

**RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
FY2002 through 2003 WORK PLAN - Narragansett Bay National Estuarine Research Reserve –**

**Program Description:**

The Reserve was created in 1980 from parcels of the Bay Islands Park and wildlife management areas. Management of the Reserve is a cooperative effort between DEM and the National Oceanic and Atmospheric Administration to provide stewardship for the sensitive habitats on and around Prudence Island, Patience Island, and Hope Island. The Reserve is one of 25 sites in the National Estuarine Research Reserve System (NERRS) protecting one million acres of the nation's estuaries.

**Mission of Program:**

The NBNERR has two complimentary missions. One focuses on the State of Rhode Island's interest in managing a valuable natural resource and the second focuses on the National Oceanic and Atmospheric Administration's goals for the National Estuarine Research Reserve System.

The first mission seeks to protect and improve the quality of the Reserve for wildlife management and low intensity recreation, including hiking, biking, swimming, hunting, boating, fishing, and wildlife observation. In this regard, the Reserve is considered to be a prime destination for eco-tourism. Prudence Island depends on this resource for a significant portion of its economic activity.

The second mission is to protect and improve the quality of estuaries nationally through research, monitoring, education, and stewardship of the land and waters within the borders of the Reserves which, in Rhode Island, is a representative area of the Virginian - southern New England - biogeographic region.

**Program Highlights:**

**Conditions, Trends, Opportunities and Challenges**

The Reserve is in the center of the Bay and encompasses 2,353 acres of land and 1,591 acres adjoining the islands to a depth of 18 feet. DEM owns 60% of Prudence and all of Patience and Hope Island.

**Upland** -- The Reserve includes extensive acreage of what was once farmland but has since grown into dense shrubs and early successional trees.

This section relates to:

- DEM Goal # 3 -- Environmental Protection and Restoration
- DEM Goal # 5 – Natural Resource Stewardship
- DEM Strategic Priority # 5 –Ecosystem and Watershed Management

- The Reserve has worked with other DEM divisions to restore areas of Prudence Island to a succession stage that is more productive for wildlife and increases biodiversity. Firebreaks at both the north and south end of Prudence Island have grown into brush, which threatens the safety of nearby homes. The Reserve is working with the Prudence Island Volunteer Fire Department, the DEM Divisions of Forest Environment and Fish and Wildlife to restore these firebreaks.

- The upland area of Hope Island is a major rookery for large colonial nesting wading birds. This rookery is managed in close cooperation with the DEM Division of Fish and Wildlife to maintain a habitat that is suitable for these species. The abundance of these birds is declining across the eastern seaboard as habitat is degraded or disappears.
- The vegetation of Prudence Island and the fact that it is an island has resulted in a large deer herd living on the Island. As a result of this, Prudence Island is considered one of the best destinations for bow hunting in the Eastern United States. However, large deer herds support large deer tick populations and, in turn, have resulted in an elevated incidence of Lyme disease on Prudence Island. The Reserve is working cooperatively with the Harvard School of Public Health, Prudence Conservancy, RI Department of Health, University of Connecticut and the University of RI to test Prudence Island residents for Lyme disease and experiment in tick control. A balance must be achieved between managing the herd for archery hunting and for public health.
- The Reserve has an extensive trail system, some of which is maintained by the Reserve, but volunteers from the Prudence Conservancy maintain much of it. The trails access both the natural areas and historic sites on Prudence Island.

**Salt Marshes** -- The Reserve includes extensive salt marshes. For example, Coggeshall Cove (Prudence) is a reference site used by researchers who then compare it to other, more impacted salt marshes around the Bay and the nation where changes may be occurring as a result of human impacts. The upland areas bordering this salt marsh salt marsh are completely protected from such impacts.

- DEM Goal # 3 -- Environmental Protection and Restoration
- DEM Goal # 4 – Narragansett Bay and the Coastal Environment
- DEM Goal # 5 – Natural Resource Stewardship
- DEM Strategic Priority # 5 –Ecosystem and Watershed Management

### **Subtidal and Littoral Habitats**

This section relates to:

- DEM Goal # 3 -- Environmental Protection and Restoration
- DEM Goal # 4 – Narragansett Bay and the Coastal Environment
- DEM Goal # 5 – Natural Resource Stewardship
- DEM Strategic Priority # 5 –Ecosystem and Watershed Management

- Eelgrass beds in the Reserve represent some of the last remaining native assemblages in Narragansett Bay. The eelgrass beds at the north end of Prudence Island are the most northerly in the Bay. Some of the eel grass beds at the south end of the island were planted as part of an experimental restoration project. A large eelgrass bed on the southeast end of Prudence Island is a CRMC-designated protected area. The eelgrass bed serves as a reference in eelgrass restoration studies.
- There are extensive shellfish resources around the islands. Some of the oysters may be a result of early aquaculture efforts at Jenny Creek (Prudence).

