation (including eelgrass), macro-algae, salt marsh plants, and invasive and rare species. We would welcome the opportunity to find out more about the initial bio-monitoring program—in terms of what biological assemblages were sampled, how they were sampled, what the initial findings were, and how WBNERR is envisioning the program as a permanent operation. As you know, CZM maintains program areas and staff expertise in coastal habitat management, including the monitoring and assessment of salt marsh, eelgrass, and marine invasive species. One suggestion is to present the WBNERR bio-monitoring program at a CZM staff meeting in the near future. Objective 1.3 should also include a clear description of how monitoring results, including monitoring by WBNERR staff and volunteer-based monitoring (e.g., BayWatchers and CoastWatchers), are reported. Timely and user-accessible reporting will facilitate the development of appropriate management and research strategies.

- **WBNERR staff will work with CZM to schedule a presentation on the bio-monitoring program in the near future.**
- **Monitoring results are made available to researchers and other interested parties according to the mechanisms described under Objective 1.5.**

Under Objective 2.1, CZM would like to commend WBNERR for its continued strong leadership role in the Coastal Training Program (CTP) and to add our emphasis to the recommendations in the Draft Plan to “seek appropriate partners for specific training events and to expand the geographic scope of its activities.” Because WBNERR is located on Cape Cod and has strong partners and relationships there, most of its training and outreach efforts are directed there. This has been a tremendous asset to the region, and while we do not wish to detract from this important role, we do share the belief that most of the training has broader audiences and implications. Again, CZM is committed to working with WBNERR and the CTP to extend the program to other coastal (and even non-coastal) regions.

In Objective 3.5 WBNERR discusses the creation of a Restoration Science Program—modeled on a national implementation plan in development by NOAA—and commits to continued work on restoration projects. The goal of the Restoration Science Program is to improve the effectiveness of habitat restoration practices by advancing the science of restoration through two primary elements: Restoration Demonstration Projects and Restoration Reference Sites. As you are well aware, CZM, through its Wetlands Restoration Program, works with a broad and diverse network of partners in the pro-active restoration of coastal wetlands, including salt marshes, coastal wetlands associated with anadromous fish runs, and eelgrass beds. We also continue to be very involved with the preservation and restoration of coastal dunes and barrier beaches and their role as habitat for threatened and endangered shore birds. Because the restoration of coastal habitats is a high priority programmatic goal for CZM, we have a strong interest in the development of the Restoration Science Program, including (1) the framing of the most appropriate restoration science questions and the strategies to answer them, (2) the decisions about Restoration Reference Sites and the types, extent, and protocols for restoration reference data collection, and (3) the criteria for prioritizing restoration sites in the Reserve. We strongly encourage WBNERR to engage CZM staff as you move forward with this objective.

**WBNERR will certainly involve CZM in the development of the Restoration Science Program. At a minimum, CZM will be invited to be a member of the advisory group.**



*As previously stated, much of CZM's comments on the Draft Plan involve improved coordination and more frequent and consistent communication. We are optimistic that by following through on elements cited in the Draft Plan (e.g., CZM participation in the WBNERR Administrative Committee and WBNERR participation in CZM staff meetings) and other non-prescribed venues for coordination and communication, WBNERR will go along way to address these comments. We are looking forward to a new period of improved relationships and partnerships.*

*Sincerely,  
Susan Snow-Cotter  
Director*

## **Verbal Comments**

A caller from the Seacoast Shores neighborhood of East Falmouth left a lengthy voice mail message expressing her concerns related to over development of the local area. In particular, the caller was concerned about the heavy traffic along Route 28 and a lack of infrastructure to support the existing population. To alleviate traffic along Route 28 (the main east-west corridor along Cape Cod's south shore), she proposed creating an alternate shore route wherein South Cape Beach, Washburn Island, Seacoast Shores and Central Ave. (Falmouth) would be connected by a series of swinging bridges that are open to vehicle traffic on a very limited schedule throughout the day. She also suggested that the town stop approving requests for high-density new developments that set aside 25 percent of the units as affordable housing (so called 40B developments). Instead, she supports renovation of existing housing stock.

### WBNERR Response:

The Reserve is actively engaged in efforts to minimize the impacts of development. For instance, the Reserve seeks to preserve undeveloped land in and around the Waquoit Bay watershed (Objective 3.6). Reserve staff also provides sustained support of community coastal decision making (Objective 4.3). For example, the Reserve's renewable energy education programs target homebuilders, vocational technical schools, college students and homeowners and brings together the Cape Cod Community College, the Cape Cod Economic Development program, Cape and Islands Self Reliance, and several other entities.

## **Summary of Revisions to Draft Document**

Based on the limited comments described which were submitted during the public review process documented above, no major changes have been made to the final Waquoit Bay National Estuarine Research Reserve Management Plan 2006-2011 from the draft version circulated during this public review process.

# B: Federal Consistency Certification



THE COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
OFFICE OF COASTAL ZONE MANAGEMENT  
251 Causeway Street, Suite 800, Boston, MA 02114-2136  
(617) 626-1200 FAX: (617) 626-1240

October 17, 2005

Christine Gault, Reserve Manager  
Waquoit Bay National Estuarine Research Reserve  
P.O. Box 3092  
Waquoit, MA 02536

RE: Federal Consistency Certification: WBNERR Management Plan

Dear Ms. Gault:

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the proposed Waquoit Bay National Estuarine Research Reserve Management Plan.

We concur with your certification and find that the plan as proposed is consistent with the CZM enforceable program policies.

If the above-referenced plan, which has received this concurrence from CZM, is modified in any substantive manner or is noted to be having effects on the coastal zone or its uses that are substantially different than originally proposed, please submit an explanation of the nature of the change to this Office pursuant to 301 CMR 21.17 and 15 CFR 930.66.

Thank you for your cooperation with CZM.

Sincerely,

Susan Snow-Cotter  
Director

SSC/th

Cc: Truman Henson, Jr.,  
CZM Cape & Islands Regional Coordinator

MITT ROMNEY GOVERNOR KERRY HEALEY LIEUTENANT GOVERNOR STEPHEN R. PRITCHARD SECRETARY SUSAN SNOW-COTTER DIRECTOR  
www.mass.gov/czm



## C: WBNERR Active Research and Monitoring Project List for 2005 (Updated 8/3/2005)

### Internal Projects

| Project  | Institution / Organization                                   | Principle Contacts  |
|--|--|---|
| Bay Watchers: Citizen Water Quality Monitoring<br>(since 1993, currently 8 sites)  | WBNERR   | MK. Fox<br>C. Weidman   |
| Coast Watchers: Citizen Shoreline Change Monitoring<br>(since 2000, 4 times /yr, 75 sites / 3 miles of beach)  | WBNERR   | C. Weidman<br>H. Tschaekofske<br>MK. Fox  |
| NERR SWMP-Water Quality<br>(since 1996, 1/2 hrly continuous records at 4 sites currently)  | WBNERR   | H. Tschaekofske<br>C. Weidman   |
| NERR SWMP-Meteorology<br>(since 2002, 15-min continuous records)   | WBNERR   | H. Tschaekofske<br>MK. Fox<br>C. Weidman  |
| NERR SWMP-Nutrients<br>(since 2002, monthly records at 4 sites currently)  | WBNERR   | MK. Fox<br>C. Weidman   |
| NERR SWMP-Bio-mapping of the Reserve's salt marsh vegetation, seaweed and seagrass<br><br>(2004-2005 initial year of project – to be repeated every 3-5 yrs) | WBNERR<br>WBNERR<br>WBNERR<br>WBNERR<br>Mashpee<br>Mass. DEP | A. Reynolds<br>H. Tschaekofske<br>C. Weidman<br>B. Annett<br>R. York<br>C. Costello |
| Restricted Salt Marsh Monitoring<br>(Salt marsh restoration project)   | WBNERR<br>Mass. CZM  | B. Annett<br>B. Carlisle  |
| Salt Marsh Fish Survey   | WBNERR   | B. Annett   |

### Other NOAA Estuarine Research Division-Supported Projects (NERR-Graduate Research Fellowships and CICEET projects)

| Project   | Institution / Organization | Principle Contacts   |
|---|----------------------------|--|
| Designing effective coastal outreach programs                                     | URI                        | B. Barak<br>(Grad. Fellow-Waquoit Bay NERR)                |
| Stable isotope signatures in saltmarsh cordgrass                                  | BUMP / MBL<br><br>BUMP/MBL | E. Kinney<br>(Grad. Fellow-Waquoit Bay NERR)<br>I. Valiela |
| Plant-herbivore interactions: latitudinal variation and impacts of climate change | University of Houston      | C.-K. Ho<br>(Grad. Fellow-ACE NERR)                        |
| Web Framework for comparative N-loading models (CICEET project)                   | BUMP / MBL                 | J. Bowen<br>(Grad Fellow- Jobos Bay NERR)                  |

|   |   |   |
|---|---|---|
|   | BUMP / MBL  | I. Valiela  |
| Shellfish Aquaculture and Nitrogen-load mitigation (CICEET project)                       | WHOI<br>WHOI / USGS<br>WHOI-SG / Barnstable Cty<br>WHOI               | H. Kite-Powell<br>K. Kroeger<br>B. Walton<br>D. Angel |
| Designing a new efficient onsite denitrification septic system (CICEET project)           | UMASS-Dartmouth<br>UMASS-Amherst                                      | S. Sengupta<br>S. J. Ergas                            |
| Fecal coliform /colliphage RNA monitoring (CICEET project)                                | Univ. of North Carolina<br>Univ. of North Carolina                    | G. Lovelace<br>M. Sobsey                              |
| Reactive barrier technology for reducing estuarine N-loading (CICEET project)             | Ecosystems Center / MBL<br>Ecosystems Center / MBL<br>Lombardo Assoc. | K. Foreman<br>J. Valino<br>P. Lombardo                |
| Rapid assessment of anthropogenic copper pollution in estuaries (CICEET project)          | WHOI<br>Univ. of Maryland   | J. Moffet<br>R. Thompson                              |
| Synthesis of SWMP data for ASSETS eutrophication assessment of the Northeast Region NERRs | NOAA<br>Wells NERR<br>FB Environmental                                | S. Bricker<br>C. Dalton<br>F. Dillon                  |

## Collaborative Projects

| Project  | Institution / Organization                | Principle Contacts  |
|--|---|---|
| Creating a 30-year faunal database from the Mass. Div. of Fisheries Young of the Year Winter Flounder seine survey in Waquoit Bay and Cape Cod south coast estuaries | WBNERR<br>MDMF<br>WBNERR                  | E. Shields<br>V. Manfredi<br>C. Weidman                     |
| Falmouth Buzzard's Bay Shoreline Study   | Falmouth CRWG<br>USGS<br>WBNERR<br>WBNERR | J. Tucker, Chair<br>R. Thieler<br>C. Weidman<br>A. Reynolds |
| Sedimentological processes and evolution of Waquoit Bay  | WBNERR<br>WHOI<br>WHOI                    | C. Weidman<br>M. Charette<br>J. Donnelly                    |
| Shelf –estuarine interactions  | <b>WHOI</b><br>WHOI<br>WBNERR             | <b>S. Gallagher</b><br>R. Beardsley<br>C. Weidman           |
| Trace elements in <i>M. mercenaria</i> shells  | WHOI<br>WHOI<br>WHOI<br>WBNERR            | A. Rago<br>M. Charrette<br>S. Thorrold<br>C. Weidman        |
| N <sup>15</sup> in <i>M. mercenaria</i> shells   | Univ. Maine-Machias<br>WBNERR/WHOI        | R. Carmichael<br>C. Weidman                                 |

|  |                        |  |
|--|------------------------|--|
| Monitoring changes in endangered coastal plain plant populations: <i>Agulinus</i> , <i>Liatrix</i> | MDFW<br>MDFW<br>WBNERR | P. Somers<br>S. Brownback<br>B. Annett |
|--|------------------------|--|

## External Projects

| Project   | Institution / Organization                      | Principle Contacts                                      |
|---|---|---|
| Macroalgae and Nitrogen-loading   | BUMP / MBL<br>BUMP / MBL                        | S. Fox<br>I. Valiela                                    |
| The effects of N-loading on phytoplankton populations                               | BUMP / MBL<br>BUMP / MBL                        | G. Tomasky<br>I. Valiela                                |
| Near-source atmospheric deposition as a nitrogen source to coastal lagoons          | Cornell Univ.<br>Cornell Univ.<br>Cornell Univ. | B. Howarth<br>N. Bettez<br>E. Davidson                  |
| Geochemical transformations in subterranean estuaries: reactions, rates, and fluxes | WHOI<br>WHOI                                    | M. Charette<br>A. Mulligan                              |
| Mechanisms of dinitrogen production in coastal permeable sediments                  | WHOI<br>WHOI<br>WHOI<br>WHOI                    | M. Charette<br>K. Kroeger<br>K. Casciotti<br>K. Edwards |
| Developing the Concept of a Coastal Groundwater Observatory                         | WHOI<br>WHOI                                    | M. Charette<br>A. Mulligan                              |
| Macroalgal blooms   | BUMP / MBL<br>BUMP / MBL                        | M. Teichberg<br>I. Valiela                              |
| Eelgrass dynamics   | BUMP / MBL<br>BUMP / MBL                        | Y. Olsen<br>I. Valiela                                  |
| Mapping storm-driven nearshore sediment transport                                   | WHOI<br>WHOI                                    | B. Raubenheimer<br>P. Shultz                            |
| Using seismic reflection to resolve the glacial history of Cape Cod, MA             | Boston College                                  | Matt Gruber   |
| Body size variability of Spotted Salamanders across Massachusetts                   | UMASS-Lowell<br>Oxbow Assoc.                    | S. Smyers   |
| Eutrophication and seagrass assessment using a bio-optic approach                   | NOAA-CCFHA<br>MDEP<br>Smithsonian-ERC           | W. J. Kenworthy<br>C. Costello<br>C. Gallegos           |
| Coastal dune plant community structure  | UMASS-Dartmouth                                 | T. Rajaniemi  |

### Acronym Key:

**BUMP / MBL:** Boston University Marine Program at the Woods Hole Marine Biological Laboratory

**CICEET:** Cooperative Institution for Coastal Environmental and Estuarine Technology

**Falmouth CRWG:** Town of Falmouth Coastal Resources Working Group

**MDEP:** Massachusetts Dept. of Environmental Protection

**MDFW:** Massachusetts Division of Fisheries and Wildlife

**MDMF:** Massachusetts Division of Marine Fisheries

**NOAA:** National Oceanic and Atmospheric Administration

**NOAA-CCFHA:** NOAA Center for Coastal Fisheries and Habitat Research  
**Smithsonian-ERC:** Smithsonian Environmental Research Center  
**UMASS:** University of Massachusetts  
**WBNERR:** Waquoit Bay National Estuarine Research Reserve  
**WHOI:** Woods Hole Oceanographic Institution  
**WHOI-SG:** WHOI-Sea Grant

# **D: Land Stewardship Zoning Guidelines**

## **Department of Conservation and Recreation**

Revised Draft 8/15/05

### **Background**

In July, 2003 state legislation established the Department of Conservation and Recreation (DCR), consisting of a Division of Urban Parks and Recreation, a Division of State Parks and Recreation, and a Division of Water Supply Protection. This legislation essentially merged the former Department of Environmental Management (DEM) and the Metropolitan District Commission (MDC). In addition, the legislation required the preparation of management plans for state parks, forests and reservations under the management of DCR (Chapter 21, Section 2F). This legislation states that management plans shall include guidelines for operation and land stewardship, provide for the protection and stewardship of natural and cultural resources, and shall ensure consistency between recreation, resource protection, and sustainable forest management.

As part of addressing this legislative requirement, land stewardship zoning guidelines will be incorporated into the development and implementation of DCR Resource Management Plans. These Land Stewardship Zoning Guidelines (Guidelines) represent a revision of the previous Land Stewardship Zoning system developed by Executive Office of Environmental Affairs (EOEA) agencies in the early 1990s, and which had been applied to the preparation of management plans for state parks, forests and reservations under the management of the former DEM.

The purpose of these revised Guidelines is to provide a general land stewardship zoning framework for the development of Resource Management Plans for all state reservations, parks and forests under the management of the DCR Divisions of Urban Parks and Recreation and State Parks and Recreation. The Guidelines do not apply to Division of Water Supply Protection (DWSP) properties because DWSP watershed planning has a separate legislative mandate and established planning procedures.

### **Overview of Guidelines**

The Guidelines define three types of zones to address the legislative requirement to provide for the protection and stewardship of natural and cultural resources and to ensure consistency between recreation, resource protection, and sustainable forest management. The Guidelines are intended to provide a general land stewardship zoning framework that is flexible and that can guide the long-term management of a given DCR property or facility. The three zones may be supplemented with significant feature overlays that identify specific designated/recognized resource features (such as Forest Reserves, Areas of Critical Environmental Concern, or areas subject to historic preservation restrictions). DCR parks, forests and reservations are also subject to specific policy guidelines and/or performance standards (such as Executive Order No. 181 for Barrier Beaches) and applicable environmental laws and regulations of the Commonwealth.

Application of the three-zone system to a particular DCR park, forest or reservation is facilitated by the development and application of Geographic Information Systems (GIS) technology. GIS resource overlays provide a general screen whereby lands of special resource significance and sensitivity can be mapped and identified. General landscape features such as forested areas, wetlands, streams and ponds can also be mapped as part of this overlay approach. Further, additional data regarding recreational uses and developed facilities and sites can be added. This type of mapping and data collection, based on the best information currently available, provides the basis for subsequent analysis and ultimately the development and application of appropriate land stewardship zoning guidelines to a specific state park, forest or reservation.

Land Stewardship Zoning Guidelines provide a foundation for recommendations that will address resource stewardship and facility management objectives, and are intended to cover both existing DCR property or facility conditions and desired future conditions for that property or facility. Proposals for changing the Guidelines in a previously approved Resource Management Plan should be submitted to the DCR Stewardship Council for review and adoption.

## **Land Stewardship Zones**

### **Zone 1**

#### **General Description**

This zone includes unique, exemplary and highly sensitive resources and landscapes that require special management approaches and practices to protect and preserve the special features and values identified in the specific Resource Management Plan. Examples of these resources include rare species habitat identified by the Natural Heritage & Endangered Species Program as being highly sensitive to human activities, fragile archaeological or cultural sites, and unique or exemplary natural communities. Management objectives emphasize protecting these areas from potentially adverse disturbances and impacts.

#### **General Management Guidelines**

- Only dispersed, low-impact, non-motorized, sustainable recreation will be allowed provided that the activities do not threaten or impact unique and highly sensitive resources.
- Existing trails and roads will be evaluated to ensure compatibility with identified resource features and landscape, and will be discontinued if there are suitable sustainable alternatives. New trails may be constructed only after a strict evaluation of need and avoidance of any potential adverse impacts on identified resources. New roads may only be constructed to meet public health and safety needs or requirements; however, the project design and siting process must avoid any potential adverse impacts on identified resources and demonstrate that there are no other suitable alternatives.
- Vegetation or forest management will be utilized only to preserve and enhance identified resource features and landscapes.



## Zone 2

### General Description

This Zone includes areas containing typical yet important natural and cultural resources on which common forestry practices and dispersed recreational activities can be practiced at sustainable levels that do not degrade these resources and that hold potential for improving their ecological health, productivity and/or protection through active management. Examples include terrestrial and aquatic ecosystems characterized by a diversity of wildlife and plant habitats, rare species habitat that is compatible with sustainable forestry and dispersed recreation, agricultural resources, and resilient cultural sites and landscapes. Zone 2 areas may be actively managed provided that the management activities are consistent with the approved Resource Management Plan for the property.

### General Management Guidelines

- Management approaches and actions may include a wide range of potential recreational opportunities and settings that are consistent and compatible with natural resource conservation and management goals.
- Utilize Best Management Practices for forestry and other resource management activities to encourage native biodiversity, protect rare species habitats and landforms.
- Protect and maintain water quality by providing for healthy functioning terrestrial and aquatic ecosystems.
- Provide a safe, efficient transportation network with minimal impact on natural and cultural resources while serving public safety needs and allowing visitors to experience a variety of outdoor activities.
- New trails may be allowed dependent upon existing area trail densities, purpose and need, physical suitability of the site, and specific guidelines for protection of rare species habitat and archaeological resources.
- Sustainable forest management activities may be undertaken following guidelines established through ecoregion-based assessments, district level forestry plans, current best forestry management practices, and providing for consistency with resource protection goals.
- Roads may be constructed if access for resource management or public access is needed and construction can be accomplished in an environmentally protective manner. Existing roads will be maintained in accordance with the DCR road classification system and maintenance policy.
- Additional site-specific inventory and analysis may be needed prior to any of the management activities described above to ensure that no adverse impacts occur to previously un-documented unique and sensitive resources and landscape features.

### **Zone 3**

#### **General Description**

This zone includes constructed or developed administrative, maintenance and recreation sites, structures and resilient landscapes which accommodate concentrated use by recreational visitors and require intensive maintenance by DCR staff. Examples include areas developed and deemed appropriate for park headquarters and maintenance areas, parking lots, swimming pools and skating rinks, paved bikeways, swimming beaches, campgrounds, playgrounds and athletic fields, parkways, golf courses, picnic areas and pavilions, concessions, and areas assessed to be suitable for those uses.

#### **General Management Guidelines**

- The management approach and actions will emphasize public safety conditions and provide for an overall network of accessible facilities that meets the needs of DCR visitors and staff.
- Maintenance of these facilities and associated natural and cultural resources, and new construction or development, will meet state public health code, and state building code and environmental regulations.
- Shorelines and surface waters may be used for recreation within constraints of maintaining public safety and water quality.
- Historic restoration, rehabilitation or reconstruction for interpretation or adaptive reuse of historic structures will be undertaken only in conjunction with a historic restoration plan.
- To the greatest extent possible, construction will include the use of “green design” for structures, such as use of low-flow water fixtures and other water conservation systems or techniques, solar and other renewable energy sources, and the implementation of Best Management Practices to protect the soil and water resources at all facilities.

#### **Significant Feature Overlays**

##### **General Description**

The three land stewardship zones may be supplemented with significant feature overlays that identify specific designated/recognized resource features. These significant features are generally identified through an inventory process or research, and are formally designated. The purpose of these overlays is to provide more precise management guidance for identified resources and to recognize, maintain, protect, or preserve unique and significant values, regardless of the zone in which they occur. Examples of significant feature overlays include Forest Reserves, areas subject to public drinking water regulations, or areas subject to historic preservation restrictions.

##### **Management Guidelines**

Specific management guidelines for significant features overlays are provided by resource specialists or by the Federal/state/regional/local agency that has recognized and listed the resource or site.

# E: Waquoit Bay ACEC Designation Document



EDWARD J. KING  
GOVERNOR

JOHN A. BEWICK  
SECRETARY

*The Commonwealth of Massachusetts*  
*Executive Office of Environmental Affairs*  
*100 Cambridge Street*  
*Boston, Massachusetts 02202*

Designation of Waquoit Bay as an  
Area of Critical Environmental Concern  
and Supporting Findings

Following an extensive process, including nomination, research, informal meetings with local groups, public informational meetings, public hearings, on-site visits, and a formal evaluation of all assembled data, I, the Secretary of Environmental Affairs, hereby designate Waquoit Bay an Area of Critical Environmental Concern pursuant to the authority granted to me by G.L. c. 21A, s. 2(7).

I also hereby, find that the Waquoit Bay ACEC is significant to flood control, the prevention of storm damage, the protection of land containing shellfish and fisheries; public interests protected by the Wetlands Protection Act, G.L. c. 131, §40.