**Recreation Facilities** – The Reserve maintains facilities to support research, monitoring, education, and natural resource stewardship.

This section relates to:

- DEM Goal # 2 – Environmental Ethic and Awareness
- DEM Strategic Priority # 6 – Promote Partnerships
- DEM Strategic Priority # 10 – Improve Communication

- An education center at the main building has museum quality exhibits and a small interpretive building at the T-wharf that has large display tanks and touch tanks
- Boating and swimming are popular activities for both Prudence Island residents and visitors. The Reserve provides short-term docking and moorings at Potters Cove and at the south end of the island. Fishing from the T-wharf at the south end of Prudence Island is a popular year-round activity.
- Bow hunting is permitted throughout the Reserve, in season, and is so popular that reservations are required for the most desirable dates. In addition, Prudence Island provides one of the few sites where paraplegics can deer hunt due to the extensive network of roads through the south end of the Island
- Hiking and biking are among the public uses of the Reserve property

### **Recent Reserve Achievements**

#### **Management**

In cooperation with the DEM Division of Fish and Wildlife, more than 20 acres of open habitat was created at the north end of Prudence Island in order to provide varied habitats to encourage a diversity of wildlife in that unite of the Reserve. (DEM Goal # 5 – Natural Resource Stewardship, DEM Strategic Priority # 6 – Promote Partnerships)

In cooperation with the DEM Division of Fish and Wildlife, firebreaks were cleared at the north end of Prudence Island to protect the residences from fires in the event of a wildland fire within that unit of the Reserve. (DEM Goal # 5 – Natural Resource Stewardship, DEM Strategic Priority # 6 – Promote Partnerships)

#### **Monitoring**

The Reserve is a participant in the National system-wide water quality and meteorological monitoring program. This provides long-term scientific data on the status and trends of environmental indices at all 24 reserves, nation-wide. This data is collected and stored electronically every 15 minutes. All reserves report their data to the national Central Data Management Office. This monitoring is one of

the central requirements of the NOAA grant. (DEM Goal # 4 – Narragansett Bay and the Coastal Environment, DEM Strategic Priority # 3 – Proactive Planning to Protect and Restore Critical and Threatened Resources)

Scientific monitoring during the past year included: water quality monitoring, meteorological conditions (precipitation, pH, temperature), terrestrial plants, shorebirds, sea mammal sightings, estuarine invertebrates, mosquito control, shallow-water fish, waterfowl, nesting colonial wading bird, and deer populations. These monitoring programs were conducted in cooperation with the DEM Division of Fish and Wildlife, DEM Division of Agriculture, and the US Environmental Protection Agency (DEM Goal # 4 – Narragansett Bay and the Coastal Environment, DEM Strategic Priority # 3 – Proactive Planning to Protect and Restore Critical and Threatened Resources, and DEM Strategic Priority # 6 – Promote Partnerships.)

### **Research**

Research was conducted in the following area: the role of nutrient loading on marsh plant community structure (**Brown University**); tick-borne diseases affecting humans and transmitted by several species of ticks (**Harvard University, School of Public Health** and the **University of Connecticut**); density-dependant effects of grazing on the success of eelgrass plants (**URI Graduate School of Oceanography**); biogeographic influence on zonation in marsh plants driven by interspecific competition (**Brown University**, funded by the National Institute of Global Climate Change); biological control of deer ticks (**URI**); sediment dynamics in tidal marshes (**University of Maryland**); and eelgrass health and eutrophication (**University of New Hampshire**, Cooperative Institute for Coastal and Estuarine Environmental Technology); tick ecology (**University of Connecticut**) (DEM Goal # 4 – Narragansett Bay and the Coastal Environment and DEM Strategic Priority # 6 – Promote Partnerships.)