1. Boundary of the Waquoit Bay ACEC

The Area of Critical Environmental Concern (ACEC) extends from the extreme southwestern end of Dead Neck barrier beach (mean low water, MLW) and extends straight across the entrance channel to Waquoit Bay by the shortest distance to the mean low water line of the western side of the entrance channel. The ACEC boundary then follows the MLW line in a westerly direction (excluding the western jetty of the Waquoit Bay entrance channel) to a point approximately 1370 feet (straight line measure) from the westernmost tip of Washburn Island. This point falls on a line perpendicular to the MLW line of Vineyard Sound and tangent to a segment of shoreline which is both the southeast MLW shoreline of Eel Pond and a western edge of Washburn Island.

The ACEC boundary then follows that perpendicular line to the intersection with the western MLW shore of Washburn Island. The boundary follows the MLW line along the Washburn Island to its extreme northeastern point. The boundary then extends from this point north into Waquoit Bay by the shortest distance to the 6 foot depth curve (datum: MLW). The boundary follows the 6 foot depth curve in a northerly direction to the point of intersection with a true azimuth bearing line of 150°, drawn from the southwestern most point of shoreline of the un-named pond east of Seapit Road. From this point of intersection the ACEC boundary then follows this above-mentioned bearing line in a northwesterly direction to the southwestern most point of shoreline of the un-named pond east of Seapit Road and continues along an extension of this straight line to the intersection with the 100 year flood boundary still east of Seapit Road.

The ACEC boundary then follows the 100 year flood boundary in a generally easterly direction including all of Bourne Pond, Bog Pond, Caleb Pond, parts of the Quashnet River and Red Brook and all of Witch Pond, Fells Pond, and Jehu Pond. At the point of the fifth intersection of the 100 year flood boundary with Great Oak Road, the ACEC boundary extends west on the northern side line of Great Oak Road across the 10 foot contour line (datum: mean sea level) to the second intersection with the 10 foot contour line (MSL). The ACEC boundary extends from this point in a northwesterly direction along the 10 foot contour line (MSL) to the point closest to the eastern shore (MLW) of the Great River. From this point the line extends by the shortest distance to the eastern shore (MLW) of the Great River. The boundary then extends in a northerly direction along the eastern shore (MLW) of the Great River to the western most point of the entrance channel to Jehu Pond. The boundary then extends due west to the MLW line on the west side of Great River and following the MLW line northward to the boundary between Monomoscoy Island and the adjacent northerly salt marsh. The boundary follows a northwesterly trend along the southern edge of this salt marsh, crosses Monomoscoy Road, and continues along the southern edge of this salt marsh to the intersection with the MLW line on the eastern side of Hamblin Pond. The boundary continues in a southerly direction along the MLW line on the east side of Hamblin Pond, across the northern channel entrance of the Little River and continues along the MLW line on the northern edge of Seconsett Island to the intersection of the MLW line and the town boundary between Falmouth and Mashpee. The ACEC boundary follows the town boundary to the intersection with the MLW line on the eastern shore of Waquoit Bay. The ACEC boundary extends from this point in a southerly direction along the MLW line, around Seconsett Island and then in a northerly direction to the point of intersection (Point A) with a true azimuth bearing line of  $290^{\circ}$ , drawn from the point (Point B) along the MLW line on the eastern shore of the Great River which is also the northernmost point (Point B) of property along the MLW line on the eastern shore of the Great River as described in the Plan of Land, South Cape Beach, Mashpee, Mass., prepared for the Department of Environmental Management, Scale 1"=200', February 16, 1976, Briggs Engineering and Testing Co., Inc., Norwell, Mass., as revised March 31, 1976. The ACEC boundary then proceeds southeasterly from Point A along the previously described true azimuth bearing line of  $290^{\circ}$  to Point B and continues in an easterly direction along the northern boundary line of said Plan of Land for South Cape Beach to the intersection with the southern side line of Wills Work Road. The ACEC boundary follows the southerly side line of said Road to the intersection with Great Oak Road and then follows the southerly side line of Great Oak Road to the intersection with 100 year flood boundary. The ACEC boundary follows the 100 year flood boundary in a north-easterly direction to the intersection of the southerly side line of Great Oak Road. The ACEC boundary then follows the southerly side line of said Road to the next intersection with the 100 year flood boundary. From this point, the ACEC boundary follows the 100 year flood boundary in a southerly direction to the southernmost extent of the 100 year flood boundary in Mashpee. The boundary then extends due south in a straight line to the MLW line of Vineyard Sound and thence in a westerly direction along the MLW line along South Cape Beach to the point of origin.

Also included within the ACEC boundary is the land along the upper reaches of the Child's River. The ACEC boundary begins at the intersection of the northerly side line of Rt. 28 and the 100 year flood boundary on the eastern side of the Childs River. The ACEC boundary proceeds northerly along the 100 year flood boundary on the eastern side of the Childs River to the point where the 100 year flood boundary crosses in a westerly direction the Childs River. The ACEC boundary then follows the 100 year flood boundary on the western side of the Childs River in a southerly direction to the point of intersection with the northern side line of Rt. 28. The ACEC boundary then proceeds from this point in an easterly direction across the Childs River to the point of origin.

Within the boundary the following exclusions exist:

- 1) The existing Waquoit Bay navigational channel (6 foot depth, Mean Low Water) extending in a northerly direction from the entrance jetties of Waquoit Bay to the head of Waquoit Bay. Specifically, this means the channel delineated by existing U.S. Coast Guard buoys (See National Oceanic and Atmospheric Administration, nautical chart #13229, 15th Ad., February 3, 1979, page C, Waquoit Bay and U.S. Coast Guard navigational buoys). Where the channel is unmarked by buoys, the west channel boundary will be delineated by a straight line drawn from buoy C-7 northerly to the western edge of Bourne Pond. This channel would extend no further than 100 feet to the east of the west channel boundary and not exceed a dredged depth of 6 feet below mean low water. This channel will extend no further north than the present Falmouth town landing (near Seapit Road).
- 2) The existing Seconsett navigational channel extending from U.S. Coast Guard buoy N-6 (see NOAA nautical chart #13229, 15th Ad., February 3, 1979, page C, Waquoit Bay and U.S. Coast Coast navigational buoys) to the entrance of the Great and Little Rivers, Mashpee. The southern boundary of the Seconsett channel extends from buoy N-6, southeasterly in a direct line not to extend beyond Seconsett point. The width of the Seconsett channel will not exceed 100 feet from the southern boundary line. The Seconsett channel will not exceed a dredged depth of 6 feet below MLW.
- 3) The existing small culvert beneath Monomoscoy Road, Mashpee.

## II. Designation of the Resources of Waquoit Bay

Waquoit Bay area is an extensive and largely unaltered resource system. Among the natural components of the system are many specified as Significant Resource Areas (SRA's) in the Massachusetts CZM Program. These include a long barrier beach system, dunes and sandy beaches, many acres of salt marsh, productive shellfish beds, a large estuary, anadromous fish runs and floodplain, erosion and accretion areas. The area is a spawning and nursery ground for many marine species, as well as an important habitat for upland species and waterfowl. The beaches, dunes, and salt marshes provide protection against storms for low-lying inland areas. The region clearly meets the regulatory criterion of the ACEC Program, that a region proposed for designation must contain at least five of the specified Significant Resource Areas.

### 1. III. Procedures Leading to ACEC Designation

The Waquoit Bay Area was first proposed for ACEC consideration by local citizens at a CZM planning meeting over two years ago. Active planning commenced in March 1979. Meetings on May 3, May 24, and August 2 were held in Falmouth and Mashpee and attended by local officials and local planning boards, committee members, owners of the area's three marinas and some property owners.

On August 2 a proposed boundary was unanimously endorsed by the six officials and marina owners present at this meeting. On July 9, 1979, a letter nominating the Waquoit Bay Estuarine System as an Area of Critical Environmental Concern was submitted by the Selectmen, Conservation Commission and Waterways Committee/Harbormaster of the Towns of Falmouth and Mashpee. After reviewing this nomination, the Secretary of Environmental Affairs decided, on August 21, 1979 to proceed with a full review of the proposed area.

Notice of the receipt of the nomination request and a public hearing notice were published in the Environmental Monitor on August 22, 1979. The public hearing notice also appeared in two local newspapers: The Cape Cod Times and The Falmouth Enterprise. Additional information on the region was collected by the Coastal Zone Management office staff in consultation with local officials, town boards and natural resource officers. The results of this research were forwarded for comment and review to the Selectmen, Conservation Commissions, Planning Boards, Waterways Committee, and Natural Resource Officers and members of the CZM Citizen Advisory Council for Cape Cod. Copies also went to interested individuals and were available to the general public upon request. Informational articles about the proposed nomination appeared in the local newspaper. A final informational meeting was held at Mashpee Town Hall on August 30, 1979.

A public hearing was conducted on September 27, 1979 in the Falmouth Town Hall. The recorded testimony was largely favorable and an informal vote was 50-3 in favor of the designation. As the result of a number of concerns raised at this meeting, on-site visits were also arranged. On October 19, eighteen citizens and officials toured Waquoit Bay by boat following existing main navigational channels. In addition, CZM staff conducted site visits with individual landowners who had concerns.

A second public hearing was scheduled for October 25, 1979. A public hearing notice was published in the Environmental Monitor on October 22, 1979. The public hearing notice also appeared in the Cape Cod Times and The Falmouth Enterprise.

The hearing record remained open until November 7, 1979 for those persons who wished to submit written comments. After careful consideration of all public comments, final boundary modifications were defined.

#### IV. Discussion of Factors Specified in Section 6.48 of the CZM Program Regulations

Prior to designation of a region as an Area of Critical Environmental Concern, the Secretary must consider the factors specified in Section 6.48 of the CZM Program regulations. Based on research and information from local residents, I find that the following factors are applicable to the Waquoit Bay Barrier Beach System.

Quality of Natural Characteristics: This estuarine system is a relatively large unaltered physical and biological resource. Its unpolluted water attracts a wide range of finfish species and nurtures large numbers of shellfish. The undeveloped stretches of Washburn Island and Dead Neck accommodate contiguous environments of beach, dune, marsh, and low wooded hills. Minimum alteration of the natural features of this area will allow them to function at their maximum capacity. These undeveloped expanses also contribute significantly to the scenic beauty enjoyed by users of the area.

Public Health: The high water quality currently existing supports many important activities, including swimming, boating, fishing and shellfishing. Clean water must be maintained to ensure the safety of the recreational users of the area. Activities that would degrade water quality would have both environmental and economic consequences. The barrier beach formed by Washburn Island and Dead Neck acts as a natural storm buffer to protect the property of shore dwellers within the system. Development of this barrier would impair its natural form and protective function.

Uniqueness: An estuary, where fresh water inflow meets and mixes with salt water, is the most significant of all coastal features in the amount and variety of biological production. The largely unaltered Waquoit Bay estuarine system makes this area both a highly significant and uncommon feature of the Massachusetts coast. The availability of nutrients supports a great number and variety of species. These conditions provide excellent opportunities for scientific research. In a study conducted in the late 1960's, the Massachusetts Division of Marine Fisheries determined that of nine sample estuaries in the state, Waquoit Bay supported the greatest diversity of estuarine-associated fin-fish. Currently, a biologist from the Woods Hole Oceanographic Institution is studying the genetics and distribution of quahogs in the estuary.


Productivity: The region contains diverse and viable populations of fish, shellfish and waterfowl. The biological productivity of this area is sustained by its ponds and salt marshes which contribute large quantities of nutrients to the coastal food chain.

Imminence of Threat to the Resource: Alterations which could severely impact the natural functions or reduce productivity of the components of the Waquoit Bay system have been considered for the area. The ACEC designation would focus attention on the area's significant environmental and economic resources, and would serve as a guide regarding future activity in the area.

Irreversibility of Impact: Because the estuary has only limited access to the open Sound through the narrow cuts at the east end of Washburn Island, the entire basin is susceptible to inadequate flushing. The discharge of pollutants into this system would tend to remain concentrated rather than to disperse. As a result, impacts on shellfish and finfish could be severe, thereby damaging an important economic resource of the Waquoit basin. Other habitat alterations such as filling or removal could also severely affect sensitive spawning or nursery areas, thereby decreasing the abundance of valuable commercial, recreational, and aesthetic resources.

Economic Benefits: This ACEC brings significant income to Falmouth and Mashpee through tourists and area residents who purchase shellfish permits, the use of area services such as boatyards, and the wholesale trade in shellfish. Any alteration in the area that threatens to disrupt its utilization and/or attractiveness carries a potentially detrimental economic impact. Damage to the groundwater is also an important consideration because the shore-dwellers depend on private groundwells for their fresh water supply.

Supporting Factors: Residents, business persons and other users of the ACEC agree that the area carries environmental importance, economic utility and aesthetic qualities. Groups at many levels, including local residents, town authorities and state administrative agencies, have voiced their concern about the need to preserve the undeveloped portions, particularly Washburn Island and South Cape Beach.

  
\_\_\_\_\_  
John A. Bewick  
Secretary of Environmental Affairs

11/26/79  
Date



# F: Waquoit Bay ACEC Resource Summary

Summer, 2003

## Waquoit Bay Area of Critical Environmental Concern (ACEC)

**Designation Date:** November 26, 1979  
**Total approximate acreage:** 2,575 acres  
**Watershed/subwatershed:** Cape Cod/Waquoit Bay  
**Municipalities (% of ACEC):** Falmouth (48%) and Mashpee (52%)

### What makes this area so special?

#### **Designated Habitats**

The Waquoit Bay ACEC was nominated by the Conservation Commissions, Boards of Selectmen, and Waterways Committees in the Towns of Mashpee and Falmouth and was designated as an ACEC in 1979 because of the area's extraordinary natural resources. The ACEC boundary generally follows the 100-year floodplain elevation on the landward side of the Bay and mean low water on the seaward side and includes the Waquoit Bay National Estuarine Research Reserve (WBNERR). The entire bay is designated by the state as an Ocean Sanctuary while much of the surrounding upland is also part of the Mashpee National Wildlife Refuge. Important habitats within the boundary include estuarine waters, freshwater wetlands and ponds, shrub and wooded swamps, streams, salt marsh, tidal flats, coastal dunes, and beaches. These areas provide flood control, storm damage prevention, improved water quality, wildlife habitat, and recreation opportunities to surrounding communities.

#### **Wildlife**

The diverse and relatively unaltered habitats of this ACEC provide feeding, spawning, and nursery grounds for numerous shellfish, finfish, amphibians, reptiles, birds, and mammals. In 2002, the state's Natural Heritage and Endangered Species Program (NHESP) identified approximately 500 acres or 20 % of the ACEC as core habitat through their BioMap project that highlights areas in Massachusetts with high biodiversity and most in need of protection. That same year, NHESP listed 7 species that were either Endangered (E), Threatened (T) or of Special Concern (SC), including: the Shortnose Sturgeon (E- fish), Mattamuskeet Panic-Grass (E-plant), Diamondback Terrapin (T - reptile), Piping Plover (T- bird), Least Tern (SC- bird), New England Blazing Star (SC-plant), and Bristly Foxtail (SC - plant). American eel, rainbow smelt, blueblack herring, striped bass, trout, and white perch have also been sited in the area. In 2001, the NHESP also certified one vernal pool and located 6 potential vernal pools in this ACEC.

The Quashnet River, which stretches from the Bay to John's Pond in Mashpee, is an important migratory fish run for alewife and trout and is the site of successful restoration efforts. Habitat for soft shell clams, bay scallops, and quahogs can be found within the ACEC boundary according to draft maps made in 2003 by the Division of Marine Fisheries and based on historical information and interviews with local shellfish officers.

#### **Land Use**

One quarter of the land within the Waquoit Bay ACEC boundary is forested while approximately 15% of the area is covered by freshwater wetland or salt marsh habitats. The majority of the 770

acres or approximately 30% of the ACEC that is protected open space is owned by the state's Department of Environmental Management and includes Washburn Island and South Cape Beach State Park. Although only 70 acres of land within the boundary has been converted to residential development, a large portion of the land immediately adjacent to the ACEC has a mix of residential areas, especially in the densely developed Seacoast Shores on the west side of the Bay. Because of the high proportion of development near the ACEC, sources of nitrogen entering local waterways from septic systems and lawn fertilizers and their effects on such things as eelgrass beds are being studied by stewardship groups working in the region.

### **Economy**

The economies of Falmouth and Mashpee are tied to this area since local fishing and tourism industries depend on the natural resources in this ACEC. Rich shellfish populations, including soft shell clams, quahogs, and bay scallops, are an important part of the recreational and commercial fishing industry in the Bay. In 2002, tidal areas in the ACEC supported 22 acres of aquaculture lease sites used by one license holder. Residents and tourists are also drawn to the clean waters and beaches for recreational activities such as boating, swimming, walking, and bird watching. Public access is provided at WBNERR and on the town and state owned South Cape Beach.

### **Archaeology**

"Waquoit" is the Wampanoag name used by the Mashpee tribe who originally settled here. The Waquoit Bay ACEC contains nine archaeological sites, with four sites on Washburn Island alone. However, this number greatly underestimates the significant archaeological record around Waquoit Bay because many sites are lumped together on Washburn Island. One discovery of undated human remains from the Island was identified as that of a 30-year-old Native American female, while arrowhead and shellheap evidence can still be found in the area. Although limited, available information suggests that Waquoit Bay was first occupied 9,000 - 8,000 years ago.

### **Stewardship**

One goal of the ACEC program is to promote stewardship of this area's resources through the participation, cooperation, and expertise of many interest groups. The Waquoit Bay National Estuarine Research Reserve provides long-term protection of habitats and natural resources, serves as a natural laboratory for research, and promotes outreach and training activities. The Reserve works with partners to explore solutions to coastal management issues and transfers the information learned to the public and coastal decision makers in the region.

There have been numerous studies, restoration projects, and water quality monitoring conducted by a variety of groups in Waquoit Bay. A collaborative effort between Trout Unlimited and the Massachusetts Department of Fish and Wildlife is helping to restore the Quashnet River and has resulted in a self-sustaining brook trout population. Important studies are investigating the effects of nutrient loading and eutrophication of Bay waters. Other studies have focused on the loss of eelgrass beds, protection of drinking supplies, pathogens in the water, erosion of the coastline and barrier beaches, protection of endangered species, and ecological impacts of boats, docks, and piers.

The Quashnet River, Hamblin Pond, and Jehu Pond were selected in 2001 as priority waterbodies for the *Estuaries Project - Southeastern Massachusetts Embayment Restoration* conducted with collaboration of state agencies, academic institutions, and local municipalities. The goal of the Estuaries Project is to classify the nitrogen sensitivity of southeastern Massachusetts's coastal bays and estuaries. This study will result in the generation of planning and policy guidance

documents to help the communities of Waquoit Bay consider how to improve water quality by implementing nitrogen management strategies.

By becoming active stewards, community members can help monitor the condition, target problems, and find ways to improve and protect the natural resources in their ACEC. If you have any questions or ideas for stewardship in the Waquoit Bay ACEC, please contact the Massachusetts Office of Coastal Zone Management's ACEC Stewardship Coordinator, Katie Lund, at (508) 289-2889 or the Department of Environmental Management's ACEC Coastal Coordinator, Liz Sorenson, at (617) 626-1394. Also see the ACEC website, <http://www.mass.gov/dem/programs/acec> and WBNERR website, <http://www.waquoitbayreserve.org>.

**Who are local ACEC stewards?**

Waquoit Bay National Estuarine Research Reserve (WBNERR)  
WBNERR volunteers  
Citizens for the Protection of Waquoit Bay  
Waquoit Bay Watchers  
Waquoit Association  
Falmouth Associations Concerned with Estuaries and Saltponds (FACES)  
Trout Unlimited  
Coonamessett River Park Coalition

**What coastal resources are included (partially or entirely) in the ACEC?**

**Harbors, Sounds, Bays:** Waquoit Bay (*Falmouth, Mashpee*)

**Rivers:** Childs River, Quashnet River (*Falmouth*)

**Lakes, Ponds:** Bog, Bourne, Caleb, and Hamblin Ponds (*Falmouth*); Flat, Hamblin, Jehu, Jim, Little Flat, Sage Lot, and Witch Ponds (*Mashpee*)

**Brooks, Creeks:** Red Brook (*Mashpee*)

**Great Ponds (ponds > 10 acres):** Jim Pond (*Mashpee*)

**Outstanding Resource Waters (ORWs):** Waquoit Bay and Hamblin Pond (*Falmouth, Mashpee*); Childs River, Quashnet River, Bog, Bourne, and Caleb Ponds (*Falmouth*); Flat, Hamblin, Jehu, Jim, Sage Lot, and Witch Ponds, Red Brook (*Mashpee*). (*ORWs are waters, such as public water supplies and vernal pools that are protected by the most stringent standards because they constitute an outstanding resource as determined by their socio-economic, recreational, ecological, and/or aesthetic values.*)

**Barrier Beaches included in ACEC (Massachusetts Barrier Beach Inventory, CZM, 1982):** *in Falmouth - on Washburn Island:* beach to west of bay inlet (Fm-1), beach to east of Eel Pond Inlet (Fm-11), areas fronting marshes on east side of island (Fm-7,8,9), beach on west side of island opposite Bayview Drive (Fm-10); *within Waquoit Bay:* mouth of Quashnet River (Fm-3,4), area fronting Caleb Pond (Fm-5), fronting pond south of Waquoit cemetery (Fm-6), fronting Hamblin Pond (Fm-2); *in Mashpee:* South Cape Beach/Dead Neck (Ms-5), beach fronting Flat Pond (Ms-9)

### NATURAL RESOURCE ACREAGE ESTIMATES

*Note: acreages are estimated using Massachusetts Geographic Information System data (2001).*

| HABITAT TYPE       | ACREAGE<br>in ACEC | % of<br>ACEC | LAND USE    | ACREAGE<br>in ACEC | % of<br>ACEC |
|--------------------|--------------------|--------------|-------------|--------------------|--------------|
| barrier beach      | 135                | 5            | recreation  | 105                | 4            |
| eelgrass           | 100                | 4            | agriculture | --                 | --           |
| salt marsh         | 280                | 11           | residential | 72                 | 3            |
| tidal flat         | 6                  | <1           | commercial  | --                 | --           |
| freshwater wetland | 155                | 6            | industrial  | <1                 | <1           |
| cranberry bog      | 30                 | 1            |             |                    |              |
| forest             | 665                | 26           |             |                    |              |
| open water         | 1,227              | 48           |             |                    |              |
| 100 yr floodplain  | 2,105              | 79           |             |                    |              |

## G: Waquoit Bay ACEC Legal Boundary Description

The Waquoit Bay Area of Critical Environmental Concern (ACEC) boundary is defined as follows: the ACEC extends from the extreme southwestern end of Dead Neck barrier beach (mean low water, MLW)

CONNECTING LINE and extends straight across the entrance channel of Waquoit Bay by the shortest distance to the mean low water line of the western side of the entrance channel.

MLW The ACEC boundary then follows the MLW line in a westerly direction (excluding the western jetty of the Waquoit Bay entrance channel) to a point approximately 1370 feet (straight line measure) from the westernmost tip of Washburn Island. This point falls on a line perpendicular to the MLW line of Vineyard Sound and tangent to a segment of shoreline which is both the southeast MLW shoreline of Eel Pond and a western edge of Washburn Island.