- intraspecific habitat utilization of saltmarshes by two species of crabs (**Smithsonian Institute**)
- eelgrass restoration (**University of Rhode Island**)
- marsh vegetation health indices (**US Environmental Protection Agency**)

The Reserve supported and participated in the Narragansett Bay synoptic dissolved-oxygen monitoring project organized in cooperation with the **Narragansett Bay Estuary Program**. (DEM Goal # 4 – Narragansett Bay and the Coastal Environment and DEM Strategic Priority # 6 – Promote Partnerships.)

### **Education**

Additional exhibits were created at the Reserve's Learning Center on Prudence Island. (DEM Goal # 2 – Environmental Ethic and Awareness and DEM Strategic Priority # 6 – Promote Partnerships)

### **Strategic Priorities and Targets**

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## **Consolidation / Coordination**

- Collaborate with the other DEM programs to more effectively protect the resources of Narragansett Bay, perhaps through formation of an intra-agency Narragansett Bay Council and the development of a joint Narragansett Bay Workplan (continuous)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management
- Collaborate with the other DEM programs in the manner that other related DEM programs cooperate in the watershed approach to environmental management (continuous)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management
- Collaborate with the Narragansett Bay Estuary Program to share the expertise of that programs scientist to serve jointly as the Reserve’s Research Coordinator (continuous)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management
- Conduct, cooperatively with the Narragansett Bay Estuary Program, 4 major workshop for coastal zone decision-makers. (throughout the period of the workplan)
  - DEM Goal # 2 – Environmental Ethic and Awareness
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 6 –Promote Partnerships
  - DEM Strategic Priority # 10 – Improve Communication

## **Ecosystem Integrity**

- Develop a Reserve zoning map and listing of permitted activities in each zone (target – June 2002)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management
- Collaborate with the Prudence Conservancy to develop an interim stewardship plan for the farm on the Prudence Conservancy Unit of the Reserve (target – December 2001)
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 6 –Promote Partnerships
- Acquire Dyer Island and incorporate into the Reserve (target – September 2001)

DEM Goal # 4 – Narragansett Bay and the Coastal Environment

DEM Goal # 5 – Natural Resource Stewardship

DEM Strategic Priority # 5 –Ecosystem and Watershed Management

- Conduct biological survey to rank the most important habitats within the Reserve. Determine and rank the most important ecological units essential to maintain the integrity of the area and its resources. Prepare a map for each of the units identifying core areas of the Reserve (target – June 2002)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management
  
- Human activities or natural processes occurring outside the core areas could pose a risk to the integrity of core areas. Prepare a map for each of the units identifying buffer areas of the Reserve (target -- June 2002)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management
  
- Establish a long-term program for assessing habitat and biological community trends (target – March 2003)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management
  
- Continue operation of the GIS mapping project to provide mapping capabilities for individual units of the Reserve, critical habitats, and Reserve overlays. Hire a full-time post-doctoral researcher who has GIS mapping skills. (target – immediate)
  - DEM Goal # 4 – Narragansett Bay and the Coastal Environment
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 5 –Ecosystem and Watershed Management

### **Improve Communication**

- Collaborate with the Partnership for Narragansett Bay to develop and provide workshops for coastal decision makers and to conduct a survey of coastal decision makers to determine the type of information they want about bay resources and the manner in which they would like to get that information (target – ongoing )
  - DEM Goal # 2 – Environmental Ethic and Awareness
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 6 –Promote Partnerships
  - DEM Strategic Priority # 10 – Improve Communication

- Continue to encourage collaboration with Save the Bay and other environmental, governmental, land stewardship, and scientific groups to utilize Reserve facilities educational programs (target – immediate)
  - DEM Goal # 2 – Environmental Ethic and Awareness
  - DEM Goal # 5 – Natural Resource Stewardship
  - DEM Strategic Priority # 6 –Promote Partnerships
  - DEM Strategic Priority # 10 – Improve Communication