CONNECTING LINE *The ACEC boundary then follows that perpendicular line to the intersection with the western MLW shore of Washburn Island.*

MLW *The boundary follows the MLW line along the Washburn Island to its extreme northeastern point.*

CONNECTING LINE *The boundary then extends from this point northerly into Waquoit Bay by the shortest distance to the 6 foot depth curve (datum: MLW).*

6 FOOT DEPTH CURVE *The boundary follows the 6 foot depth curve in a northerly direction to the point of intersection with a true azimuth bearing line of 150°, drawn from the southwestern most point of shoreline of the un-named pond east of Seapit Road.*

CONNECTING LINE *From this point of intersection the ACEC boundary then follows this above-mentioned bearing line in a northwesterly direction to the southwestern most point of shoreline of the un-named pond east of Seapit Road and continues along an extension of this straight line to the intersection with the 100 year flood boundary still east of Seapit Road.*

FLOODPLAIN *The ACEC boundary then follows the 100 year flood boundary (floodplain definitions are based on the most currently available Flood Insurance Rate Maps from the Federal Emergency Management Agency) in a generally easterly direction including all of Bourne Pond, Bog Pond, Caleb Pond, parts of the Quashnet River and Red Brook and all of Witch Pond, Fells Pond, and Jehu Pond.*

ROAD *At the point of the fifth intersection of the 100 year flood boundary with Great Oak Road, the ACEC boundary extends west on the northern side line of Great Oak Road across the 10 foot contour line (datum: mean sea level) to the second intersection with the 10 foot contour line (MSL).*

10 FOOT CONTOUR

CONNECTING LINE The ACEC boundary extends from this point in a northwesterly direction along the 10 foot contour line (MSL) to the point closest to the eastern shore (MLW) of the Great River.

MLW From this point the line extends by the shortest distance to the eastern shore (MLW) of the Great River.

CONNECTING LINE The boundary then extends in a northerly direction along the eastern shore (MLW) of the Great River to the western most point of the entrance channel to Jehu Pond.

MLW The boundary then extends due west to the MLW line on the west side of Great River

WETLAND *and following the MLW line northward to the boundary between Monomoscoy Island and the adjacent northerly salt marsh.*

CONNECTING LINE *The boundary follows along the southern edge of this salt marsh until it*

WETLAND *crosses Monomoscoy Road at the southern edge of the culvert,*

MLW *and continues along the southern edge of this salt marsh to the intersection with the MLW line on the eastern side of Hamblin Pond.*

CONNECTING LINE The boundary continues in a southerly direction along the MLW line on the east side of Hamblin Pond,

MLW connecting across the northern channel entrance of the Little River,

TOWN LINE and continues along the MLW line on the northern edge of Seconssett Island to the intersection of the MLW line and the town boundary between Falmouth and Mashpee.

MLW The ACEC boundary follows the town boundary to the intersection with the MLW line on the eastern shore of Waquoit Bay.

CONNECTING LINE The ACEC boundary extends from this point in a southerly direction along the MLW line, around Seconssett Island and then in a northerly direction to the point of intersection (Point A) with a true azimuth bearing line of 290°, drawn from the point (Point B) along the MLW line on the eastern shore of the Great River which is also the northernmost point (Point B) of property along the MLW line on the eastern shore of the Great River as described in the Plan of

PROPERTY LINE

ROAD Land, South Cape Beach, Mashpee, Mass., prepared for the Department of Environmental Management, Scale 1"=200', February 16, 1976, Briggs Engineering and Testing Co., Inc., Norwell, Mass., as revised March 31, 1976.

FLOODPLAIN The ACEC boundary then proceeds southeasterly from Point A along the previously described true azimuth bearing line of 290° to Point B

CONNECTING LINE and continues in an easterly direction along the northern boundary line of said Plan of Land for South Cape Beach to the intersection with the southern side line of Wills Work Road.

MLW The ACEC boundary follows the southerly side line of said Road to the intersection with Great Oak Road and then follows the southerly side line of Great Oak Road to the intersection with 100 year flood boundary.

From this point, the ACEC boundary follows the 100 year flood to the southernmost extent of the 100 year flood boundary in Mashpee.

The boundary then extends due south in a straight line to the MLW line of Vineyard Sound

and thence in a westerly direction along the MLW line along South Cape Beach to the point of origin.

Also included within the ACEC boundary is the land along the upper reaches of the Child's River. The ACEC boundary begins at the intersection of the northerly side line of Rt. 28 and the 100 year flood boundary on the eastern side of the Childs River.

FLOODPLAIN The ACEC boundary proceeds northerly along the 100 year flood boundary on the eastern side of the Childs River to the point where the 100 year flood boundary crosses the Childs River in a westerly direction. The ACEC boundary then follows the 100 year flood boundary on the western side of the Childs River in a southerly direction to the point of intersection with the northern side line of Rt. 28.

ROAD The ACEC boundary then proceeds from this point in an easterly direction across the Childs River to the point of origin.

Within the boundary the following exclusions exist:

- 1) The existing Waquoit Bay navigational channel (6 foot depth, Mean Low Water) extending in a northerly direction from the entrance jetties of Waquoit Bay to the head of Waquoit Bay. Specifically, this means the channel delineated by existing U.S. Coast Guard buoys (See National Oceanic and Atmospheric Administration, nautical chart 13229, 15th Ad., February 3, 1979, page C, Waquoit Bay and U.S. Coast Guard navigational buoys). Where the channel is unmarked by buoys, the west channel boundary will be delineated by a straight line drawn from buoy C-7 northerly to the western edge of Bourne Pond. This channel would extend no further than 100 feet to the east of the west channel boundary and not exceed a dredged depth of 6 feet below mean low water. This channel will extend no further north than the present Falmouth town

landing (near Seapit Road).

- 2) The existing Seconsett navigational channel extending from U.S. Coast Guard buoy N-6 (see NOAA nautical chart #13229, 15th Ad., February 3, 1979, page C, Waquoit Bay and U.S. Coast Coast navigational buoys) to the entrance of the Great and Little Rivers, Mashpee. The southern boundary of the Seconsett channel extends from buoy N-6, southeasterly in a direct line not to extend beyond Seconsett point. The width of the Seconsett channel will not exceed 100 feet from the southern boundary line. The Seconsett channel will not exceed a dredged depth of 6 feet below MLW.
- 3) The existing small culvert beneath Monomoscoy Road, Mashpee.

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*Where ACEC boundaries are defined by the location of natural resource features (e.g. floodplain, wetlands), the boundaries are subject to change based on the most current definitions and data. For a review of site specific projects within the ACEC boundary, determinations need to be made in the field or in consultation with ACEC Program staff.*

*Coastal ACEC Boundary Clarification Project, November 2002.*

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# H: WBNERR Land Acquisition Plan: 2006-2011

## Introduction

### Purpose

The WBNERR Land Acquisition Plan documents a strategy to acquire interest (fee simple or easement) in key land parcels in proximity to the Reserve boundary that provide one or more of the following values:

- Resource protection for terrestrial resources,
- Resource protection for aquatic/estuarine resources,
- Access for research,
- Access for education programs,
- Sites for stewardship demonstrations,
- Locations for potential research/education facilities, and/or
- Access for passive coastal recreation.

The Reserve will pursue acquisitions independently and in partnership with other organizations.

### Overview of WBNERR

Waquoit Bay National Estuarine Research Reserve, located in the towns of Falmouth and Mashpee in Massachusetts, was formally established in June 1998. It is composed of open waters, barrier beaches, sand dunes, fresh and salt marshes, rivers, and mixed pine and oak forests. The more than 2,700 acres of aquatic and terrestrial habitat in the Reserve are representative of the New England portion of the Virginian biogeographic province.

The Reserve is guided by the following mission, vision, and goal statements:

**Mission:** To improve the stewardship of the region's estuarine and coastal watershed ecosystems.

**Vision:** To be recognized as a vital regional resource for expertise on sustainable coastal management provided through integrated programs of coastal ecosystem research and monitoring; management and stewardship; and education and training aimed at coastal communities, organizations, and individuals.

#### Goals:

1. Improve the understanding of coastal ecosystems and the human influences on them.
2. Improve environmental literacy in our communities to enable environmentally-sustainable decision-making.

3. Demonstrate sustainable stewardship of the land and water ecosystems within the Reserve to serve as a model for community stewardship in the region.
4. Foster dialogue and development of coastal ecosystem management solutions through sustained community engagement.
5. Improve the operations, infrastructure and stature of the Reserve.

The Reserve's primary activities are organized into three program areas: research and monitoring, training and education, and stewardship. All of the programs address the themes of water quality/eutrophication, climate change/renewable energy, and coastal ecosystem management. The program areas are supported by the Reserve's administrative and maintenance functions. Presently, there are thirteen full-time positions, two job-sharing positions, and six categories of seasonal employees. The actual number of seasonal employees changes annually based on funding.

### **Local Real Estate Market**

Cape Cod is one of the nation's major resorts, located 75 miles from Boston and Providence and 250 miles from New York City. WBNERR is located in two towns, Falmouth and Mashpee, with roots dating back to the seventeenth century. Today, both towns are becoming increasingly more developed. In fact, they are two of the most rapidly growing towns in Massachusetts. Undeveloped land in the area is rapidly disappearing as the once rural landscape becomes suburbanized. Developable parcels greater than 100 acres no longer exist in the vicinity of Waquoit Bay and its watershed. In fact, there are only a few examples of developable parcels of greater than 30 acres. Most unprotected, undeveloped land remaining in the area is in parcels of two to thirty acres and many of these pieces are already, or are in the process of being, subdivided.

The decreasing regional supply of developable land makes land protection ever more important. The associated increase in land pricing, however, makes land protection ever more challenging. Waterfront and waterview land is almost entirely developed and remaining parcels are priced at a tremendous premium. Even inland of the water within the Waquoit Bay watershed, the demand for residential housing is driving up the price of undeveloped land. Recent market research indicates that neighborhood subdivisions with privacy and a high level of conformity support home prices in the range of \$650,000 and above. The remaining undeveloped land parcels in the vicinity of the Reserve are currently highly vulnerable to this type of development. Additionally, the State of Massachusetts' Comprehensive Permit Law (known as Chapter 40 B) which allows for a relaxation of local zoning restrictions when a proposed development includes affordability restrictions on 25% of its units, enables higher housing densities that, in turn, lead to higher land values.

In the past, WBNERR has been integral in protecting large tracts of land threatened by conversion to residential developments. The Reserve's land preservation efforts have created the regionally unique environment that exists today for research, education, stewardship and

recreation. WBNERR's role in land acquisition is changing with the changing regional real estate market. There are few opportunities for large parcel protection that match the high profile successes of the past. A variety of opportunities exist, however, to protect important resource values and provide sites for enhanced research, education and stewardship activities through the acquisition of certain smaller parcels in the area. This plan describes the strategy for identifying parcels for acquisition by WBNERR.

## **Boundary Change**

Despite the very challenging real estate market, the Reserve has gained title to five properties since the last management plan was written. These properties, listed below, are being incorporated into the Reserve boundary with this management plan (refer to Figure 1).

- The two Childs River properties total 19 acres and straddle the Childs River (the second largest tributary to the Bay) just upstream of tidal influence. The property includes coastal pine/oak woodland habitat and unique coastal low gradient stream habitat important to multiple migratory fish species.
- The 35 acre Abigail Brook parcel is located immediately adjacent to the easternmost portion of the Reserve in the vicinity of Upper Great River. This property includes coastal upland pine/oak woodland and important riparian buffer to the adjacent Abigail Brook and its associated wetlands.
- The 10 acre Phinney parcel is located near the Quashnet River in the central portion of the Bay's watershed. The property includes pine oak woodland characteristic of coastal uplands in the area.
- The 35 acre NStar parcel is also located near the Quashnet River in the central portion of the Bay's watershed. It is immediately adjacent to the Reserve's Quashnet River Area property and includes a variety of coastal upland and wetland habitats, including some vernal pool and freshwater wetland habitats not previously represented in the Reserve.

The Reserve has also acquired a conservation easement on about seven acres of Town of Mashpee open space land which is not being incorporated into the Reserve boundary at this time.

Protection of the five properties listed above prevents their future development and, thus, eliminates potential new sources of nitrogen in the Waquoit Bay estuarine ecosystem. Inclusion of these properties within the Reserve boundary adds underrepresented habitats typical of the biogeographic province, including various migratory fish runs, coastal forested uplands and freshwater wetlands. These properties also provide previously non-existing access and further opportunities for the Reserve's research and education programs.

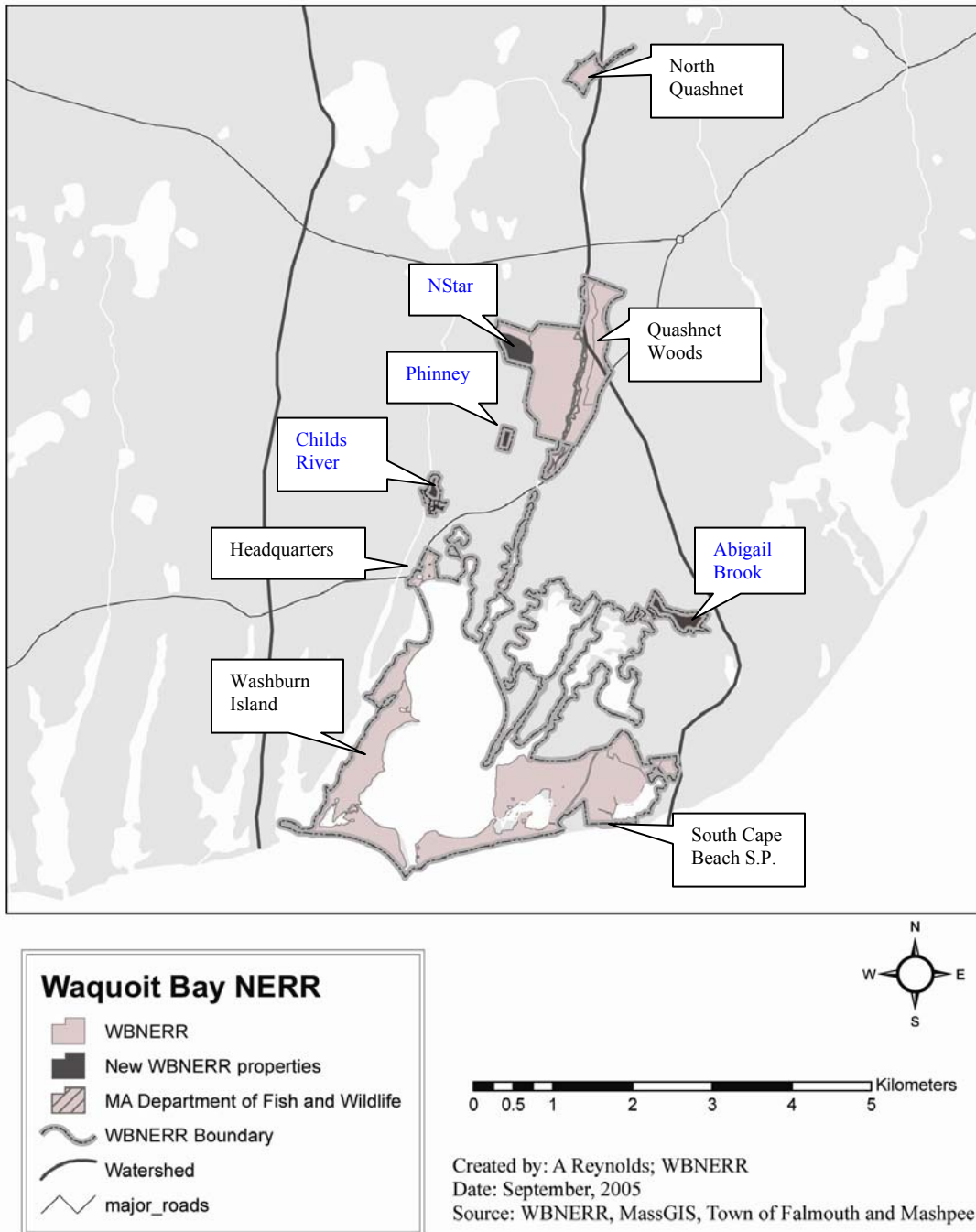
All of these parcels have a history of rural agricultural land use. Cranberry operations existed at the Childs River and Abigail Brook parcels, while grazing was the likely historic land use at the other parcels. Agricultural operations at all sites have been abandoned for at least 30 years and vegetation succession is occurring on all of the properties.

With the inclusion of these properties into the NERR boundary, they are subject to all land and water resource management, signage and public information, law enforcement, and other site

control activities outlined in this Management Plan. Reserve led biological monitoring, including vegetation and rare species, has already begun in these areas. The habitats represented on these properties are currently being made available to research, education and stewardship demonstration activities. For example, an invasive species control project is currently underway at the Childs River property, vernal pool monitoring is occurring at the NStar property and restoration of tidal restrictions is being planned for the Abigail Brook property.

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**Figure 1: WBNERR Boundaries.**



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## **Public and Community Involvement in Development of the Land Acquisition Plan**

WBNERR's land acquisition activities are guided by, and coordinated with, the land acquisition priorities of the Mashpee National Wildlife Refuge. The Refuge was established in 1995 by the U.S. Fish and Wildlife Service, through an act of Congress, to assure long-term protection of the unique and highly productive natural resources associated with the Waquoit Bay watershed. The authorizing legislation established a land acquisition boundary that includes 5,871 acres, the majority of which lie within the Waquoit Bay watershed. Also in 1995, the U.S. Fish and Wildlife Service developed a Land Protection Plan that prioritized all land parcels within the land acquisition boundary based on:

- Biological significance of the habitat for the protection of the Waquoit Bay watershed,
- Existing and potential development threats,
- Continuity with other protected parcels within the Refuge, and
- Availability of willing sellers.

Concurrent with establishment of the Reserve, eight Federal, state, local and private conservation organizations, including WBNERR, formed the Mashpee National Wildlife Refuge Conservation Partnership (MNWRCP). At the time of designation, 2,782 acres of land within the acquisition boundary were already protected by the organizations of the MNWR Partnership. Since 1995 the partners have protected approximately 1,400 additional acres of land within the acquisition boundary. WBNERR has gained title to several parcels and has facilitated the acquisition of land by partner organizations. In recent years WBNERR has focused all land acquisition activities toward parcels that are both within the MNWR land acquisition boundary and within the Waquoit Bay watershed boundary, and has worked closely with other MNWR partner organizations in planning, prioritizing and implementing land acquisitions.

All of the new lands acquired by WBNERR during the past five years are within the MNWR land acquisition boundary. A Final Environmental Assessment of the MNWR (USFWS 1995) found “no significant impact” would result from the proposal to cooperatively preserve, protect, and manage lands within the towns of Mashpee and Falmouth. The proposal was developed by USFWS after extensive public input from citizens, elected officials, government agencies, and interested organizations.

The *Waquoit Bay National Estuarine Research Reserve Management Plan, 2006-2011* (of which this land acquisition plan is a part) was, likewise, developed with input from core constituents and partners. About a dozen citizens attended a public meeting on December 8, 2004 to offer their advice about where the Waquoit Bay Research Reserve's efforts should be focused over the next five years. Participants were invited to address three broad questions:

- Which of the Reserve's programs are most beneficial?
- Which could be improved? and,
- Are there unmet needs the Reserve can address?

WBNERR staff also met individually with representatives of the scientific, education, and coastal management communities (refer to Acknowledgements) to solicit their insights and



recommendations for future management of the Reserve. The WBNERR interviewer prepared notes following each meeting and shared these with other staff members, as appropriate, for their consideration and potential inclusion in the Management Plan.

A full draft of the *Management Plan* was circulated in the summer of 2005 to key partners within state and Federal government. Once recommendations generated by this first review were incorporated and partner agencies were comfortable with the content of the plan, a 30-day public comment period was initiated by publishing a notice in the MEPA Environmental Monitor on April 10, 2006. A public meeting was held May 3, 2006. A summary of all comments received during the MEPA review and actions taken to address them is included in Appendix A.

## Existing Land Protection Tools

A variety of excellent conservation planning tools currently exist to guide land protection in the State of Massachusetts. WBNERR and the Mashpee National Wildlife Refuge Conservation Partnership drew heavily upon the resources and policies of BioMap, Living Waters, the Massachusetts Statewide Land Conservation Plan (SLCP), and the Coastal and Estuarine Land Conservation (CELC) Plan when developing this land acquisition plan.

- **BioMap:** BioMap, a program of the the Massachusetts Natural Heritage and Endangered Species Program (NH&ESP), maintains and continually updates a series of maps depicting “Core Habitats” and “Supporting Natural Landscapes” critical for protecting biodiversity in Massachusetts. The maps are based on a long-term data base of rare plants, animals and natural communities in the state. The terrestrial “Core habitat” areas include multiple sites for 246 rare plant species, 129 rare animal species (vertebrates and invertebrates), and 92 natural community types.
- **Living Waters:** Living Waters, another MA NH&ESP effort, is intended to compliment BioMap. Living Waters identifies the lakes, ponds, rivers and streams that should be the highest priority for freshwater biodiversity conservation in Massachusetts. Similar to BioMap, these special areas are referred to as “Core Habitats” and are comprised of the most important habitats for rare aquatic animals and plants and exemplary freshwater habitats. The Living Waters report also identifies the “Critical Supporting Watershed” for each of the freshwater “Core Habitats.” The Supporting Watersheds included the portion of the watershed that has the greatest potential to sustain or degrade the “Core Habitats”.
- **Massachusetts Statewide Land Conservation Plan (SLCP):** The Massachusetts Statewide Land Conservation Plan (SLCP) was developed by a 33-member task force that was appointed by the Commonwealth’s Secretary of Environmental Affairs in the spring of 2001 and included all major state and regional land trusts, state and Federal conservation agencies, statewide watershed and conservation commission organizations, a regional planning agency, and a conservation foundation. The goal of the task force was to use existing statewide and regional plans and other data to develop a strategy that would protect the six major resource categories of the Commonwealth including: water resources, important habitat, working farms and forests, greenways, outdoor recreation sites, and urban parks.

The plan includes specific acreage goals that should be protected by the partners and a discussion of the various tools that should be considered for conservation protection. Core Habitat and Supporting Natural Landscape areas identified in the BioMap project form a large component of the plan. Other areas were considered to have statewide or regional significance and in the Cape Cod region, were included in the SLCP if they were contained in three or more regional conservation planning efforts. Land acquisitions by Massachusetts state agencies, including DCR are guided by the SLCP.

- **Coastal and Estuarine Land Conservation (CELC) Plan:** In 2005, the Massachusetts Office of Coastal Zone Management in cooperation with other state and Federal land management agencies, including the Department of Conservation and Recreation, developed a statewide Coastal and Estuarine Land Conservation (CELC) Plan. This plan was developed as a requirement to allow Massachusetts coastal land protection projects to be eligible for funding from NOAA's Coastal and Estuarine Land Conservation Program (CELCP). This plan provides an assessment of priority conservation needs and clear guidance for nominating and selecting coastal and estuarine land conservation projects within the state. Land areas identified for protection in this plan are based on lands identified within the BioMap, Living Waters and the SLCP that occur in the coastal towns of Massachusetts. The CELC Plan does not include parcels from the SLCP that were valued solely for agricultural/silvicultural values and gives parcels protective of drinking water resources equal importance to parcels protective of other resource values (SLCP gives twice the consideration to drinking water as to other resource values). Additional parcels were included in the CELCP for proximity to marine and estuarine shoreline (all parcels greater than three acres in size and within 2,000 feet of shoreline), for proximity to major surface water tributaries (all parcels greater than three acres in size within 1000 feet of a major tributary), and for proximity to regional trails (all parcels within 200 feet of an existing or proposed regional trail).

## **WBNERR Stewardship Focus Area**

The Stewardship Focus Area (SFA) is the geographic planning area identified by WBNERR that contains those lands and resources that, if altered, are likely to change (improve or degrade) the quality of resources and/or uses within the Reserve boundary. The SFA includes the designated lands and waters of the Reserve, as well as other lands as defined below.

Research at WBNERR has clearly demonstrated that changes in land use within the watershed are capable of causing drastic degradation of natural resources within the Waquoit Bay estuary. Thus, WBNERR is concerned with land use planning throughout the Waquoit Bay watershed, particularly activities that are known to increase watershed derived nitrogen loads to the estuary (*i.e.*, discharge of nitrogen to the atmosphere, land, surface water or groundwater) and all lands within the watershed of the Waquoit Bay estuarine system are included in the SFA. Most land within the Waquoit Bay watershed that has not been set aside for conservation has already been developed for residential, commercial, retail and military aviation uses. Nonetheless, several parcels containing important habitat or other attributes of value to advance WBNERR's mission still exist.