<b>OBJECTIVE 1: STEWARDSHIP</b> To provide Reserve <b>stewardship</b> of estuarine ecosystem types of the Virginian – southern New England - biogeographic region, for long-term scientific and educational use.	<b>Environmental Indicators</b> Habitat preservation	
<b>STRATEGIES</b>	<b>ACTIVITIES</b>	<b>Performance Measures</b>
Restore impacted section of Potter Cove salt marsh	Road crossing section will be removed, crushed culvert replaced, road replaced.	Severely impacted marsh will become a healthy salt marsh
Protect eelgrass beds	Appropriate signage will be designed, produced and placed to alert boats of protected eelgrass beds	Signs will be in place at Reserve eelgrass beds
Increase meadow acreage to support field species	Restore at least 10 acres of meadow habitat	10 acres of meadow supporting a range of meadow species
Manage Reserve wildlife populations: protect rare, threatened, or endangered species; control invasive non-native species; manage species to protect public health; manage habitats to support a diversity of native species.	Protect horseshoe crab in accordance with existing regulation, conduct hunting program to control deer population and lessen risk of tick-borne diseases, maintain open areas for field species	Deer herd will be reduced during the fall hunting season, 5 acres will be selectively cut through a woodcutting program to improve habitat
Provide for orderly management of the Reserve’s Resources	develop a management plan for the Baker Farm unit of the Reserve	Production of the plan

<b>OBJECTIVE 2: RESEARCH AND MONITORING</b> To expand scientific knowledge of estuarine processes by addressing significant gaps in the understanding of dynamic changes within estuarine ecosystems; and to develop information for improved coastal zone decision making.	<b>Environmental Indicators</b>	
<b>STRATEGIES</b>	<b>ACTIVITIES</b>	<b>Performance Measures</b>
Expand water quality monitoring program to comply with NOAA requirements	Add two new water quality monitoring stations	Have new monitoring stations
Expand meteorological program to comply with NOAA requirements	Add meteorological monitoring equipment	Expanded weather station
Support visiting scientist program to develop data and information for the National Estuarine Research Reserve System and for coastal zone decision makers.	Support 15 researchers from various colleges and universities who are working on estuary research at the Reserve.	Document the research ongoing at the Reserve
Provide on-site laboratory and over-night facilities to support scientist conducting research at the Reserve.	Provide on-site laboratory and over-night facilities to support 30 scientist conducting research at the Reserve.	Document the use of the on-site laboratory and over-night facilities.

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STRATEGIES	ACTIVITIES	Performance Measures
Administer fellowship program for specific research projects at the Reserve as part of the National Estuarine Research Reserve System fellowship program.	Support 2 graduate fellowships.	Recruit 2 graduate research fellows.
Collaborate with the scientific research community to encourage development of research proposals.	Collaborate with 3 colleges or universities to encourage the development of research proposals.	Document collaborative contacts.
Develop a Bay/Sound characterization and provide an electronic data base for the Bay/Sound natural resources.	Compile data and generate maps.	Document % completion. (This is a multi-year project.)
Continue the long-term program for assessing water quality.	Determine the status and trends of water quality at Prudence Island	Gather water quality data continuously (every 30 minutes) at 2 stations and send data to NOAA Central Data Management Office.
Coordinate bay-wide dissolved oxygen assessment with the Estuary Program	Provide scientific data environmental regulators and scientists.	
Continue operation of the Reserve weather station and provide computerized data to Reserve researchers.	Gather meteorological data on a daily basis and check the weather station equipment weekly.	52 reported check
Continue to develop and participate in National Estuarine Research Reserve system-wide monitoring programs.(beyond the water quality monitoring)		Document the progress in this development effort.
Initiate biological monitoring program to comply with NOAA requirements	Determine the status and trends of nutrients and chlorophyll in the Bay waters	Evaluation of instrumentation and methodology and initiate monitoring
Integrate water quality and biological monitoring program into the ongoing Narragansett Bay monitoring program	Participate and collaborate with the Partnership for Narragansett Bay	Provide water quality and biological monitoring data to the Narragansett Bay Estuary Program