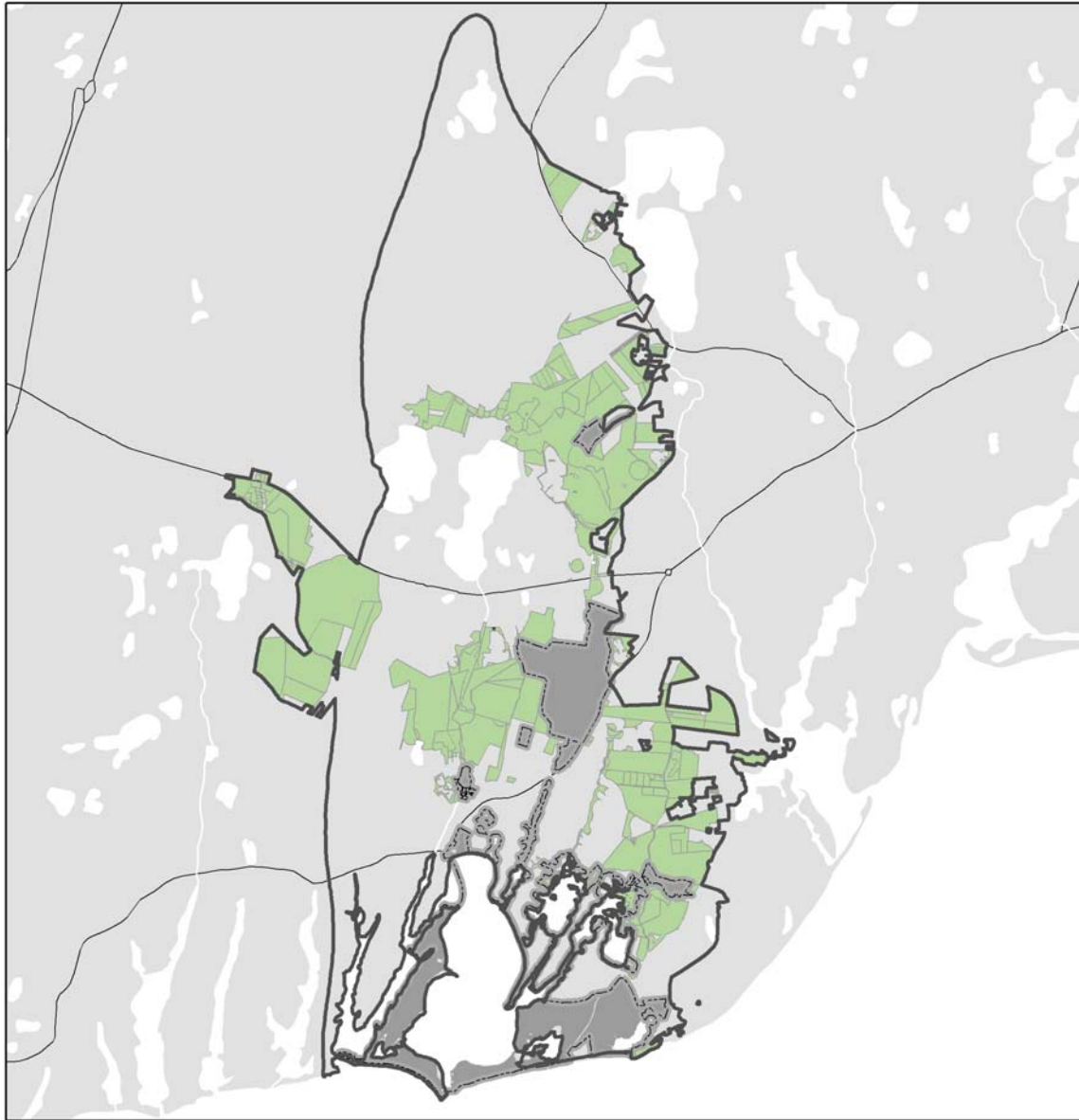
Additionally, there are some parcels that lie outside of the Waquoit Bay watershed that have been included in the MNWR boundary because they are the last remaining contiguous parcels of representative coastal terrestrial and freshwater wetland habitats remaining in the vicinity of the estuary. WBNERR has an interest in the ecological integrity of the habitats contained on these lands as well. Therefore, all lands included in the MNWR land acquisition boundary are included in the WBNERR SFA.

The WBNERR Stewardship Focus Area, thus, includes all of the following areas:

- All designated Reserve lands and waters,
- All land parcels that lie (at least partially) inside the watershed boundary of the Waquoit Bay estuarine system.
- All land parcels within the MNWR land acquisition boundary

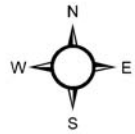
The WBNERR SFA is depicted in Figure 2.

**Figure 2:** WBNERR Stewardship Focus Area.



**Stewardship Focus Area**

- Waquoit Bay NERR
- MNWR protected parcels
- WBNERR boundary
- Stewardship Focus Area



Created by: A Reynolds; WBNERR  
Date: September, 2005  
Source: WBNERR, MassGIS, Town of Falmouth and Mashpee

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## **Resource Assessments**

### **Land Use**

Lands within the SFA are primarily composed of upland pitch pine/oak forests, freshwater wetlands, kettle ponds and other habitats representative of the bioregion. Much of the forested open space in the watershed has been converted to low density single family home residential development (Figure 3). The towns of Falmouth, Mashpee and Sandwich lie within the Waquoit Bay watershed. These are some of the most rapidly growing towns in Massachusetts.

Commercial and retail developments occur along Route 28 and Route 151. The Massachusetts Military Reservation, including a large airstrip and associated facilities, exists in the northern most portion of the watershed. A limited amount of land in the watershed is still used for cranberry agriculture.

### **Rare, Threatened or Endangered Species**

A variety of state and Federally listed protected species occur within the watershed (Figure 4).

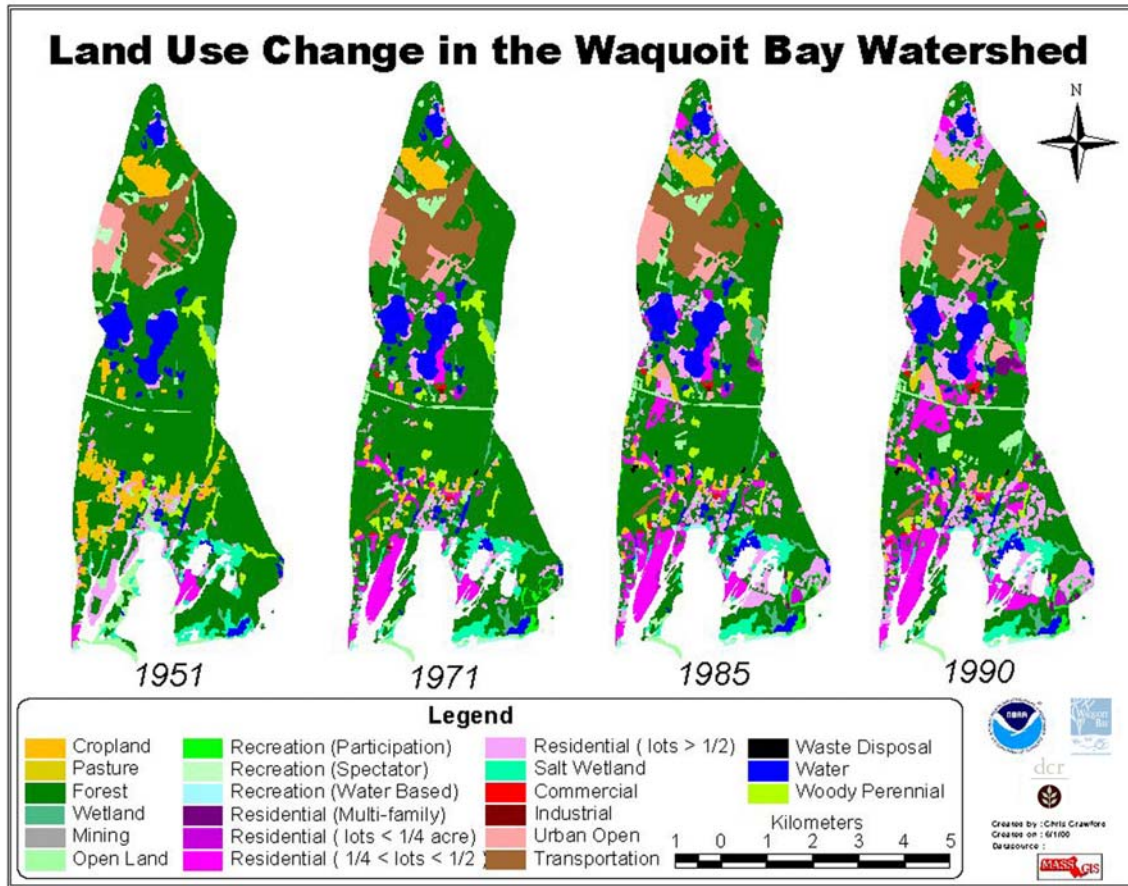
### **Archeological, Historical, and Cultural Resources**

The Waquoit Bay region is the ancestral and modern home of the Wampanoag Indians. There are, therefore, an abundance of significant archeological sites within both the Reserve Boundary and the SFA. Details about specific sites, including locations, are kept confidential because of the vulnerability of these irreplaceable resources. The information is maintained by the Massachusetts Historical Commission and the DCR Office of Cultural Resources. Such resource values should be considered in planning future land acquisition and protection activities.

The Reserve's headquarters are located within the Waquoit National Historic District (Figure 5). The Historic District was established in 2004 in recognition of the area's significance as an isolated Falmouth Village that reached the high point of its development in the 1850s with industrial, marine, agricultural, and summer tourism components. The Historic District is roughly bounded by the Childs River, Carriage Shop Rd., Waquoit Hwy., Moonakis River, Moonakis Rd., Waquoit Bay, and Waquoit Landing.

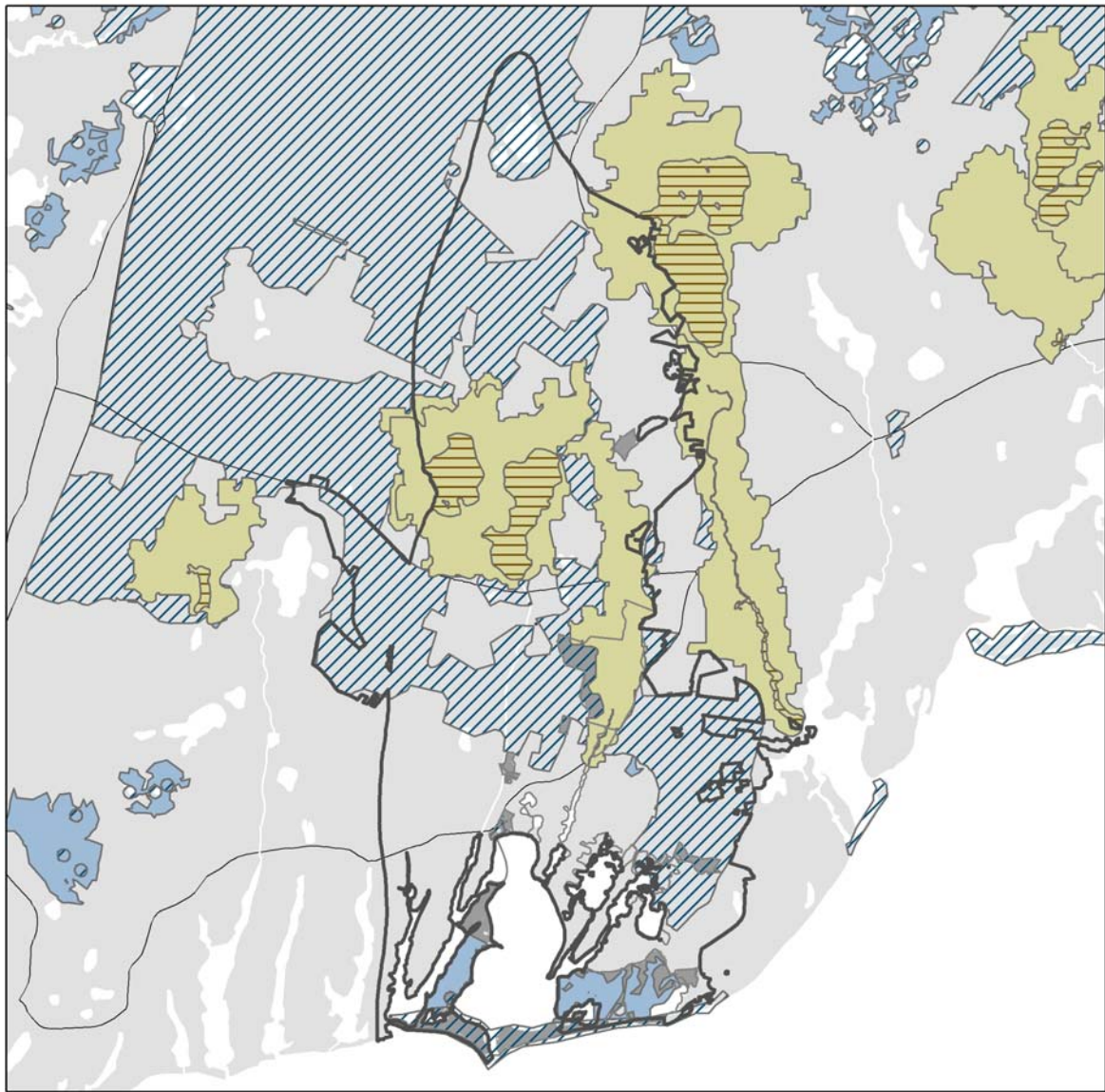
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**Figure 3:** Land Use Change in the Waquoit Bay Watershed.



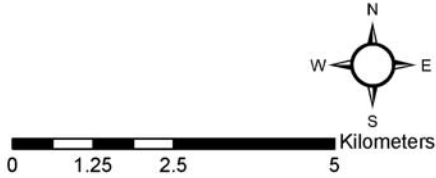


**Figure 4:** Rare species habitat.



**Rare Species Habitat**

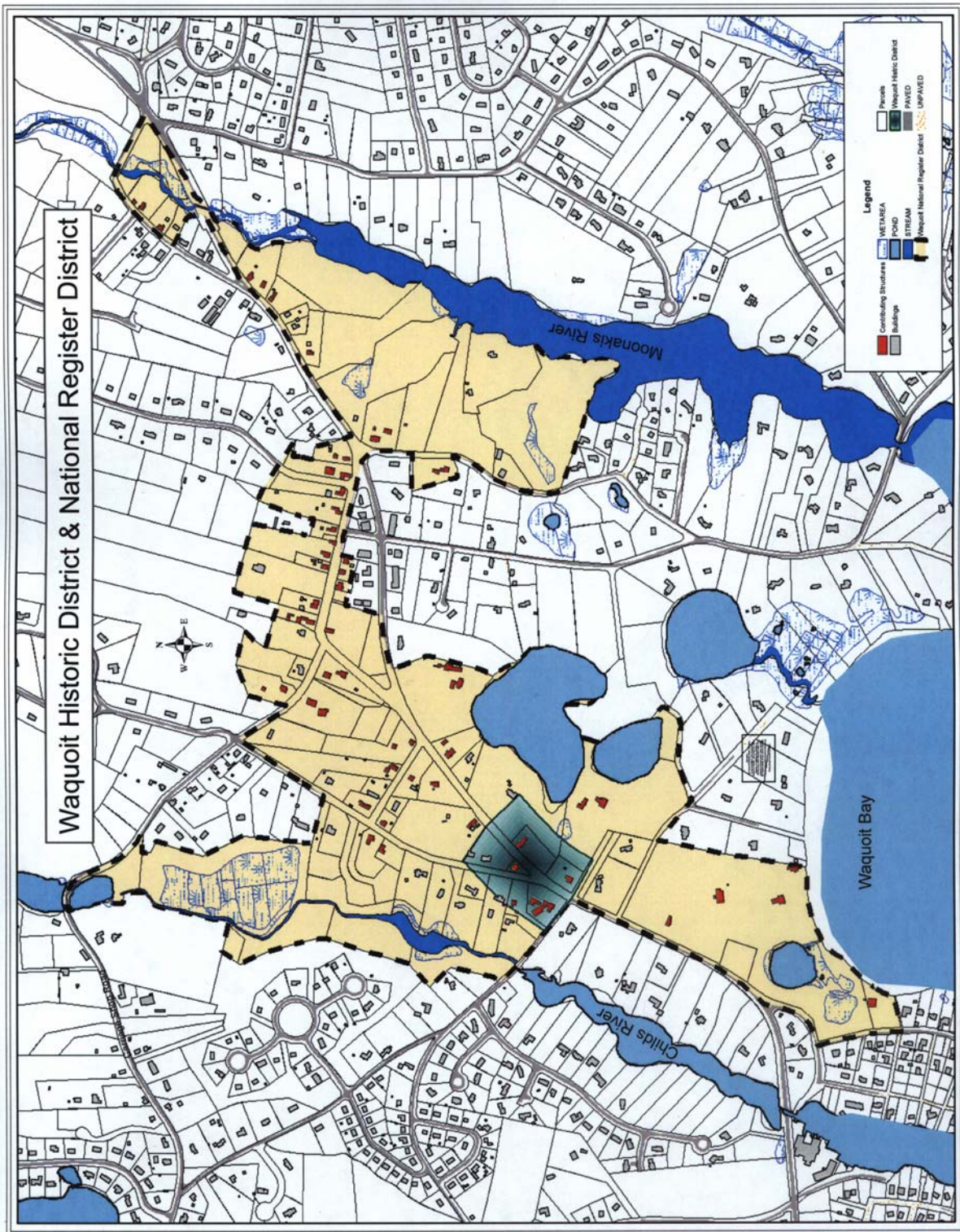
-  Stewardship Focus Area
-  Waquoit Bay NERR
-  NHESP BioMap Core Habitat
-  NHESP BioMap Supporting Natural Landscape
-  NHESP Living Waters Core Habitat
-  NHESP Living Waters Critical Supporting Watershed
-  Major Roads



A north arrow with 'N', 'S', 'E', and 'W' labels. Below it is a scale bar labeled 'Kilometers' with markings at 0, 1.25, 2.5, and 5.

Created by: A Reynolds; WBNERR  
Date: September, 2005  
Source: WBNERR, MassGIS,  
Town of Falmouth and Mashpee,  
Natural Heritage and Endangered Species  
Program (NHESP)

Figure 5: Waquoit National Historic District.



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## Priority Land Types

The following descriptors classify land types that exist within the SFA that are priorities for acquisition in order to advance the WBNERR mission.

- **Shoreline:** This category includes actual coastal shoreline on Nantucket Sound, the Waquoit Bay Estuarine System and its associated salt pond embayments and salt marshes, the estuary's tributary rivers, and the kettle ponds of the watershed.
- **Coastal habitats:** This category includes any land within 2000 feet of a shoreline. These areas often contain important habitats and are critical to controlling non-point source nitrogen loading to surface waters.
- **Rare/protected species and unique natural habitats:** This category includes state identified coastal "core habitats" for listed species such as piping plover and least tern (which would also be included in "coastal habitat" above), but also includes "core habitat" areas for inland and freshwater species within the SFA which are also very important coastal resources needing protection.
- **Contiguous large undisturbed habitats:** This category includes parcels that abut or are adjacent to existing protected conservation lands. Such parcels can significantly build upon the values of the existing protected land by buffering existing protected habitats and providing large, unfragmented natural habitat areas for flora and fauna that require them. Preservation of large contiguous areas of undeveloped land is particularly important in the Waquoit Bay area on Cape Cod because development patterns in the region have made these unfragmented areas increasingly rare.
- **Contributing watershed area:** This category refers to any piece of land that drains to groundwater discharging into the Waquoit Bay estuary system. The waters of the Waquoit Bay estuary are highly affected by land derived pollutants, particularly nitrogen, moving to the Bay by groundwater and streams. Protecting watershed land can reduce pollutants from a variety of the most prominent sources. Also, natural habitats effectively intercept pollutants coming from outside sources, such as atmospheric deposition.

## Priority Areas

The following list describing WBNERR's priorities for land acquisition, including land parcels within the Stewardship Focus Area that remain threatened with development. Working through the Mashpee National Wildlife Refuge Partnership, or alone, using established DCR land acquisition procedures, the Reserve will work to acquire these priority land parcels from willing sellers. Acquisition will occur with funds from NOAA, DCR, other grant sources, a combination of these or through donation. The Reserve will prioritize fee simple acquisitions, but will consider easements of the appropriate type on parcels where it will better suit the needs of the Reserve and the available funding. Individual properties are not given priority ranking because of the constantly changing market environment. Inclusion of valuable habitat, continuity with existing WBNERR land or water, continuity with other conservation lands, proximity to surface waters, and level of development threat are all considered along with development threat, market conditions and available funding when making specific land acquisition decisions.

Possible partners for land acquisition include the Compact of Cape Cod Conservation Land Trusts and all of the members of the MNWR Conservation Partnership: United States Fish and Wildlife Service, MA Department of Fisheries and Wildlife, Town of Mashpee, Town of Falmouth, The 300 Committee, The Orenda Wildlife Land Trust, and Falmouth Rod and Gun Club.

Individual parcel acquisition projects will include a variety of actions by WBNERR. Funding will be sought from state, Federal and other sources in order to acquire parcels within the areas identified in this plan. The possibility of real estate donations of parcels within the SFA will be investigated and donations will be accepted. The Reserve will continue to work with the MNWR partners to encourage creative land protection deals in the spirit of the three way land swap that resulted in the 2005 acquisition of the NStar parcel. Acquisition of conservation restrictions will be investigated as an alternative to full fee acquisition. When funding is not available to the Reserve, partner organizations will be encouraged and assisted in protecting lands within the SFA.

### **Estuary Waterfront**

Reasons for acquisition: Undeveloped parcels in this area represent the few remaining unprotected, undeveloped land parcels that immediately abut the estuaries, tributaries or associated surface waters of the Waquoit Bay estuary ecosystem. Because of their proximity to the water these parcels are burdened with the highest risk of development. These parcels are unique and valuable for their proximity to the shoreline. The natural communities that they support, including fish, wildlife and vegetation resources are limited and vanishing resources in the Waquoit Bay area. These parcels also yield significant benefits to surface water quality in their undeveloped condition. Proximity to the water also gives these parcels very high value for Reserve research, education and stewardship activities. Some of these parcels could provide sites for waterfront research and education facilities.

Land use regulations: The use of these undeveloped parcels is regulated by Falmouth and Mashpee bylaws. Land use is also subject to regulation under Massachusetts laws including the Massachusetts Environmental Policy Act (MGL c. 30, ss. 61-62H and 301 CMR 11.00), Public Waterfront Act (MGL c. 91 and 310 CMR 9.00), Wetlands Protection Act (MGL c. 131, s. 40 and 310 CMR 10.00), Massachusetts Coastal Zone Management (MCZM) Program Regulations (310 CMR 21.00), and State and Federal Endangered Species Act (M.G.L. c. 131A and 321 CMR 8:00, 321 CMR 10:00).

How acquisition will further purpose and goals of Reserve: The acquisition of estuarine waterfront land will protect estuarine and surface water quality and natural communities. Acquisition will also allow access to the estuary and shoreline for research, education and stewardship activities. Additionally, some of these parcels could provide valuable public access for passive recreation.

Post acquisition stewardship: Stewardship at each acquired parcel would be similar to stewardship at existing Reserve parcels and would likely include signage, surveillance, enforcement, and habitat protection and restoration.

Potential partners: The organizations of the Mashpee National Wildlife Refuge conservation are possible partners for all land acquisition projects.

Acquisition costs and future ownership: Full fee ownership is desirable for most parcels. Conservation restrictions on some of these parcels, however, could provide significant benefits if fee ownership is not negotiable due to limited funding or other reasons. Market values in the vicinity of the Reserve range from \$200,000 to over \$1 million per developable acre depending on proximity to waterfront. All interests, fee or otherwise, would be owned by the Commonwealth of Massachusetts.

## **Central Watershed**

Reasons for acquisition: These key land parcels remain unprotected from development in an area where a very successful coordinated effort has protected large tracts of land. This area includes the subwatersheds for the Childs and Quashnet Rivers, the two largest tributary streams of the Waquoit Bay estuary system. Protection efforts by the partners of the Mashpee National Wildlife Refuge have had tremendous benefits in terms of protecting water quality in the estuary and natural habitat in and adjacent to the two streams, both of which are important anadromous fish runs. Development of any of these key parcels will contribute to nitrogen loading in the estuary and will undermine benefits of the proposed plan to protect large contiguous tracts of habitat anchored by the existing WBNERR Quashnet River Area and Childs River Area parcels. Each of these parcels has very high value for Reserve research, education and stewardship activities.

Land use regulations: The use of these undeveloped parcels is regulated by Falmouth and Mashpee bylaws. Land use is also subject to regulation under Massachusetts laws including the Massachusetts Environmental Policy Act (MGL c. 30, ss. 61-62H and 301 CMR 11.00), Public Waterfront Act (MGL c. 91 and 310 CMR 9.00), Wetlands Protection Act (MGL c. 131, s. 40 and 310 CMR 10.00), Massachusetts Coastal Zone Management (MCZM) Program Regulations (310 CMR 21.00), and State and Federal Endangered Species Act (M.G.L. c. 131A and 321 CMR 8:00, 321 CMR 10:00).

How acquisition will further purpose and goals of Reserve: Acquisition of parcels in the central watershed will protect estuarine and surface water quality and natural communities. Acquisition would also protect significant tracts of undisturbed natural habitat important for some research, education and stewardship activities. Some of these parcels could also provide valuable public access for passive recreation.

Post acquisition stewardship: Stewardship at each acquired parcel would be similar to stewardship at existing Reserve parcels and would likely include signage, surveillance, enforcement, and habitat protection and restoration.

Potential partners: The organizations of the Mashpee National Wildlife Refuge conservation are possible partners for all land acquisition projects.

Acquisition costs and future ownership: Full fee ownership is desirable for most parcels. Conservation restrictions on some of these parcels, however, could provide significant benefits if fee ownership is not negotiable due to limited funding or other reasons. Market values in the vicinity of the Reserve range from \$200,000 to over \$1 million per developable acre depending on proximity to waterfront. All interests, fee or otherwise, would be owned by the Commonwealth of Massachusetts.

## **East Reserve**

Reasons for acquisition: These key land parcels remain unprotected from development in an area where a very successful coordinated effort has protected large tracts of land. This area includes the subwatershed for Jehu Pond, one of the few remaining areas containing eel grass habitat in the Waquoit Bay estuary system. WBNERR's Abigail Brook area is in this vicinity and some of these priority parcels would protect the upper portion of Abigail Brook's watershed and area with high potential for habitat restoration research and demonstration projects. Protection of each of these parcels has very high value for Reserve research, education and stewardship activities and would help to limit nitrogen loading.

Land use regulations: The use of these undeveloped parcels is regulated by Mashpee bylaws. Land use is also subject to regulation under Massachusetts laws including the Massachusetts Environmental Policy Act (MGL c. 30, ss. 61-62H and 301 CMR 11.00), Public Waterfront Act (MGL c. 91 and 310 CMR 9.00), Wetlands Protection Act (MGL c. 131, s. 40 and 310 CMR 10.00), Massachusetts Coastal Zone Management (MCZM) Program Regulations (310 CMR 21.00), and State and Federal Endangered Species Act (M.G.L. c. 131A and 321 CMR 8:00, 321 CMR 10:00).

How acquisition will further purpose and goals of Reserve: Acquisition of parcels in the east watershed will protect estuarine and surface water quality and natural communities. Acquisition would also protect significant tracts of undisturbed natural habitat important for some research, education and stewardship activities. Some of these parcels could also provide valuable public access for passive recreation.

Post acquisition stewardship: Stewardship at each acquired parcel would be similar to stewardship at existing Reserve parcels and would likely include signage, surveillance, enforcement, and habitat protection and restoration.

Potential partners: The organizations of the Mashpee National Wildlife Refuge conservation are possible partners for all land acquisition projects.

Acquisition costs and future ownership: Full fee ownership is desirable for most parcels. Conservation restrictions on some of these parcels, however, could provide significant benefits if fee ownership is not negotiable due to limited funding or other reasons. Market values in the vicinity of the Reserve range from \$200,000 to over \$1 million per developable acre depending on proximity to waterfront. All interests, fee or otherwise, would be owned by the Commonwealth of Massachusetts.

## **Northern Watershed**

Reasons for acquisition: These parcels fall within the land acquisition boundary of the Mashpee National Wildlife Refuge in the northern part of the Waquoit Bay watershed. Protection of these parcels would limit nitrogen loading associated with land development to the Quashnet River and the estuaries. Protection of these parcels will also contribute to protection of large contiguous parcels of natural habitat that are important for some Reserve research, education and stewardship activities.

Land use regulations: The use of these undeveloped parcels is regulated by Falmouth and Sandwich bylaws. Land use is also subject to regulation under Massachusetts laws including the Massachusetts Environmental Policy Act (MGL c. 30, ss. 61-62H and 301 CMR 11.00), Public Waterfront Act (MGL c. 91 and 310 CMR 9.00), Wetlands Protection Act (MGL c. 131, s. 40 and 310 CMR 10.00), Massachusetts Coastal Zone Management (MCZM) Program Regulations (310 CMR 21.00), and State and Federal Endangered Species Act (M.G.L. c. 131A and 321 CMR 8:00, 321 CMR 10:00). Some parcels in this area are also subject to military aviation easements.

How acquisition will further purpose and goals of Reserve: Acquisition of parcels in the northern watershed will protect estuarine and surface water quality and natural communities. Acquisition would also protect significant tracts of undisturbed natural habitat important for some research, education and stewardship activities. Some of these parcels could also provide valuable public access for passive recreation.

Post acquisition stewardship: Stewardship at each acquired parcel would be similar to stewardship at existing Reserve parcels and would likely include signage, surveillance, enforcement, and habitat protection and restoration.

Potential partners: The organizations of the Mashpee National Wildlife Refuge conservation are possible partners for all land acquisition projects.

Acquisition costs and future ownership: Full fee ownership is desirable for most parcels. Conservation restrictions on some of these parcels, however, could provide significant benefits if fee ownership is not negotiable due to limited funding or other reasons. Market values in the vicinity of the Reserve range from \$200,000 to over \$1 million per developable acre depending on proximity to waterfront. All interests, fee or otherwise, would be owned by the Commonwealth of Massachusetts.



# I: Outline of Final Report of U.S. Commission on Ocean Policy

## **Part I – Our Oceans: A National Asset**

Chapter 1: Recognizing Ocean Assets and Challenges

Chapter 2: Understanding the Past to Shape a New National Policy

Chapter 3: Setting the Nation's Sights

## **Part II – Blueprint for Change: A New National Ocean Policy Framework**

Chapter 4: Enhancing Ocean Leadership and Coordination

Chapter 5: Advancing a Regional Approach

Chapter 6: Coordinating Management in Federal Waters

Chapter 7: Strengthening the Federal Agency Structure

## **Part III – Ocean Stewardship: The Importance of Education and Public Awareness**

Chapter 8: Promoting Lifelong Ocean Education

## **Part IV – Living on the Edge: Economic Growth and Resource Conservation along the Coast**

Chapter 9: Managing Coasts and their Watersheds

Chapter 10: Guarding People and Property against Natural Hazards

Chapter 11: Conserving and Restoring Coastal Habitat

Chapter 12: Managing Sediments and Shorelines

Chapter 13: Supporting Marine Commerce and Transportation

## **Part V – Clear Waters Ahead: Coastal and Ocean Water Quality**

Chapter 14: Addressing Coastal Water Pollution

Chapter 15: Creating a National Monitoring Network

Chapter 16: Limiting Vessel Pollution and Improving Vessel Safety

Chapter 17: Preventing the Spread of Invasive Species

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## **Part VI – Ocean Value and Vitality: Enhancing the Use and Protection of Ocean Resources**

Chapter 19: Achieving Sustainable Fisheries

Chapter 20: Protecting Marine Mammals and Endangered Marine Species

Chapter 21: Preserving Coral Reefs and Other Coral Communities

Chapter 22: Setting a Course for Sustainable Marine Aquaculture

Chapter 23: Connecting the Oceans and Human Health

Chapter 24: Managing Offshore Energy and Other Mineral Resources

## **Part VII – Science-based Decisions: Advancing Our Understanding of the Oceans**

Chapter 25: Creating a National Strategy for Increasing Scientific Knowledge

Chapter 26: Achieving a Sustained, Integrated Ocean Observing System

Chapter 27: Enhancing Ocean Infrastructure and Technology Development

Chapter 28: Modernizing Ocean Data and Information Systems

**Part VIII – The Global Ocean: U.S. Participation in International Policy**

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**Part IX – Moving Ahead: Implementing a New National Ocean Policy**

Chapter 30: Funding Needs and Possible Sources

Chapter 31: Summary of Recommendations

*For full report, visit <http://www.oceancommission.gov>.*

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## J.1: WBNERR Research Registration Procedure: 2005

The Waquoit Bay National Estuarine Research Reserve (WBNERR) has a Research Registration Procedure, which entails your filling out the attached form (pages 2-4). The purpose of this process is threefold.

First, the information provides Reserve staff with a concise description of your research program at WBNERR in your own words. An important component of the Reserve's mandate is to provide outreach between the science sector and the public regarding coastal zone management and estuarine issues. The registration process will ensure that our descriptions of activities underway at the reserve are timely and accurate. Also, the scope of your endeavors will be more generally known by WBNERR staff, other researchers, and an interested public. This will also enhance our staff's ability to assist you in the protection of your study sites from disturbance by the legitimately curious public or other activity.

Second, it results in the assignment of a WBNERR Research Project number to your project. When you mark your buoys, etc. with this number Reserve staff can assist you in your work by easily identifying your site and equipment should the need arise (e.g. gear adrift, tampering, etc.).

The third objective is to facilitate the compliance of field research activities at the Reserve with regulations stipulated by town authorities of Mashpee and Falmouth. Many of these regulations have been in place for a number of years and researchers were previously expected to address them on their own back in the early days. However, the WBNERR research program has obtained permits of general scope from the two towns. These permits apply to many common field research activities and are implemented through the registration process. Registered researchers conducting projects that entail the specified permitted activities no longer have to seek specific permission from the towns to be in legal compliance. WBNERR staff listed below will assist you with any questions.

**Chris Weidman (ext. 105), Research Coordinator;**

- questions about the registration process,
- assignment of a WBNERR Research Project number,
- availability of laboratory or storage space, and
- other questions about conducting research at the reserve.

**MaryKay Fox (ext. 109), Research Assistant Research Coordinator;**

- availability of laboratory space, storage space, boat mooring
- assistance with research equipment, and
- questions about conducting research at the reserve

**Heather Tschaekofske (ext. 129), Research Assistant;**

- other questions about conducting research at the reserve

**Christine Gault (ext. 101), Reserve Manager;**

- general information

**Vaira Harik (ext. 100), Administrative Assistant;**

- availability of (and scheduling) dormitory housing, and
- using other WBNERR facilities, such as meeting rooms, classroom or library.

## WBNERR Research Registration Form

---

Date:                /2005

**1. Project Title** (make as concise as possible, 10 words or less):

---

**2. Duration** (month/year to month/year):

**3. Funding Source(s):**

**4. Principal Investigator(s), institutional affiliation(s), and contact info**

(Indicate lead investigator as well as on-site contact responsible for field activities if different)

Lead Investigator:

Affiliation:

Phone:

Email:

Primary contact mailing address:

On-site Contact:

Affiliation:

Phone:

Email:

Other Participants:

*Please provide any additional telephone numbers useful in case of emergency situation:*

**5. Project Description:** *Briefly (150 words or less) describe your research project and its motivation (in language for the non-technical audience):*

**6. Planned Activities:** Briefly list field activities planned at the reserve this year along with an estimated schedule (if this is first year of multi-year project include a general outline of planned activities over course of project)

**7. Study Site Location:** Identify the exact location of your study site(s) and / or mark the position(s) on a map of Waquoit Bay (i.e., use one off our web site) and surrounding areas. This information is used to reduce interference with other researchers, high-use water-ways, and other conflicting uses. It will also help WBNERR answer queries from local authorities and the public regarding equipment observed in the field. If your field equipment is sensitive to "disturbance", we will assist you in designing a scheme to minimize intrusion.

**8. Hazardous material and activities:** Does your planned research include any potentially hazardous materials or activities, such as radioisotopes, toxic chemicals or reagents, or environmentally-impacting electromagnetic, sonic or optic emissions?

Are any unusual or special services / facilities required?

Specifics relating to any items indicated above should be noted below and discussed with the Research Coordinator:

**9. WBNERR General Research Permit:** Many research activities require permits from local town resource management authorities. The WBNERR Local Research Permit applies to a range of routine field activities and covers projects that are registered with the Reserve. Contact the WBNERR Research Coordinator, Dr. Chris Weidman at 508-457-0495 (ext. 105), for help or clarification.

**10. Other Permit Requirements:** Project activities that are outside the scope of the WBNERR Local Research Permit (based on the WBNERR Research Coordinator's assessment) will need separate approval by the appropriate local or state authority (e.g., Falmouth and/or Mashpee Conservation Commission, shellfish warden, Mass. Department of Marine Fisheries). **This is your responsibility.** Examples include (but are not limited to) a Scientific Collectors Permit issued by the Massachusetts Division of

Marine Fisheries for the collection of fishes and/or invertebrates, and migratory bird and vertebrate handling permits issued by various state and federal authorities. Contact the Research Coordinator for assistance in determining whether such additional permits are required. If your research requires such permits, we will need copies of them on file with the Research Coordinator.

**11. Lab Space Needs:** If you plan to use the WBNERR laboratory, precisely describe your need. The Research Coordinator will try to provide you with lab space in so far as other activities allow. WBNERR generally does not supply equipment, laboratory materials or expendable supplies. Requests for exceptions to this rule will be considered on an individual basis (e.g., a collaborative project with the Reserve). A classroom adjoining the laboratory is primarily a facility supporting the WBNERR education program. If you desire to make use of this space, we will need to coordinate with the Education Program Coordinator.

**12. Boating Needs:** Several boat moorings are available for research programs being conducted at the reserve, on a “first come, first serve” basis. Generally, a project is allocated one mooring only. List below the dates needed, the name and contact info of the person responsible for the boat (bailing, etc.), and other pertinent information (e.g. need for storage of equipment or boat trailer). Note that there are no docking facilities at the reserve and Waquoit Bay is shallow (typical depths are <2 m). If you only have a limited need for boat on just a few occasions, the Reserve may be able to provide you with a boat and driver as our other commitments allow.

**13. Last Questions**

- A. Have you received and have read the attached WBNERR document "Information for Researchers and Guests: 2005"?
- B. Do you have a field Safety Plan ?

**Confirmation of these last two questions is a requirement of project registration.**

## **J.2: 2005 Field Season at WBNERR—Information for Researchers and Guests**

The science program at the Waquoit Bay National Estuarine Research Reserve (WBNERR) continues to grow (currently an average of over 20 individual and group research projects are carried out annually -- See our website: [www.waquoitbayreserve.org](http://www.waquoitbayreserve.org)). The following information contains 2005 guidelines regarding the use of the Reserve's grounds and facilities. This document is distributed to help all users (scientists, technicians and students) to be informed about the proper procedures for maximizing their access to the Reserve's resources. If you have any questions, contact WBNERR's Research Coordinator, Chris Weidman, at 508-457-0495 ext. 105 (email: [chris.weidman@state.ma.us](mailto:chris.weidman@state.ma.us)) , or the Research Assistant, Heather Tschaekofske (ext. 109) (email: [heather.tschaekofske@state.ma.us](mailto:heather.tschaekofske@state.ma.us)).

### **1. Registering a Research Project:**

The reserve has a research registration process to facilitate communication and coordination between visiting users of the reserve and the Reserve's research program. At the start of each field season (typically in the late spring), users must complete a WBNERR Research Registration form and return it to the Research Coordinator / Assistant.

Upon approval, each user will be assigned a WBNERR Project Number that will be unique to that project for that year's field season. Users are required to use this number and the initials "WBNERR" to label equipment used and/or stored in the laboratory or at field site(s). This will help harbormasters, shellfish wardens, and WBNERR staff to monitor the status of your equipment or experiment and to notify you in the event of an emergency. Items to be marked include buoys, flags, and other markers (e.g., sticks).

Once a project is registered, certain conforming aspects are covered by the conditions provided by the WBNERR Researcher's Permit the reserve has obtained from the towns of Falmouth and Mashpee. This permit applies to Determinations of Applicability that local authorities require to demonstrate compliance with wetlands regulations. Each research project conducted within either of these towns, whether at WBNERR or elsewhere, is required to obtain a negative determination of applicability from the local selectmen. In the past, it was the responsibility of each researcher using the Reserve to obtain this designation. This is no longer the case once a project has been registered.

The WBNERR Research Registration is an umbrella authorization that provides the needed designation to WBNERR registered projects which entail "typical" field research activities. A list of such activities within the scope and specific conditions of this permit is contained in a copy of the permit itself, which can be requested from WBNERR or you can call to clarify.



Other licenses and permits (e.g., Scientific Collectors Permit from the Mass. Division of Marine Fisheries or Migratory Bird research permit from US Fish and Wildlife) remain the responsibility of individual researchers. Copies of these must be presented to WBNERR along with the completed registration form. It is the user's responsibility to adhere to the provisions of the regulations pertinent to each of them.

**2. Safety Plan:** All registered research project applicants need to confirm that they have a safety plan in place to minimize the potential for injury or to ensure a rapid response in case of an emergency. The specifics of the plan would, of course, depend on the nature of the project and the planned activities. Waquoit Bay is a beautiful place, but, like any marine or coastal area, it can become dangerous and precautions are prudent. For example, it is best if researchers in the field have a buddy system (two is better than one), carry a cell phone or radio for emergency communication, and notify Reserve staff (or some designated person) of your field whereabouts and your departure and estimated return times. Ask the Research Coordinator or Research Assistant for further suggestions or about your concerns regarding field safety.

**Special arrangements must be made with the Research Coordinator if you plan to handle non-aquatic vertebrates or use radioactive or highly toxic materials (See Research Registration form item # 8).**

**3. Upon project completion,** researchers using WBNERR facilities or conducting studies on WBNERR grounds (either Reserve grounds proper or on lands managed by the Reserve) are requested to send us a **project summary** that is suitable for use in the library (e.g., project final report, thesis, or journal publication).

We also request that documents, published or otherwise, containing data obtained from work done at WBNERR acknowledge the support provided by the Waquoit Bay National Estuarine Research Reserve, and our parent agencies the National Oceanographic and Atmospheric Agency and the Massachusetts Department of Conservation and Recreation.

**4. Reserving use of the laboratory facilities (See Research Registration form item # 11):**

a. The laboratory in the Carriage House is sometimes available for processing field samples, etc. However, to ensure the lab's availability, researchers must make prior arrangements with the Research Coordinator or Research Assistant. The latter is responsible for the day-to-day management of laboratory operations and will assist you with questions regarding your use of laboratory facilities. Laboratory safety is an important issue and needs to be discussed directly with the Research Assistant or Research Coordinator when planning your use of the facilities. However, space is limited and reservations are required.

**5. Boat Use at WBNERR:**

WBNERR does not provide boats for general research use, other than a dingy to access moored vessels. However, in some cases, the Research Coordinator or

Research Assistant may be able to assist a project by operating a WBNERR boat. Contact either of them to see if their work load allows them to accommodate you.

The Reserve does have a limited number of moorings available for researchers. Boat trailer storage space is also available. **A project is usually limited to one mooring (depending on demand).** You must reserve a mooring during the Research Registration process. Call the Research Assistant (Heather Tschaekofske: WBNERR ext. 124) for information.

Neither WBNERR, the Commonwealth of Massachusetts, nor NOAA assumes any liability or responsibility for vessels using these moorings. Do not leave items of value or gas cans in an unattended boat. Users are responsible for keeping their boats bailed out. If your boat will be unused for an extended period, arrange to have someone bail it out when needed or install an automatic bilge pump. A major cause of fuel spillage into the estuarine environment is sunken boats with portable fuel tanks.

The Falmouth and Mashpee harbormasters have officially designated all bay waters as a "No Wake Zone", except for an area to the east of Washburn Island that is set aside for waterskiing and Hamblin Pond. Boaters are allowed to travel at high speed in the main navigation channel that passes from the "no wake" buoy at the northern end of Washburn Island southward to the "no wake" buoy near the inlet to Nantucket Sound. Speeding regulations (less than 5 knots) are enforced in the mooring area at the head of the bay and in the various rivers and channels.

The bay is patrolled by Assistant Harbormasters who are local citizens using their personal boats. Occasionally the official markings on these boats are not conspicuous. If you exceed about 6 mph (5 knots) in areas exclusive of the navigation channel passing North/South through the "center" of the bay (e.g., Child's River, Jehu Pond, etc.), you may be stopped. You are personally responsible for any fines levied against you.

#### **6. Gasoline storage at WBNERR:**

Gasoline and oil for motorboat use are to be stored outside the Boathouse in the two yellow, lockable storage cabinets located next to the parking area adjacent to the building (near the fuel oil tank). Approved gasoline storage containers (e.g., boat gasoline tank) are the only type of container allowed. Label your containers stored in these cabinets. The key for the cabinet doors is stored in the Boathouse lower level on a nail in the support post between the two entrance doors (above the light switch). (Additional storage is available in the small shed in the maintenance compound near the Carriage House. A separate key is required for this shed.)

**Transferring gasoline into portable boat tanks is not allowed on the lower level of the Boathouse or beach.** Transferring gas into boat-type tanks is allowed near the yellow storage containers at the upper level of the Boathouse but only when the transferring occurs on the cement pad leading to the walkway and stairs to the beach.

## 7. Identification of field sites:

Each field site identification marker (float, stake, etc.) must be labeled with your project's registration number and the initials "WBNERR". The reserve often receives calls from officials and the public about floats or markers. We cannot respond appropriately (or inform a researcher of a problem) without a means of identification.

Area harbormaster regulations stipulate that **yellow floats** be used to mark temporarily moored objects. Proper floats should be obtained from marine equipment suppliers. Researchers are to retrieve floats and equipment (including cinder block anchors, etc.) when a season's field work is done. Local authorities (e.g., harbormasters) reserve the right to remove improperly labeled field markers.

## 8. Other WBNERR buildings and facilities:

- a. **Main house** -- Reserve headquarters offices, exhibit center, meeting room, library.
- b. **Gatehouse** -- dormitory with 12 beds, a kitchen, and two full baths. Users may reserve space in the Gatehouse by contacting the Research Coordinator (ext.105).
- c. **Boathouse upper level** -- meeting room and resource center (i.e., GIS) . The Boathouse upper level also has a kitchen and bathroom, though we prefer that visiting researchers usually use the restrooms located in the Carriage House next to the classroom and the laboratory. There is a privacy corner in the Boathouse basement for changing out of wet clothes and there is a freshwater hose on the outside of the building as well. Requests to use the upstairs bathroom and kitchen area for meal preparation must first be cleared through the Research Coordinator or the Administrative Assistant.
- d. **Boathouse lower level** -- This area is primarily for storing field gear. The left side is for WBNERR use only. The right side is for guest researchers. There are several lockable storage bins at the rear of the right side which provide a degree of security for stored gear. Users must reserve the use of a bin at the time of registration and bins are available on a first-come-first-served basis. Gear not stored in a bin should be labeled. On the outside of the building next to the right door is a hose (cold freshwater only) for rinsing gear. There are a few benches for setting up field operations and processing field samples in the lower level as well. However, this area should not be used for laboratory analytical work without first clearing it the Research Coordinator as it is not a facility that can be easily cleaned and is proximate to the sensitive estuarine environment.
- e. **Carriage House maintenance shop** -- Tools and equipment in the shop are for WBNERR staff use only.
- f. **Facility etiquette** -- Users of the WBNERR facilities are responsible for keeping them clean, particularly bathrooms and the kitchen.

## 9. Telephone use at WBNERR:

The reserve has only three telephone lines. Lines 1 and 2 are local access (508-457-0495). Line 3 is a Centrex long distance line (617-727-xxxx) and is only for staff use. A special code is required to access this line. No long distance calls are to be billed to

WBNERR lines 1 and 2. Use your credit card to charge such calls to your own account.

There are phones in the Main Building, in the Gatehouse, and in the Boathouse. WBNERR business use of the telephone lines has priority, particularly in the summer. During business hours, visitors are to limit their calls to brief business and emergency purposes. Best these days is to have your own cell phone. For connecting to the internet, ask someone on the WBNERR research staff.

**10. Resource conservation:**

Practice resource conservation while using reserve facilities. Do not waste water, for example by unnecessarily leaving a hose flowing when washing gear at the Boathouse. Be aware that too much toilet paper will easily clog the "low flow" toilets at the Reserve. Turn off lights when they are not needed, except when you expect to return to a lighted work space soon (it takes about as much energy to start a florescent fixture as it does to run one for 1 hour). WBNERR recycles.

**11. Miscellaneous:**

- Smoking is prohibited in WBNERR buildings. Do not smoke while transporting or filling fuel containers.
- Alcohol is not allowed on any state property. This includes all reserve lands and all reserve buildings.
- It is also official policy of the Massachusetts Department of Recreation and Conservation that pets are prohibited from all state buildings. This includes reserve buildings (e.g., dormitories). Dogs are allowed on the grounds of the reserve headquarters during visits but they must be on a leash.

**12. Research coordination at WBNERR:**

Scientists and students are asked to contact the Research Program Coordinator (Chris Weidman) to arrange an orientation meeting at the beginning of your field season. This meeting will be an informal opportunity to get to know our staff and facilities and to discuss any questions or concerns you may have.

## **J.3: Gatehouse Policies and Guest Registration Form**

*Welcome to the Waquoit Bay National Estuarine Research Reserve. This research and education facility, one of 26 sites around the country that make up the National Estuarine Research Reserve System, is jointly funded and managed by the National Oceanic and Atmospheric Administration (NOAA) and the Commonwealth of Massachusetts, Department of Conservation and Recreation (DCR).*

***Please be advised that we conduct regular tours of the Reserve, which includes a visit to the common areas of the Gatehouse, so please keep it neat!***

### **General House Rules**

Please be respectful of the other guests and follow the following rules:

- Quiet hours in the house are from 10:00pm to 7:00am, Monday through Saturday.
- Quiet hours on Sunday are extended to 10:00am.
- Pets are not allowed.
- Please observe the need for privacy and security of others.
- Smoking is prohibited in all state buildings, including the Gatehouse.
- Reservations are required. Beds will be assigned on a first come – first served basis.

### **Kitchen Guidelines**

Please remember you must clean up after yourself or as a group. Individual responsibilities include washing dishes and insuring the refrigerator is kept clean. Storage space for food is limited, please be conscious of how much space you are using to store your supplies. Prior to departure all guests **MUST** remove **all** food items stored in the refrigerator. This is particularly important during the non-summer months because the Gatehouse may remain vacant for long periods of time.

### **Bathroom Guidelines**

Please clean up after yourself. This includes insuring that the shower, sinks and floor are free of dirt, sand, hair, and water. Researchers and other visitors who work in the field should rinse off as much as possible in the Carriage House or using the Boathouse outdoor shower before entering the Gatehouse. Please use the bathrooms in the Gatehouse and Carriage House instead of the Boathouse or Main House. The Carriage House Bathrooms should be used primarily for cleaning off after fieldwork. They are open from approximately 7:30am – 5:00pm, 7 days a week in the summer. The Carriage House Bathrooms have more limited hours in the winter, check with the office for details.

### **Use of Phones**

The phones at the Reserve are for Reserve business. You may make and receive personal calls only after normal business hours (5:00 Monday – Friday), unless it is an emergency. To make a local call: pick up the receiver and press line 1 or 2, then dial the number as you would on any normal telephone. Please note that here in Massachusetts you must enter the area code and the seven-digit number for all local calls (e.g. 508-457-0495). The phone will not allow you to make calls that require a 1 in front of the 10 digit number (those are calls outside the local calling area and must be charged to a calling card). To make a call within the Reserve, pick up the receiver and dial the 3-digit extension (for the main office just dial 0). Unless you are a summer staff person who has a voicemail account set up, the Reserve staff will **NOT** take messages for you.

### **Keys**

You will need a key to the Gatehouse if you reserve a bed. To obtain a key, contact the office. Arrangements can be made if you are arriving after hours. **ALL** keys **MUST** be returned to the office at the conclusion of your stay! Please do not lend your key out.

**Gates**

Gates are open weekdays (and on Saturdays in summer) from 7:30am to 5:00pm. Please leave the gates as you find them. If you will be arriving or departing after 5:00pm please contact the office about how to deal with the gates. Please do not leave them open after hours.

**Parking**

Limited parking for vehicles is available at the Gatehouse. Special arrangements must be made if you have a trailer.

**Trash and Recycling**

Prior to your departure please deposit **all** trash in the dumpster behind the Carriage House. Recycling bins are provided. If you leave and the recycling bin is full, please inform the office.

**Fees**

The fee is \$12:00 per night. Fees are waived for employees of the Department of Conservation and Recreation and for other individuals under certain circumstances.

## **Departure Check List**

*Before you leave, don't forget to:*

- Place all trash in the dumpster behind the Carriage House.
- Inform the Reserve office if the recycling bin is full.
- Turn the heat down to 50 (unless otherwise noted on thermostat).
- Empty and clean the refrigerator-do not leave any food for us.
- Tidy up the kitchen (wipe counters, tables, sweep floors).
- Make sure all lights are off.
- Close all windows.
- Close and lock the door.
- Return the key to the Reserve office.

*Thanks for your help in keeping the Gatehouse clean!*

## Waquoit Bay NERR Gatehouse Guest Registration Form

Please complete and return form to your on-site contact person prior to your stay.

Name: \_\_\_\_\_

Organization: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone (h): \_\_\_\_\_ (w): \_\_\_\_\_

E-mail address: \_\_\_\_\_

Date of Arrival \_\_\_\_\_

Date of Departure \_\_\_\_\_

Purpose of stay: \_\_\_\_\_

On-Site Contact: \_\_\_\_\_

*The fee is \$12.00 per night and MUST be paid in full before you pick up your key, prior to your stay. Checks should be made out to the Commonwealth of Massachusetts. Cash is accepted, credit cards are not*

*By signing this form you certify that you have read and agree to the conditions explained on the Gatehouse Policies.*

Signature \_\_\_\_\_

Date: \_\_\_\_\_

## J.4: WBNERR Mooring Agreement

Welcome to the Waquoit Bay NERR! We are hoping that you have a great summer and a successful research season! Summer is here and it's time to put the boats back in the water.

In the interest of the safety of your boat and to clarify liability, please sign and return the following agreement and form:

I understand that I have been assigned to a specific Waquoit Bay NERR mooring for use only for a specified period during 2005. I am fully responsible for the boat including maintenance, bailing out after storms, etc. I will remove my boat from the water if requested by Waquoit Bay NERR or in the event of a major forecasted storm (i.e. hurricane). I will remove my boat in the fall, before the moorings are replaced with winter sticks, unless otherwise authorized by the Reserve's Mooring Coordinator (MaryKay Fox (508)-457-0495 x109).

The above action is necessary to prevent environmental and equipment damage.

Additionally, please provide Waquoit Bay NERR Research Department with your contact information (personnel using the boat, phone, fax and institutional affiliation) and your boat registration number.

Waquoit Bay NEER is responsible for maintaining the mooring and informing you if the staff observes any problems with your boat. Waquoit Bay NERR is NOT responsible for your boat, its maintenance, or securing it in the event that a hurricane is eminent.

Please report any mooring deficiencies to the Mooring Coordinator.

AGREED:

\_\_\_\_\_  
Name/Researcher

\_\_\_\_\_  
Date

\_\_\_\_\_  
MaryKay Fox  
Mooring Coordinator/Assistant Research Coordinator

\_\_\_\_\_  
Date

\_\_\_\_\_  
Mooring number



## J.5: WBNERR Mooring Contact Information

Welcome to the Waquoit Bay NERR! We are hoping that you will have a great summer and a successful research season! Please provide the Research Department at Waquoit Bay NERR with your contact information. Please include your boat registration number and the names of all personnel using the boat, their phone numbers (office, cell, and fax), and institutional affiliation.

### Supervisor Contact Information:

Name: \_\_\_\_\_

Phone# \_\_\_\_\_

Cell# \_\_\_\_\_

Fax# \_\_\_\_\_

Institution \_\_\_\_\_

Make of Boat \_\_\_\_\_

Boat Registration # \_\_\_\_\_

Duration of Research at WBNERR \_\_\_\_\_

Research Vehicle # \_\_\_\_\_

### Research Crew

1) Name: \_\_\_\_\_ 2) Name: \_\_\_\_\_

Phone #: \_\_\_\_\_ Phone #: \_\_\_\_\_

Cell #: \_\_\_\_\_ Cell #: \_\_\_\_\_

Email: \_\_\_\_\_ Email: \_\_\_\_\_

3) Name: \_\_\_\_\_ 4) Name: \_\_\_\_\_

Phone #: \_\_\_\_\_ Phone #: \_\_\_\_\_

Cell #: \_\_\_\_\_ Cell #: \_\_\_\_\_

Email: \_\_\_\_\_ Email: \_\_\_\_\_

5) Name: \_\_\_\_\_  
Phone #: \_\_\_\_\_  
Cell #: \_\_\_\_\_  
Email: \_\_\_\_\_

6) Name: \_\_\_\_\_  
Phone #: \_\_\_\_\_  
Cell #: \_\_\_\_\_  
Email: \_\_\_\_\_

## J.6: External Organization Program/Event Reservation Form

Time of Program/Event: \_\_\_\_\_ Date of Program/Event: \_\_\_\_\_

**Contact Information** Name: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone #: \_\_\_\_\_

Expected number of people attending: \_\_\_\_\_

Type/title of program/event: \_\_\_\_\_

Short description of program/event: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Waquoit Bay NERR Staff

Contact: \_\_\_\_\_

**Equipment Needs:**

Overhead Projector       Slide Projector       Other \_\_\_\_\_

**Location:**

Boathouse       Main House       Classroom       Other \_\_\_\_\_

*By signing this form you and your organization agree to abide by the External Organization Facilities Use Guidelines.*

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Please submit this form to Waquoit Bay NERR administrative offices via fax at (617) 727-5537 or mail to: PO Box 3092, Waquoit, MA 02536**

## J.7: Special Use Permit to Conduct an Event at WBNERR

Date

Permittee

Organization

Address

City, State Zip

Dear Permittee,

Enclosed is your Special Use Permit. After you have thoroughly read the permit, please sign both copies, retain one for your records, and return the other to me as soon as possible. Your copy must be in your possession at the time of the authorized event.

Well in advance of your event, all the necessary arrangements must be made with the Supervisor of the facility. Please contact him or her to see if there are any additional matters of concern.

You should Contact:           Brendan Annett  
  WBNERR  
  508-457-0497

I hope that you and your group have a pleasant visit to the Waquiot Bay National Estuarine Research Reserve and that your event is a successful one.

Sincerely,

---

Brian Shanahan  
Regional Director

SPECIAL USE PERMIT TO CONDUCT AN EVENT AT THE:

**Waquoit Bay National Estuarine Research Reserve**

Pursuant to the rule and regulations promulgated in conjunction with recreation facilities, under Chapter 30A, permission is hereby given by the Massachusetts Department of Conservation and Recreation TO:

\_\_\_\_\_  
(Permittee)

As representative of the:

\_\_\_\_\_  
(Permittee's Organization)

As sponsors to utilize a specific area at the above-mentioned state research reserve to conduct the following activity:

\_\_\_\_\_  
(Planned Activity)

This authorization is intended to cover the period:

Begin Date: \_\_\_\_\_ End Date: \_\_\_\_\_

Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

In order to insure the rights and safety of the general public as well as to insure the reasonable exercise of the above-mentioned authorization, the following conditions that are preceded by an asterix(\*) shall prevail:

- \_\_\_\_\_ 1. The Permittee, organization and sponsored event are subject to all applicable Federal, state and municipal laws.
  
- \_\_\_\_\_ 2. The exercise of this permitted use shall constitute the Permittee's acceptance of complete liability for Permittee's actions upon the aforementioned site and agreement that he Permittee will indemnify and hold harmless the Department against any claims

that may arise therefrom. Further, Permittee will not make any claims against the Department for any injury, loss or damage to person (including bodily injury and death) or property occurring from any cause arising out of the Permittee's actions or those of its agents and guests.

- \_\_\_\_\_ 3. The Director of the Division of State Parks and Recreation or approving Regional Supervisor may cancel this permit at any time for any reason which in his/her opinion is in the best interest of the Commonwealth.
  
- \_\_\_\_\_ 4. Being a state owned and operated facility this authorization does not grant exclusive use of the property involved. The general public shall be allowed to attend this event.
  
- \_\_\_\_\_ 5. This permit shall not grant the right to engage in commercial or promotional activity or any other form of advertisement on state lands.
  
- \_\_\_\_\_ 6. This permit is not transferable and no privilege contained herein may be sublet to any other person or organization.
  
- \_\_\_\_\_ 7. The Permittee shall also be responsible for complying with all rules and regulations set forth by the Department of Conservation and Recreation governing the use of their lands which include the prohibition of alcoholic beverages being consumed within the state Facility.
  
- \_\_\_\_\_ 8. The terms of this permit are to cover the designated route (s) or areas (s) to be used in conjunction with this permit.
  
- \_\_\_\_\_ 9. The Permittee shall provide the necessary number of police officers prescribed by the appropriate local Police Department for the purpose of crowd and traffic control in the interest of public safety.
  
- \_\_\_\_\_ 10. The Permittee shall be responsible for the

hiring and paying of the necessary number of uniformed law enforcement officers, as per our hiring procedures, if alcoholic beverages are to be consumed and the total number of adults in the group of legal drinking age exceeds twenty-four (24). One officer is required for such groups of 25 to 50 persons plus one officer per each multiple of 50 persons thereafter. The hourly pay for the officers will be the current overtime rate for each officer.

- \_\_\_\_\_ 11. All intersecting roads and/or trails throughout the permit area used shall have adequate road guards provided by the Permittee to control other types of recreational traffic and provide warnings that the event is in progress.
- \_\_\_\_\_ 12. The Permittee shall provide the necessary first aid for the participants.
- \_\_\_\_\_ 13. Upon completion of the event, the entire permit area and/or route shall be checked by the Permittee to be certain that no participants remain in the state facility.
- \_\_\_\_\_ 14. In the event the fire danger rating becomes extreme or a fire does occur in the vicinity of the event, this permit may be canceled.
- \_\_\_\_\_ 15. All signs, markers, directions and warnings erected for this permitted event shall be removed and disposed of by the Permittee within one (1) day following the event.
- \_\_\_\_\_ 16. The Permittee shall notify the facility headquarters and the Department of Conservation and Recreation Regional Headquarters in South Carver at 508-866-2580 immediately of any serious accidents that occur during the running of the event.
- \_\_\_\_\_ 17. The Permittee shall notify the contact person specified in the second paragraph of the cover letter within two days after the event the number of participants and of spectators for out attendance records.

- \_\_\_\_\_ 18. The Permittee shall check in and out with the facility Supervisor or his/her designee at the facility headquarters.
- \_\_\_\_\_ 19. The Permittee shall agree that any and all reasonable requests made by the Regional Supervisor and/or his/her designee are to be complied with.
- \_\_\_\_\_ 20. Any and all work is to be done under the direct supervision of the Regional Supervisor and/or his/her designee.
- \_\_\_\_\_ 21. The Permittee shall be responsible for cleaning up and removing all litter that was generated from this event.
- \_\_\_\_\_ 22. Permittee shall make the necessary vehicle parking arrangements with the facility Supervisor.
- \_\_\_\_\_ 23. The Permittee shall need to make the necessary trail, route or area improvement prior to being allowed to conduct the event and shall be done in cooperation with and to the satisfaction of the facility Supervisor.
- \_\_\_\_\_ 24. The Permittee agrees to restore the surface of land to its original state as nearly as possible. If this action is necessary, it will be done to the satisfaction of and within a reasonable time period as determined by the facility Supervisor.
- \_\_\_\_\_ 25. The Permittee shall have received permission to cross all privately owned land involved in the course covered by this permit.
- \_\_\_\_\_ 26. All vehicles shall be subject to an inspection by an Environmental Police Officer and participating machines shall be equipped with lawful spark arrestor and mufflers to be determined within the sole discretion of the Department of Environmental Management or previously mentioned officers.



- \_\_\_\_\_ 27. All machines participating in this event shall be registered for recreational trail use in the Commonwealth of Massachusetts unless this agency receives from the Permittee written authorization issued by the Division of Law Enforcement that waivers this requirement.
- \_\_\_\_\_ 28. All refueling of participating machines shall take place on lands other than those controlled by the Department of Conservation and Recreation.
- \_\_\_\_\_ 29. All open fires are prohibited.
- \_\_\_\_\_ 30. Day use fee is waived for this permit.
- \_\_\_\_\_ 31. The Permittee shall be responsible for complying with all state and federal laws pertaining to this activity.
- \_\_\_\_\_ 32. The Permittee is responsible for insuring that vehicles are parked in appropriate areas and do not impact endangered plant management areas.
- \_\_\_\_\_ 33. The Permittee is responsible for making sure that all buildings are locked upon departure.
- \_\_\_\_\_ 34. The Permittee is responsible for making sure that the front and Gatehouse gates are closed and that all visitors have vacated the property.
- \_\_\_\_\_ 35. The beach area in front of and adjacent to the Reserve is not to be used for recreational purposes. The Permittee is responsible for ensuring that guests do not trespass on private beaches adjacent to the Reserve.

I have read the foregoing conditions and provisions and approve of, and agree to, these terms.

Issued and approved by: \_\_\_\_\_  
Brian Shanahan  
Regional Director

Accepted by:

\_\_\_\_\_  
(Requestors' Signature(s))

\_\_\_\_\_  
(Printed Name(s))

\_\_\_\_\_  
(Name of Organization)

## J.8: Work Order Requisition

Event Date: \_\_\_\_\_

Requested by: \_\_\_\_\_

Authorized: \_\_\_\_\_

**Location:**

**Action Requested (list time if necessary):**

**Special Set-up (use diagram if necessary):**

- Tables** \_\_\_\_\_
- Chairs** \_\_\_\_\_
- Trash-bins** \_\_\_\_\_
- Recycling bins** \_\_\_\_\_

**Comments:**

Date of Request \_\_\_\_\_ Forest & Parks

Supervisor \_\_\_\_\_

## J.9: WBNERR/CPWB Gift Shop Log

| Date | Item  | Size  | Color | Quantity | Amount Collected | Cash or Check |
|------|-------|-------|-------|----------|------------------|---------------|
| 1.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 2.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 3.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 4.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 5.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 6.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 7.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 8.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 9.   | _____ | _____ | _____ | _____    | _____            | _____         |
| 10.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 11.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 12.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 13.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 14.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 15.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 16.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 17.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 18.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 19.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 20.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 21.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 22.  | _____ | _____ | _____ | _____    | _____            | _____         |
| 23.  | _____ | _____ | _____ | _____    | _____            | _____         |



## J.11: Weekly Staff Meeting Agenda

Date: \_\_\_\_\_

| Staff                  | Agenda Item | Action Needed |
|------------------------|-------------|---------------|
| Christine              |             |               |
| Joe                    |             |               |
| John                   |             |               |
| Chris/Research Staff   |             |               |
| Brendan/Seasonal Staff |             |               |
| Joan/Education Staff   |             |               |
| Pat                    |             |               |
| Vaira                  |             |               |
| Heather                |             |               |
| Tonna-Marie            |             |               |
| MaryKay                |             |               |
| Laurie                 |             |               |
|                        |             |               |







## J.14: Volunteer Information Form

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Address: \_\_\_\_\_

Town: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: (H) \_\_\_\_\_ (W) \_\_\_\_\_

Email address: \_\_\_\_\_

Place of Employment: \_\_\_\_\_

Person to notify in an emergency: \_\_\_\_\_ Phone: \_\_\_\_\_

The following questions are to help us match you up with a job that best fits your interests and qualifications. Please feel free to add any information you think would be useful to us.

(Please check the top 5 that interest you)

| Check here |                            | Check here |                                | Check here |                                |
|------------|----------------------------|------------|--------------------------------|------------|--------------------------------|
|            | <b>Administrative</b>      |            | <b>Education/Outreach</b>      |            | <b>Construction Projects</b>   |
|            | Mailings                   |            | Hosting/Special Events         |            | Painting                       |
|            | Filing                     |            | Phone Calls                    |            | Carpentry                      |
|            | Phone Calls                |            | Interpretive Programs          |            | Signs                          |
|            | Minute Taking              |            | Visitor Greeting               |            |                                |
|            | Library                    |            | Public Relations               |            | <b>Grounds and Maintenance</b> |
|            | Slide Cataloguing          |            | Childrens Outreach Programs    |            | Beach Cleanup                  |
|            | Computer Work              |            | Posting of Flyers              |            | Trail Work                     |
|            | Coordinating Volunteers    |            |                                |            | Grounds Maintenance            |
|            |                            |            | <b>Graphic Arts</b>            |            | Building Maintenance           |
|            | <b>Resource Protection</b> |            | Photography                    |            | Individual Cleanups            |
|            | Piping Plover/Tern Patrol  |            | Design and Layout of Materials |            | Gardening/Landscaping          |
|            | Other Surveys              |            | Sign Making for Special Events |            |                                |
|            |                            |            | Illustrations                  |            | <b>Research</b>                |
|            | <b>Fund Raising</b>        |            |                                |            |                                |

- Continued on back -

What kind of time commitment are you interested in making?

- A) 10 or less hours per week                      B) 10 or more hours per week  
C) As needed for special events                D) Other \_\_\_\_\_

Please list any previous experience you feel would be relevant (volunteer and/or paid):

Other interests and talents:

Is there anything else we forgot to ask that you would like to tell us about?

How did you hear about the volunteer opportunities at Waquoit Bay NERR?

Is there anything in particular you hope to gain from working as a volunteer at WBNERR?

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WBNERR Staff Use:

Interview Conducted By: \_\_\_\_\_ Date: \_\_\_\_\_

Training: \_\_\_\_\_ Date: \_\_\_\_\_

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## J.15: WBNERR Volunteer Sign-in Sheet

### Waquoit Bay National Estuarine Research Reserve VOLUNTEER SIGN IN SHEET

**Name**

**Year:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| <b>Dates:</b>                                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Administrative                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Special Events                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Posting Flyers                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Visitor Greeter                                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Piping Plover Monitor                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Surveys  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Graphic Arts/Artist                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Construction                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Beach Clean-Ups                                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Trail Work   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ground/Building Maintenance                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Water Quality Monitoring                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Coast Watcher                                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Training   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Research Projects <small>(specify project)</small> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Other  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Comments

# K: 312 Report: Summary of Program Suggestions

November 2004

- Although the two programs work well together, CZM and WBNERR are encouraged to take a more strategic approach to coordination and continue to ensure the science meets manager's needs and research supports management and improved decision-making statewide.
- The CZM should work with coastal communities to build enhanced awareness and increase local protection of Areas of Critical Environmental Concern (ACEC) and continue enhancements to ACEC boundaries.
- The CZM should continue to enhance its Coastal Nonpoint Pollution Control Program (CNPCP), and should continue to address important sources of nonpoint pollution, including failing septic systems.
- The CZM is encouraged to integrate the goals of the Wetlands Restoration Program into existing CZM programs.
- WBNERR should continue to work with state partners to assure Waquoit Bay watershed land acquisition priorities are addressed and included in the Massachusetts Coastal and Estuarine Land Conservation Program (CELP) plan and the WBNERR management plan.
- WBNERR should analyze future facility needs and incorporate these needs into a revised WBNERR facilities plan.
- The DCR should consider funding other WBNERR positions or utilities and maintenance costs so that NOAA award funding could be used for programs and projects.
- WBNERR and DCR should agree on a staffing and hiring plan (based on needs identified in WBNERR's management plan) to address deficiencies in personnel needs. WBNERR and DCR Human Resources should explore opportunities to increase interaction between staff and increase effectiveness of communication.
- DCR should provide WBNERR with the necessary means to fill seasonal positions in an expedient manner so that the Reserve can take advantage of hiring the best and brightest summer interns.
- DCR should modify the approval process to ensure timely acquisition of equipment and supplies, especially since such equipment and supplies requests have already been approved through the annual NOAA grants process. Within three months of receiving the final Findings, DCR should submit a strategy to NOAA for addressing this issue.
- DCR and WBNERR should develop a plan to address issues that have been problematic in the past, specifically: Reserve placement within the agency, staffing, equipment and supply needs, communication and visibility, and overall support and recognition from parent agency. A plan should be submitted to NOAA within six months of receiving final findings.

# **L: MOU between NOAA and Massachusetts Department of Conservation and Recreation**

**MEMORANDUM OF UNDERSTANDING  
BY AND BETWEEN  
THE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
AND THE  
COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF CONSERVATION AND RECREATION**

**DETAILING THE STATE-FEDERAL ROLES IN THE MANAGEMENT OF THE  
WAQUOIT BAY NATIONAL ESTUARINE RESEARCH RESERVE**

This Memorandum of Understanding (MOU) by and between the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management (OCRM), 1305 East-West Highway N/ORM, Silver Spring, Maryland, 20910, and the Commonwealth of Massachusetts, Department of Conservation and Recreation, 251 Causeway Street, Boston, MA 02114 (DCR) shall serve to establish the framework for coordination, cooperation and communication regarding the Waquoit Bay National Estuarine Research Reserve (WBNERR or Reserve).

**WHEREAS**, NOAA designated WBNERR as a National Estuarine Research Reserve (NERR) in 1988 pursuant to its authority under Section 315 of the Coastal Zone Management Act of 1972, as amended, (CZMA, P.L. 92-583, 16 U.S.C. 1461) and in accordance with implementing regulations at 15 CFR 921.30, for the purpose of creating a natural field laboratory in which to gather information by promoting and conducting scientific studies of the natural and human processes occurring along Massachusetts' coastline to: contribute to the science of estuarine ecosystem processes; enhance the quality of environmental education; and provide the technical information essential to effective coastal zone management to ensure the protection of estuarine ecosystems throughout Massachusetts and the United States; and

**WHEREAS**, DCR determined that the waters and related coastal habitats of the estuarine ecosystem of WBNERR provide opportunities to study a relatively undisturbed natural estuarine ecosystem and the natural and human processes occurring along the Massachusetts coastline; and

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

**WHEREAS**, DCR and NOAA have found that the value of the natural and cultural resources of the Waquoit Bay estuary to the citizens of Massachusetts and the United

States benefit from the management of this site as part of the National Estuarine Research Reserve System (NERRS); and

**WHEREAS**, DCR, as the responsible agency of the Commonwealth of Massachusetts for the management of WBNERR, and NOAA, as the responsible federal agency for the national administration of the NERRS, acknowledge the value of establishing federal-state cooperation in the long-term management of this Reserve in a manner consistent with the purposes of their designation; and

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

**NOW, THEREFORE**, in consideration of the mutual agreements contained herein, DCR and NOAA agree, contingent on the availability of legislative funding from the Commonwealth of Massachusetts and the Congress of the United States, respectively, as follows:

#### **ARTICLE 1: STATE-FEDERAL ROLES IN RESERVE MANAGEMENT**

##### **A. DCR Responsibilities in Reserve Management**

The DCR shall:

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

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

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

Assume the responsibility of managing the Reserve with advisory input from the Reserve's Advisory Committee and any ad hoc subcommittees that may be established to address scientific research, environmental education, or on-site management;

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

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

Coordinate and conduct active research and monitoring programs at the Reserve with scientists from a variety of institutions to obtain a better understanding of the ecology of

the Reserve's ecosystem for application to the improved manageability of the Reserve, similar coastal ecosystems, and the NERRS;

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

Maintain state funding for the facilities and staff required to implement the provisions of the Reserve's Management Plan, such as: field research laboratories; classrooms for environmental education; libraries; administrative offices; interpretive displays; equipment; storage space; and staff to perform the duties related to the management of the Reserve;

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

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

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

Respond to NOAA's requests for information and respond to evaluation findings made pursuant to Sections 312 and 315 of the CZMA.

#### **B. Federal Role in Reserve Operation**

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

Review and process applications for financial assistance from DCR and other eligible entities, consistent with 15 CFR Part 921 for the operation of the Reserve and acquisition, development, management, education, research and monitoring programs for the benefit of the Reserve, provided however, that this agreement does not create any obligation on the part of OCRM to award financial assistance;

Make periodic evaluations in accordance with Sections 312 and 315 of the CZMA to measure DCR's performance in Plan implementation;

Advise DCR of existing and emerging national and regional issues; and

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

### **C. General Provisions**

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

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

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

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

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

### **D. Other Provisions**

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

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

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



**ARTICLE III. PROGRAM EVALUATION**

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

**ARTICLE IV. EFFECTIVE DATE, REVIEW, AMENDMENT AND TERMINATION**

This MOU is effective on the date of execution and replaces the previous MOU with the Commonwealth of Massachusetts dated August 1, 2000. The MOU will be reviewed periodically. This MOU may be amended by the mutual consent of the parties. This MOU may be terminated by mutual consent of the parties, or by NOAA if it withdraws designation of Waquoit Bay as a NERR, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 CFR Part 921 Subpart E. Should this MOU be terminated, reimbursement of unexpended funds shall be determined on a pro rata basis according to the amount of work done by the parties at the time of termination.

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

  
DOUGLAS L. BROWN, ACTING

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

  
STEPHEN H. BURRINGTON

COMMISSIONER  
DEPARTMENT OF CONSERVATION  
AND RECREATION  
COMMONWEALTH OF  
MASSACHUSETTS

5/10/06  
Date

3/23/06  
Date

# M: MOU between the Town of Mashpee and the Commonwealth of Massachusetts regarding South Cape Beach

## AMENDED AGREEMENT

Agreement entered into this 29 day of June in the year 1981, by and between the Town of Mashpee and the Commonwealth of Massachusetts acting through the Commissioner of the Department of Environmental Management (DEM) pursuant to Chapter 1058 of the Acts of 1971, as amended whereby DEM is authorized to acquire by gift, purchase or eminent domain South Cape Beach in the Town of Mashpee.

WHEREAS, the aforementioned parties entered into an agreement dated September 22, 1980 by substituting in its entirety therefor this Amended Agreement and all the provisions, covenants, and condition wherein contained.

IN CONSIDERATION OF the mutual covenants herein contained and expressed and for other good and valuable consideration the parties mutually covenant and agree as follows:

- (1) That development and use of the park shall be limited to bathing, sunning, hiking, fishing, nature interpretation, non-motorized biking, and associated passive enjoyment through recreational use consistent with the fragile ecology of the site, which shall expressly exclude overnight camping, and private vehicles, except only as provided for in paragraph (4) below. Any proposed recreational use not specified in this paragraph shall first be submitted to South Cape Beach Advisory Committee for its review and recommendation.
- (2) That all park facilities will be designed, sited and maintained so that they do not harm the natural and scenic qualities of the area. The Executive Order for Barrier Beaches of Governor Edward J. King signed August 8, 1980, (attached as "Exhibit A") shall be incorporated by reference into this Agreement and the Department will undertake to enforce all its provisions throughout the area designated as South Cape Beach State Park
- (3) That the Department will manage the fragile wetland, dune and upland areas of the site to prevent erosion and to preserve critical habitat and the area's natural scenic qualities. Local ordinance and bylaws now effective will be incorporated into and made part of the park's rules and regulations and shall govern and control, provided no legal conflict exists. No park rule or regulation will permit an activity or use otherwise prohibited by the rules, regulations and bylaws of the Town of Mashpee in existence as of the date of execution of this Agreement.
- (4) That the Department may allow vehicle access to designated service roads for the sole purpose of access to fishing areas to persons over sixty years of age, those suffering from ambulatory disabilities, or holding disabled veteran status. Said access shall be by permit only, restricted to a maximum of six vehicles at any one time, and such travel shall be allowed only between the hours of sunset and sunrise. Such vehicles shall be limited to designated ways and shall in no circumstances be driven off the designated route onto sand or other unimproved terrain or used for overnight stays. Any violations of the permit provisions shall, upon finding of violation by the South Cape Advisory Committee, cause the revocation of said permits.

- (12) That any specific taking by eminent domain would be considered only when efforts for a negotiated purchase have failed despite due diligence by the Department to reach a settlement; or when title to the land in question is of such unmarketability that remedial title action would be impractical.
- (13) That the Mashpee Board of Selectmen will grant the Department eminent domain authority by appropriate vote for the purpose of acquisition of the proposed South Cape Beach State Park.
- (14) That as a result of the proposed development of the Park, it may be necessary for the Department to acquire all municipally owned lands within the proposed boundaries of the Park. These lands include the existing town beach, a portion of Great Oak Road and other isolated parcels standing in the name of the Town of Mashpee.
- (15) That such acquisition of town owned lands would be in the form of land exchange in which the Town would received from the Commonwealth land of equal value adjacent to the existing town beach. In conjunction with any exchange, the Department will make improvements to Great Oak Road, from its intersection with Red Brook Road all the way to the Beach. In addition, the Department will assume costs associated with the relocation of the town beach, including the cost of a new access road, parking areas and necessary fencing and other essential improvements. Said town beach will be to the east of the state beach in the area of Great Flat Pond and shall consist of approximately 30 acres and shall have an ocean frontage of approximately 1700 linear feet. (Map attached and incorporated by reference "Exhibit B").
- (16) That the town regards as recreation/conservation lands, all properties which may be transferred to the Department in any land exchange in conjunction with the establishment of the Park.
- (17) That the Department will reserve a suitable site on Great River, Waquoit Bay for future use and development by the Town of Mashpee for construction for a boat launch/pier facility, the metes and bounds to be mutually agreed upon by the Town of Mashpee and the Department. The area, or site, is to be no less than 10 acres with access to and from Wills Work Road. The Department will construct an improved access road to said facility and will seek on behalf of the Town of Mashpee such state funds that are available for municipal boat launching facilities. In furtherance of the above, the Department will initiate and support legislation transferring title of said site to the Town of Mashpee. In the event such legislation fails of passage, the Department will lease such land to the Town of Mashpee for a period of ninety-nine years for nominal consideration of one dollar.
- (18) That the Department shall at all times continue to recognize a South Cape Beach State Park Advisory Committee comprised of eleven (11) voting members and four (4) ex-officio, non-voting members. The voting membership of the Committee shall consist of the following eight (8) residents of or representatives for the Town to be appointed by the Board of Selectmen of the Town, and one (1) resident of or representative for the Town of Sandwich,

CERTIFICATE OF VOTE

At a meeting of the Board of Selectmen of the Town of Mashpee, Barnstable County, in the Commonwealth of Massachusetts, said meeting being held on July 15, 1981, having been duly called and a quorum being present and voting, upon motion duly made and seconded, it was,

VOTED: That the Commissioner of Environmental Management be, and is hereby authorized, pursuant to the provisions of Chapter 132A, Sections 3 and 3A of the General Laws, and Chapter 1058 of the Acts of 1971 as amended to acquire by eminent domain all that land as shown on a two sheet plan entitled, "Plan of Land-South Cape Beach - Mashpee, Mass. - prepared for Dept. of Environmental Management - Scale 1" = 200' Feb. 16, 1976 - Briggs Engineering & Testing Co.", on file with said Department, provided however, that no land owned by the Town of Mashpee shall be taken. The approval and vote hereunder is expressly subject to and conditional upon the full performance and compliance by both the Commonwealth of Massachusetts and the Department of Environmental Management of the terms, promises, covenants and conditions all of which are included and incorporated into a written agreement entitle "Amended Agreement" dated June 29, 1981 between the Town of Mashpee and the Commonwealth of Massachusetts acting through the Commissioner of the Department of Environmental Management, a copy of which agreement is attached hereto, incorporated and made part of the Certificate of Vote; the approval and vote hereunder is also expressly conditional upon the passage of Legislation by the General Court of the Commonwealth incorporating and adopting all the terms, provisions, conditions and restrictions contained in the agreement dated June 29, 1981. The Board of Selectmen reserve to itself the unconditional right to rescind and cancel the within vote for breach of any of the conditions above stated.

(Signed by Mashpee Board of Selectmen)

# **N: MOU Concerning Cooperation and Coordination with Regard to the Mashpee National Wildlife Refuge**

MEMORANDUM OF UNDERSTANDING

AMONG

THE U.S. FISH AND WILDLIFE SERVICE

AND

THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL MANAGEMENT/  
THE WAQUOIT BAY NATIONAL ESTUARINE RESEARCH RESERVE

AND

THE MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE  
AND

THE TOWN OF MASHPEE/ MASHPEE CONSERVATION COMMISSION

AND

THE TOWN OF FALMOUTH/ FALMOUTH CONSERVATION COMMISSION

AND

THE FALMOUTH ROD AND GUN CLUB INC.

AND

THE ORENDA WILDLIFE LAND TRUST

AND

THE MASHPEE WAMPANOAG INDIAN TRIBAL COUNCIL

## INTRODUCTION

The importance of the Waquoit Bay, its tributaries, and watershed area has long been recognized by the Towns of Mashpee and Falmouth, the Commonwealth of Massachusetts, conservation groups and the Mashpee Wampanoag Indian Tribal Council. Mashpee and Falmouth have protected lands within the watershed by fee title purchase and by creating open space by use of conservation restrictions and easements. The Commonwealth of Massachusetts has protected a significant amount of the watershed area around the Quashnet River by fee title purchase. In 1988, the Commonwealth of Massachusetts and the National Oceanic and Atmospheric Administration (NOAA) jointly established the Waquoit Bay National Estuarine Research Reserve in Falmouth. Most recently, the U.S. Fish and Wildlife Service established a National Wildlife Refuge which encompasses all these existing protection efforts. In addition, the Refuge provides a boundary within the watershed for future protection efforts.

This Memorandum of Understanding provides a formal basis for cooperation and coordination between the U.S. Fish and Wildlife Service, the Mass. Division of Fisheries and Wildlife, the Massachusetts Department of Environmental Protection/Waquoit Bay National Estuarine Research Reserve, the Town of Mashpee/the Mashpee Conservation Commission, the Town of Falmouth/the Falmouth Conservation Commission, the Falmouth Rod and Gun Club Inc., the Orenda Wildlife Land Trust and the Mashpee Wampanoag Indian Tribal Council for matters pertaining to Mashpee National Wildlife Refuge (NWR) in Mashpee and Falmouth. Although the responsibilities of the undersigned concerning Mashpee NWR are different, there are complimentary functions and areas of common interest that permit and would benefit from cooperation, coordination, and joint endeavors.

## RESPONSIBILITIES AND AREAS OF COOPERATION

1. By this Memorandum of Understanding, it is agreed that the undersigned will establish a Management Committee. This Management Committee will be composed of representatives from each of the signatories (partners) and will meet regularly to discuss refuge related issues of mutual interest and to explore appropriate areas of cooperation. All partners will retain whatever ownership and management rights of the lands they may currently have under their jurisdiction.
  - a. The Management Committee's role will be coordination and cooperation between the signatory partners.
  - b. The Management Committee will establish its own ground rules and operational logistics (ex., decision making through the process of consensus).

2. The U.S. Fish and Wildlife Service will consult with all partners in the development of the National Wildlife Refuge Management Plan, and in periodic review and updates of the Management Plan.
3. All partners will coordinate and cooperate in program development including education, research, public relations, outreach, public safety, maintenance and recreational opportunities.
4. All partners agree that existing long standing management activities, on lands owned by the respective partners shall be allowed to continue.
5. All partners will consult with the Management Committee before implementing new management activities.
6. All partners will provide the resource management necessary to:
  - a. Perpetuate the native fauna and flora, including federal and state listed species, within the boundaries of Mashpee NWR.
  - b. Provide compatible uses of the resources, including wildlife dependent recreational uses such as hunting, fishing, trapping and nature studies.
7. All partners will continue to cooperate in the law enforcement activities on lands for which they are responsible.
8. All partners will encourage the joint publication of studies, press releases, and grant proposals.
9. All partners agree to focus and coordinate land and water protection efforts within the Mashpee NWR boundary.
10. All partners are encouraged to be proactive in appraising and acquiring land within the Mashpee NWR boundary as it becomes available. Land acquisition shall not be limited to any one partner.
11. All partners agree to share staff expertise and labor as feasible for the benefit of the land management and protection program within the boundaries of Mashpee NWR. All partners also agree to enter into working arrangements, as appropriate for the use of lands, buildings, and other facilities owned and operated by signatories, for special projects.
12. Nothing in this Memorandum of Understanding shall be construed as obligating any of the partners hereto to the expenditure of funds.
13. Nothing contained herein shall be construed as limiting in any way the responsibility and authority, as defined by law, of any of the partners, in connection with the administration and protection of lands and resources under their respective administrations.

14. Additional parties holding fee title to permanently restricted conservation land(s) within the Mashpee NWR boundary may be added as partners.

#### EFFECTIVE DATE, DURATION, AND TERMINATION

This Memorandum of Understanding shall become effective when signed by the partners hereto. It shall continue in effect for three years unless extended through written agreement by all participating partners. All partners will review this Memorandum of Understanding annually. Should amendments or revisions to the Memorandum of Understanding be needed, such changes or adjustments may be made promptly, or at this annual review, by consent of all partners. This Memorandum of Understanding will be automatically renewed upon the end of the three year period pending approval from all partners. Any signatory partner may terminate their participation in this Memorandum of Understanding by providing 30 days written notice to all other partners.



Cathy Duvall  
Regional Director  
U.S. Fish and Wildlife Service

4/19/95  
Date

Ken Brown, Acting Secretary  
Secretary, Executive Office of  
Environmental Affairs

4/19/95  
Date

John Chubb  
Commissioner, Department of Environmental  
Management/  
Waquoit Bay National Estuarine Research Reserve

4/19/95  
Date

John Burt  
Commissioner, Department of Fisheries, Wildlife  
and Environmental Law Enforcement

4/19/95  
Date

John Burt  
Director, The Massachusetts Division  
of Fisheries and Wildlife

4/19/95  
Date

James C. ...  
Board of Selectmen  
Town of Mashpee

4/19/95  
Date

...  
Board of Selectmen  
Town of Falmouth

4/19/95  
Date

Stephen L. Baker  
President, The Falmouth Rod and Gun  
Club Inc.

4/19/95  
Date

...  
President Orenda Wildlife Land Trust

4/19/95  
Date

George ...  
President, The Mashpee Wampanoag  
Indian Tribal Council

4/19/95  
Date

# O: Letter of Agreement between the Massachusetts Department of Fisheries and Wildlife (DFW) and the Massachusetts Department of Environmental Management (DEM) to add the Quashnet Woods Property to the Boundary of the Waquoit Bay NERR



COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

100 CAMBRIDGE STREET, BOSTON, MA 02202  
PHONE 617-973-8700 FAX 617-973-8798  
www.state.ma.us/dem



July 5, 2000

Argeo Paul Cellucci  
GOVERNOR

Jane Swift  
LIEUTENANT GOVERNOR

Bob Durand  
SECRETARY

Peter C. Webber  
COMMISSIONER

Wayne MacCallum, Director  
Division of Fisheries and Wildlife  
100 Cambridge Street, 19th Floor  
Boston, MA 02202

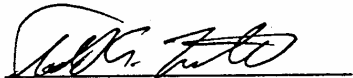
Dear Wayne:

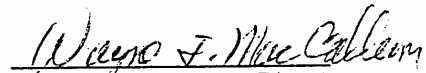
For several years the Massachusetts Department of Environmental Management (DEM) and the Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement (DFWELE), Division of Fisheries and Wildlife (DFW) have jointly owned and managed the Quashnet River Property. As outlined in the July, 1988 Memorandum of Understanding between DEM and DFWELE, DFW has primary management responsibility for the DFW owned river banks. DEM's Waquoit Bay National Estuarine Research Reserve (WBNERR) has primary responsibility for the rest of the property.

For the past several years local staff from WBNERR and DFW have coordinated efforts on projects that affect the entire property. Projects have included interpretive and educational activities, a trail system and resource protection efforts.

This agreement would terminate any previous Memorandum of Understanding and add the entire Quashnet Woods Property to the boundary of DEM's Waquoit Bay NERR. Under this agreement the property would continue to be managed in the same way subject to the provision that all activities must be in accordance with the Federal National Estuarine Research Reserve (NERR) regulations, 15 CFR Part 922. The inclusion of this property within the Reserve boundaries would in no way diminish the coordination responsibility of each agency. Each agency would continue to own and manage their lands as always, subject to the provision that all activities must be in accordance with the Federal NERR regulations. Current hunting or fishing practices and other activities important to DFW would continue. Field staff from the two agencies would continue to communicate and coordinate with each other. Any specific changes would have to be mutually agreed upon and in accordance with the Federal NEER regulations.

Expanding the WBNERR boundary to include the Quashnet River property would allow the Reserve/DEM to use Federal funds there. The Reserve staff would work cooperatively with DFW staff to conduct research and educational activities and develop appropriate stewardship and wildlife habitat programs. As an example, funds might thus become available for the ongoing river restoration work supported by DFW and Trout Unlimited. The inclusion of this land within Reserve boundaries, making DFW a management partner, would also give DFW an opportunity to have input into Reserve research priorities, increasing the likelihood that the research will be pertinent to your management issues. Signature below constitutes agreement with the above.

  
Todd A. Frederick, Director  
MA Dept. of Environmental Mgmt.

  
Wayne MacCallum, Director  
MA Dept. of Fisheries & Wildlife

DATE: 8/8/00

DATE: 8/11/00

# P: Memorandum of Agreement between Massachusetts Department of Conservation and Recreation Waquoit Bay National Estuarine Research Reserve and Town of Mashpee Regarding South Cape Beach Salt Marsh Restoration Project

Memorandum of Agreement

Between

Massachusetts Department of Conservation and Recreation  
Waquoit Bay National Estuarine Research Reserve

And

Town of Mashpee

Regarding

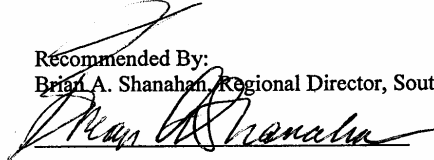
South Cape Beach Salt Marsh Restoration Project

Through this agreement, the Waquoit Bay National Estuarine Research Reserve (WBNERR) and the Town of Mashpee each recognize the other's contributions toward improving the natural resources of Waquoit Bay, by restoring salt marsh at the South Cape Beach project site. Under this agreement the Town of Mashpee agrees to support WBNERR in pursuing this project and WBNERR agrees to continue its efforts to lead the team of partners to implement the South Cape Beach Salt Marsh Restoration Project.

The Town of Mashpee authorizes the WBNERR led project team to implement this project, including replacement of the culvert under the South Cape Beach road and deepening of the salt marsh channel, on property owned by the Town. The Town of Mashpee agrees to participate in the process by providing a liaison to the project team for the purpose of assisting in project development, coordination and implementation in any way it is able. This may include reviewing and authorizing engineering designs, advancing applications for local, state and federal project permits, and identification of reasonable in kind contributions by the town that will assist with acquisition of outside funding to support the project. WBNERR agrees that project related work will not require closure of the South Cape Beach Road during the "beach season" of May through September. Any necessary road closure will be limited to as brief a period as possible in the "off season" months of October through April.

This agreement is entered into this 20 day of November in the year of 2004.

Recommended By:  
Brian A. Shanahan, Regional Director, Southeast Mass State Parks, DCR

 11.12.2004

Approved By:  
Priscilla Geigis, Director, Division of State Parks & Recreation, DCR



Accepted by:  
\_\_\_\_\_, Town of Mashpee



# Q: MOU between WBNERR and Citizens for the Protection of Waquoit Bay

## MEMORANDUM OF UNDERSTANDING

*Agreement made this \_\_\_\_\_ day of \_\_\_\_\_, 2005 by and between the Commonwealth of Massachusetts acting by and through its Department of Conservation and Recreation, (DCR), 251 Causeway Street, Boston, MA 02114 and the Citizens for the Protection of Waquoit Bay (CPWB), P.O. Box 3021, Waquoit, MA 02536, a Massachusetts non-profit corporation organized under M.G.L. Ch. 180.*

WHEREAS the DCR is the owner and manager of the property known as the Waquoit Bay National Estuarine Research Reserve (WBNERR), with a property address at 149 Waquoit Highway, Waquoit, MA 02536, located in Falmouth and Mashpee, Cape Cod and is charged with the care and oversight for the natural, cultural and historic resources of the WBNERR and with the support of the Reserve's research, education, stewardship programs and quality recreational opportunities.

WHEREAS the CPWB wishes to support the mission of DCR by promoting the wise use of the natural and historical features of WBNERR in a manner consonant with its protection and preservation, through the provision of educational, cultural, scientific and civic activities at WBNERR.

NOW, THEREFORE in consideration of mutual covenants herein contained, the parties agree as follows:

- I. Responsibilities of the CPWB:
  - A. To promote the wise use of the natural, historical and recreational resource of WBNERR through the provision of research, monitoring, stewardship, educational, interpretive, cultural and recreation programs and activities.
  - B. To attract and organize volunteer assistance and public involvement at the WBNERR.
  - C. To solicit and receive donations for funding of research, monitoring, stewardship, education, interpretive, cultural, and recreational programs and activities related to WBNERR.
  - D. To provide the means for pursuing fundraising to promote improvements to WBNERR

- E. To accept donations, receive grants, acquire educational materials, acquire artifacts related to the WBNERR as well as additional WBNERR equipment and materials.
  - F. To manage those concessions requested and approved in writing by DCR.
  - G. To raise funds on WBNERR property to accomplish the purposes set forth herein, with prior approval of WBNERR.
- II. The CPWB will provide the DCR by January 30th each year with the following:
- A. The revenue and expenses statement, prepared by a Certified Public Accountant, of the services managed by the CPWB for the preceding calendar year.
  - B. A report of the previous calendar year's activities and services of the CPWB. The Report shall include a listing of the fund raising and promotional activities held.
  - C. A list of proposed major events for the upcoming year. Such list shall be delivered to WBNERR and DCR.
- III. The CPWB shall not make improvements or alterations (temporary or permanent) to the WBNERR land or buildings or post any permanent or temporary signs without receiving a Special Use Permit issued by DCR. Any improvements or alterations shall become the property of DCR.
- IV. The CPWB, its agents, employees and volunteers shall comply with all reasonable directives (written or verbal) from the DCR.
- V. The CPWB understands that it does not have, nor does this agreement imply, exclusive use of the WBNERR or any portion thereof.
- VI. The CPWB agree to notify DCR/WBNERR immediately of all incidents of emergency or unusual nature as a result of their use of the WBNERR.
- VII. The CPWB shall obtain written permission from the DCR/WBNERR to conduct all programs, activities, events or concessions not otherwise authorized by this agreement. A list of proposed programs, activities, events or concessions for the upcoming year authorized by this agreement shall be attached to this MOU.
- VIII. The CPWB shall not assign or transfer this agreement

- IX. The CPWB shall not store cash or receipts overnight at the WBNERR. All cash accounting and reconciliation at or after major events shall be conducted with no less than 2 board members present.
- X. The CPWB shall obtain public liability insurance policy in the minimum face amount of \$500,000/\$1,000,000. A certificate of insurance naming the DCR as an additional insured shall be presented to DCR upon the execution date of this agreement and each renewal period. Such insurance policy shall be maintained during the term of this agreement.
- XI. The DCR/WBNERR reserves the right to direct the CPWB to discontinue the use of any equipment, materials, actions or supplies that it deems unsafe or inappropriate for use at the WBNERR.
- XII. The CPWB shall comply with and encourage public compliance with the rules and regulations governing the public use of DCR properties.
- XIII. The CPWB by acceptance of this agreement assumes all liability for injuries, loss or damage or any cause of action that may arise in connection with their use or activities conducted by them at WBNERR. The CPWB hereby agrees to hold the Commonwealth of Massachusetts, their agents and employees harmless and indemnified from any and all claims or demands for damages, either in law or equity, arising out of or by virtue of their use or conducting activities at WBNERR.
- XIV. The CPWB agree that they are not to discriminate against anyone, for any reason, based upon race, religion, sex, ethnic background, age or place of domicile.
- XV. Any items or artifacts owned by the CPWB and placed on display or used in conjunction with any activity of the CPWB at the WBNERR shall remain the sole property of the CPWB unless a transfer of title is evidenced by a bill of sale or other appropriate documentation. CPWB hereby acknowledges that DCR is unable to carry insurance for said items, and therefore, CPWB agrees to assume liability and hold DCR harmless for any damage, loss, destruction, vandalism or other risk resulting to any such property retained at WBNERR.
- XVI. The parties agree to attempt to resolve disputes arising out of the exercise of this agreement. The CPWB agree to notify the WBNERR Director, in writing, of any problems or complaints. If said problem or complaint is not resolved to the satisfaction of the CPWB, then the DCR's Region 1 Supervisor shall be notified in a like manner. If satisfaction cannot be achieved at this level, then the CPWB shall notify the DCR's Director of State Parks and Recreation. The CPWB agrees to abide by the decision or determination of said Director.
- XVII. CPWB understands and agrees to inform its members that neither CPWB nor its members represent DCR or the Commonwealth of Massachusetts in their

activities or actions. This Agreement does not create any agency relationship and CPWB cannot represent themselves as representatives of the Commonwealth of Massachusetts.

- XVIII. Copies of any printed materials prepared for public distribution, such as program announcements, brochures, leaflets, maps or other form of publicity shall be sent to the Facility Supervisor for review prior to distribution.
- XIX. This agreement shall take effect on the date of execution by all parties and shall be in effect three years from that date.
- XX. Either party may cancel this agreement without cause by serving written notice by certified mail, return receipt requested, at the address listed in this paragraph, at least 90 days in advance of the effective date of cancellation. The DCR may at that time remove any and all personal property of the CPWB therefrom without being liable for trespass, conversion or other cause of action. The CPWB upon expiration or cancellation of this agreement, shall be responsible for leaving the WBNERR in a clean and neat condition, free of all damages resulting from their use of the WNBERR.

Citizens for the Protection of Waquoit Bay (CPWB)  
PO Box 3021  
Waquoit, MA 02536

DCR-WBNERR (State)  
PO Box 3092  
Waquoit, MA 02536

And copy to:  
Director, Division of State Parks and Recreation  
Department of Conservation and Recreation  
251 Causeway Street  
Boston, MA 02114



I hereby agree to the aforesaid terms and conditions:

Citizens for the Protection of Waquoit Bay, Inc.

By: \_\_\_\_\_  
Michael O'Leary, President  
Citizens for the Protection of Waquoit Bay

\_\_\_\_\_  
Priscilla Geigis, Director  
Department of Conservation and Recreation  
Division of State Parks and Recreation

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

\_\_\_\_\_  
Stephen H. Burrington, Commissioner  
Department of Conservation and Recreation

\_\_\_\_\_  
Date

# **R: Agreement of Cooperation and Exchange between WBNERR and UMass-Boston**

**AGREEMENT OF COOPERATION AND EXCHANGE**  
**between**  
**THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL**  
**MANAGEMENT**  
**(Waquoit Bay National Estuarine Research Reserve)**  
**and**  
**THE UNIVERSITY OF MASSACHUSETTS, BOSTON**  
**(Department of Environmental, Coastal and Ocean Sciences, and**  
**Urban Harbors Institute)**

The Waquoit Bay National Estuarine Research Reserve (WBNERR) of the Massachusetts Department of Environmental Management (DEM) and the Department of Environmental, Coastal, and Ocean Sciences (ECOS) and the Urban Harbors Institute (UHI) at the University of Massachusetts, Boston (UMB) hereby agree to establish a framework for the development of cooperative initiatives based on the principle of equality and mutual benefit that will include staff/faculty and student exchanges, collaborative research activities, joint curriculum and course development, administration of funds, and special programs to address the research, education, and outreach needs of the National Estuarine Research Reserve System (NERRS) and the University of Massachusetts, Boston.

To promote this objective, each institution will stimulate awareness among its faculty, staff, and students of the environmental research, education, and outreach activities potentially available as a result of this cooperative agreement. Possible new initiatives include, but will not be limited to:

- Establishing an exchange of staff/faculty and students, through adjunct faculty positions and student internships or projects.
- Facilitating study and training programs that involve the faculty/staff at both institutions, including the development of:
  - Specialized curriculum and courses that cross disciplines and promote the sharing of knowledge and experiences; and
  - Integrated workshops that focus on understanding and managing human impacts on linked watershed and coastal systems.
- Conducting collaborative research and coastal monitoring activities, and sharing analytical facilities and data.
- Administrating, when appropriate, the exchange of extramural funds that may be associated with the above activities or new initiatives.

Toward the accomplishment of these objectives, DEM's Waquoit Bay National Estuarine Research Reserve and UMB's Department of Environmental, Coastal, and Ocean Sciences and Urban Harbors Institute will develop a time-frame and strategic plan for

action which will be approved in writing by DEM and UMB. WBNERR and ECOS/UHI will also serve as the mechanism through which all communications and initiatives will be channeled and coordinated for the two institutions.

Any grant application submitted by WBNERR as applicant or co-applicant under this agreement that is to be administered by DEM must be approved by DEM's grant coordinator.

By signing this agreement, UMB accepts complete liability for the actions or omissions of its employees, agents and invitees while present upon DEM property and agrees to indemnify and hold the DEM, its agents and employees harmless against any and all claims, actions, loss, damage, liability and expense, including loss of life, personal injury or damage to property, that may arise with regard to the activities permitted herein.

Each party reserves the right to terminate this agreement by delivering 60 days written notice to the other party. In witness whereof, we have here onto set our hands and seals

this .....day of .....of the year Two Thousand and One.

Arthur MacEwan,  
Vice Chancellor for Academic Affairs  
and Provost  
University of Massachusetts, Boston

Peter Webber,  
Commissioner  
Massachusetts Department of  
Environmental Management

# S: Interdepartmental Service Agreement between Executive Office of Environmental Affairs (DCR) and the University of Massachusetts, Boston

Issued 5/2001



## COMMONWEALTH OF MASSACHUSETTS INTERDEPARTMENTAL SERVICE AGREEMENT FORM

This form is issued and published by the Office of the Comptroller (CTR) pursuant to 815 CMR 6.00 for use by all Commonwealth Departments. Any changes to the official printed language of this form shall be void. This shall not prohibit the addition of non-conflicting terms. By executing this Interdepartmental Service Agreement (ISA), the Buyer and Seller Departments, under the pains and penalties of perjury, make all certifications required by law and certify compliance with the following requirements: that the Seller Department is qualified and shall at all times remain qualified to perform this ISA; that performance shall be timely and meet or exceed ISA standards, including obtaining requisite licenses, permits and resources for performance; that the Buyer and Seller are legislatively authorized to enter into this ISA; that the Buyer and Seller Departments agree to maintain the necessary level of interdepartmental communication, coordination and cooperation to ensure the successful completion of the ISA; that the Buyer certifies that sufficient funds are available for this ISA; that the Seller Department is required to provide reports as specified in the ISA, that the terms of this ISA shall survive its termination for the purpose of resolving any claim, dispute or other action, or for effectuating any negotiated representations and warranties; that the Buyer and Seller agree that all terms governing performance of this ISA are attached to this ISA or incorporated by reference herein, including the Interdepartmental Service Agreement Instructions, all relevant Massachusetts state and federal laws, regulations, Executive Orders, treaties, and any corresponding policies and procedures issued by CTR; and that the Buyer and Seller are responsible for reviewing and complying with the Interdepartmental Service Agreement Instructions and ISA Policy and 815 CMR 6.00 available under Comptroller Policy Memo #306 (or as amended) available at [www.state.ma.us/ose/Account/marimemos/memo3.htm](http://www.state.ma.us/ose/Account/marimemos/memo3.htm).

|  |   |
|--|---|
| MMARS DOCUMENT ID: _____   |   |
| BUYER DEPARTMENT:<br><b>CONSERVATION + RECREATION</b><br>MMARS 3-POSITION DEPARTMENT CODE: <b>DCR</b>  | SELLER DEPARTMENT:<br><b>UMASS-BOSTON</b><br>MMARS 3-POSITION DEPARTMENT CODE: <b>UMS</b>   |
| ISA MANAGER: <b>VAIRA HARIK</b>  | ISA MANAGER: _____  |
| PHONE: <b>508-457-0495 x100</b>  | PHONE: _____  |
| FAX: <b>617-727-5537</b>   | FAX: _____  |
| E-MAIL ADDRESS: <b>VAIRA.HARIK@STATE.MA.US</b>   | E-MAIL ADDRESS: _____   |
| BUSINESS MAILING ADDRESS: _____  | BUSINESS MAILING ADDRESS:<br><b>100 MORRISSEY BLVD, BOSTON MA 02125</b>   |
| COMPENSATION: (Check and complete all that apply)<br><input type="checkbox"/> Single Fiscal Year Financial ISA<br><input checked="" type="checkbox"/> Multiple Fiscal Year Financial ISA<br><br>Total Maximum Obligation for Duration of this ISA:<br>\$ <b>36,000</b><br><br>Transaction Amount for current fiscal year obligation:<br>\$ _____ | TRANSACTION DOCUMENTATION ATTACHED: (Check option that applies)<br><input type="checkbox"/> ASTA Form (when required to establish new Child Account)<br><input type="checkbox"/> AC Transaction (for total of current fiscal year obligation)<br><input checked="" type="checkbox"/> SC Transaction (for total duration of ISA, including 09years. Only allowable if Seller is a Higher Education State Department)<br><input type="checkbox"/> Other (only upon prior approval of CTR) |
| BUYER ACCOUNT INFORMATION (complete as many that apply)<br>Parent Account: _____, Fund: _____<br>TO: _____<br>Parent Account: _____, Fund: _____<br>TO: _____<br>Parent Account: _____, Fund: _____<br>TO: _____<br>Parent Account: _____, Fund: _____<br>TO: _____  | SELLER ACCOUNT INFORMATION (complete as many that apply)<br>Child Account: <b>OFF MMARS</b> , Fund: _____<br>Child Account: _____, Fund: _____<br>Child Account: _____, Fund: _____<br>Child Account: _____, Fund: _____  |
| BRIEF DESCRIPTION OF PERFORMANCE: (Reference to attachments without a narrative description of performance is insufficient.)<br><b>LAB SERVICES TO CARRY OUT BASIC NUTRIENT ANALYSIS ON MONTHLY WATER SAMPLES</b>  |   |
| RFR REFERENCE NUMBER: (If Seller responded to a Buyer RFR or "N/A" if not applicable) <b>MA</b>  |   |
| ANTICIPATED ISA EFFECTIVE START DATE: Performance shall begin on <b>7/1/05</b> , which shall be no earlier than the latest date this ISA is signed by authorized signatories of the Buyer and Seller Departments pursuant to 815 CMR 6.00.   |   |
| TERMINATION DATE OF THIS ISA: This ISA shall terminate on <b>7/1/08</b> unless terminated or amended by mutual written agreement by the parties prior to this date pursuant to 815 CMR 6.00.   |   |
| AUTHORIZING SIGNATURE FOR THE BUYER DEPARTMENT:<br>X: <b>[Signature]</b><br>(Signature of Buyer Department's Authorized Signatory)<br>DATE: <b>8/8/05</b><br>(Date must be handwritten at time of signature)<br>NAME: <b>TRISCILLA GETOIS</b>  | AUTHORIZING SIGNATURE FOR THE SELLER DEPARTMENT:<br>X: <b>[Signature]</b><br>(Signature of Seller Department's Authorized Signatory)<br>DATE: <b>7/19/05</b><br>(Date must be handwritten at time of signature)<br>NAME: <b>Richard F. Antonak</b>  |

TITLE: **DIR. STATE PARKS & RECREATION**

Page 1. of 3. TITLE: **Vice Provost for Research**

# INTERDEPARTMENTAL SERVICE AGREEMENT FORM

MMARS DOCUMENT ID: \_\_\_\_\_



## ATTACHMENT A - DESCRIPTION OF PERFORMANCE:

Check one:  Initial ISA Description of Performance  
 Amendment to Description of Performance

Include a statement of purpose; justification for ISA; responsibilities of the parties; any relevant definitions; a schedule of performance or completion dates if applicable; resources to be committed to the ISA and any reporting requirements. Reference to attachments without a narrative description of performance is insufficient. If amending the description of performance, identify what performance is being amended. Attach any supporting documentation and reporting requirements. This Attachment Form must be used. Insert (type or copy and paste) all relevant information using as many pages as necessary. An electronic copy of this form is available in Policy Memo #306 under Comptroller Policy Memos.

As part of the mandated NERR System-Wide Monitoring Program (SWMP) a long term coastal monitoring program – Waquoit Bay National Estuarine Research Reserve (WBNERR) will be collecting estuarine water samples for nutrient analysis on a year round basis at several locations within the reserve. It will be the responsibility of the Reserve to deliver the samples to the laboratory. Laboratory services will be required to carry out basic nutrient analysis on approximately 20 water samples collected every month (about 250 per year) and to report these results to the reserve in a timely manner. Our SWMP-approved protocol requires that these water samples be analyzed for the following parameters:

### TIER 1

- a) Ammonium, Nitrate, Nitrite
- b) Ortho-phosphate

### TIER 2

- a) Total Dissolved Nitrogen
- b) Particulate Nitrogen
- c) Silica

The cost for analyzing for all Tier 1 parameters is \$36.00 per sample.  
The cost for tier 2 parameters is \$30.00 per sample



# T: Agreement between Framingham State College, Division of Graduate and Continuing Education (DGCE), and Waquoit Bay National Estuarine Research Reserve



## FRAMINGHAM STATE COLLEGE

100 State Street, P.O. Box 9101  
Framingham, Massachusetts 01701-9101

Center for Global Education

Tel (508) 626-4037 Fax (508) 626-4030  
e-mail: [global@frc.mass.edu](mailto:global@frc.mass.edu)  
Web: <http://www.choosefsc.org/global/>

### AGREEMENT

#### **Framingham State College, Division of Graduate and Continuing Education (DGCE), and Waquoit Bay National Estuarine Research Reserve**

##### **Introduction**

This is an agreement between Framingham State College DGCE and Waquoit Bay National Estuarine Research Reserve to provide graduate credit for professional development courses offered by Waquoit Bay National Estuarine Research Reserve instructional staff, including Pat Harcourt and Joan Muller.

##### **Period of Agreement**

This agreement shall be in effect for one (1) year from the date of signing. Upon satisfactory evaluation and review by both Framingham State College DGCE and Waquoit Bay National Estuarine Research Reserve the agreement will remain in effect for an additional one year. Either party may terminate this agreement in the event of a material breach of this agreement by the other party, such termination to be effective only as of the date corresponding to the end of the school term of any year, upon not less than six months prior written notice.

##### **Waquoit Bay National Estuarine Research Reserve instructional staff responsibility will be as follows:**

- A. To submit complete course syllabi to the college for review and approval;
- B. To submit resume, official transcripts of undergraduate and graduate work, and two letters of recommendation of potential faculty to the college for review and approval;
- C. To provide all physical facilities, personnel and equipment necessary and appropriate to deliver the approved courses;
- D. To take any and all steps reasonably necessary so as to ensure that the policies and procedures will be in accord with the policies and procedures of the College;
- E. To provide all financing necessary to maintain the instructors and the courses, including without limitation:
  - (i) classroom facilities
  - (ii) faculty to teach the courses
  - (iii) the acquisition of all necessary equipment and materials appropriate to deliver the course of study of the program;
  - (iv) all approved marketing and promotions

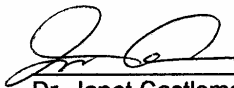
**Framingham State College responsibilities will be as follows:**

- A. To review and approve or disapprove within thirty (30) days after receipt from instructional staff of Waquoit Bay National Estuarine Research Reserve the proposed courses for the program;
- B. To review and approve or disapprove the qualifications of all course instructors;
- C. To respond to all written requests from instructors at Waquoit Bay National Estuarine Research Reserve for review, advice, consultation, and approval of additional course descriptions, additional faculty approvals, and any other obligation set forth in this Agreement within thirty (30) days of said request;
- D. To determine and notify instructors at Waquoit Bay National Estuarine Research Reserve of any reasonable action necessary to ensure the operation and management of the courses are consistent with the College's other courses and academic policies;
- E. To periodically review and evaluate classes;
- F. To allow instructors at Waquoit Bay National Estuarine Research Reserve the reasonable use of the College's name and logo in connection with all printed and/or electronically transmitted and/or live advertising or promotions of the courses.
- G. To provide Framingham State College Graduate credit with the understanding that these credits are not applicable to a degree program offered by the college without written approval by the student's advisor;
- H. To provide college registration materials or an approved substitute to instructors at Waquoit Bay National Estuarine Research Reserve prior to the start of program courses;
- I. To maintain student records.

**Revenue**

Each course participant shall pay the College \$55 to enroll in a one (1) credit professional development graduate course, \$110 to enroll in a two (2) credit course and \$165 for a three (3) credit professional development graduate course. At the beginning of each semester, unless otherwise negotiated, the instructor from Waquoit Bay Research Reserve shall provide a list of all courses approved by the college and offered for graduate credit by Waquoit Bay National Estuarine Research Reserve by course number and title.

Participants' checks for the total amount as outlined above made out to Framingham State College or individual payment from each student via Visa/MasterCard will be sent at the beginning of each course.



Dr. Janet Castleman  
Dean, Division of Graduate  
and Continuing Education  
Framingham State College

Date: 11/1/04



Christine Gault  
Manager, Waquoit Bay Nat'l Estuarine  
Research Reserve  
Waquoit, MA

Date: 11/11/04