<p><b>OBJECTIVE 3: Education, Information, and Interpretation</b> To increase awareness, understanding, and appreciation of estuarine systems and estuarine stewardship by developing and disseminating information about estuarine systems, and by providing opportunities for personal experience with them.</p>	<p><b>Environmental Indicators</b></p>	
<p><b>STRATEGIES</b></p>	<p><b>ACTIVITIES</b></p>	<p><b>Performance Measures</b></p>
<p>Provide an informative learning center at the Reserve.</p>	<p>Create, maintain, and improve educational exhibits at the Reserve learning center at the Reserve’s South Prudence Facility.</p>	<p>Maintain and improve 3 major exhibits.  Design and install 1 new exhibit.</p>
<p>Provide coastal decision makers with information they need to make informed decisions relating the resources of Narragansett Bay</p>	<p>Conduct, cooperatively the <b>Narragansett Bay Estuary Program</b> and the <b>Partnership for Narragansett Bay</b>, 6 major state-wide workshops for coastal zone decision-makers. (This performance measure is also listed under Research and Monitoring.)</p>	<p>Successful completion of 6 coastal decision-maker workshops</p>
<p>Complete the first steps in developing the Coastal Training Initiative in accordance with NOAA guidance</p>	<p>Conduct needs assessment and marketing analysis for the Coastal Training Initiative in accordance with NOAA guidance. This will be done cooperatively with the <b>Narragansett Bay Estuary Program</b> and the <b>Partnership for Narragansett Bay</b></p>	<p>implementable Needs Assessment and marketing analysis</p>
<p>Provide a range of educational and interpretive programs for organizations and for the public in order to better inform people about the resources of Narragansett Bay and Narragansett Bay issues</p>	<ul style="list-style-type: none"> <li>• Conduct off-site programs for 1,000 children and adults each year</li> <li>• Conduct on-site interpretive programs for the public during the summer for 2,500 people each years.</li> <li>• Conduct at least two teacher workshops per year</li> <li>• Conduct one-weeks day-camps for children at the Reserve each summer</li> <li>• Participate in, or participate in the organization of, major environmental events such as CoastWeek, beach cleanups and National Estuaries Day</li> <li>• Create web page</li> </ul>	<ul style="list-style-type: none"> <li>• # of programs offered</li> <li>• # of people attending</li>   <li>• # of programs offered</li> <li>• # of people attending</li> <li>• # of workshops offered</li> <li>• # of teachers attending</li>   <li>• # of camps conducted</li> <li>• # of children participating</li> <li>• # of events in which the Reserve participates</li>   <li>• # of people who access the web page</li> </ul>

<p><b>OBJECTIVE 4: PUBLIC INVOLVEMENT</b> To create opportunities for members of the public to benefit from and contribute to the Narragansett Bay National Estuarine Research Reserve.</p>	<p><b>Environmental Indicators</b></p>	
<p><b>STRATEGIES</b></p>	<p><b>ACTIVITIES</b></p>	<p><b>Performance Measures</b></p>
<p>Provide safe and attractive recreational facilities at the south Prudence unit of the Reserve, including a swimming beach and picnic area.</p>	<ul style="list-style-type: none"> <li>• Provide recreational opportunities for 1,000 people per year at the Reserve recreational facilities.</li> <li>• Provide deer hunting (bow hunting) for 400 hunter-days (over a 60-day period) per year at the Reserve sites on Prudence and Patience Islands.</li> <li>• Provide deer hunting for 12 hunters as part of a special hunting program for paraplegics and double amputees at the Reserve sites on Prudence and Patience Islands.</li> <li>• Maintain the fishing dock, beach, and picnic areas within the Reserve</li> <li>• Manage recreational uses to prevent habitat degradation and development of unsafe conditions</li> </ul>	<ul style="list-style-type: none"> <li>• # of participants in recreational activities at the Reserve</li> <li>• A successful hunting season will take place involving 400 hunter-days</li> <li>• condition of the recreational facilities</li> <li>• condition of the habitats used for recreational purposes</li> <li>• # of accidents</li> </ul>
<p>Provide programs involving the public and focus these activities at the new learning center.</p>	<p>The learning center will be open throughout the summer</p>	<p>At least 600 people will use the learning center during the course of the summer.</p>
<p>Encourage and support (with training, equipment and supervision) volunteer involvement in Reserve research, monitoring, and trail development projects.</p>	<ul style="list-style-type: none"> <li>• Support 300 -hours of water quality volunteer work performed by the Prudence Conservancy.</li> <li>• Support 2,500 -hours of volunteer trail construction and maintenance work performed by the Prudence Conservancy.</li> <li>• Support and train volunteers in various research and monitoring programs at the Reserve</li> </ul>	<ul style="list-style-type: none"> <li>• Determine the status and trends of water quality.</li> <li>• # of volunteers</li> <li>• # of volunteer hours</li> <li>• condition of the trails</li> <li>• # of volunteers</li> <li>• # of volunteer hours</li> <li>• success of the monitoring and research programs</li> </ul>

<p><b>OBJECTIVE 5: FACILITIES</b> To provide accessible facilities necessary to fulfill the Reserve’s mission as established in state and Federal law, administrative rules, and interagency agreements.</p>	<p><b>Environmental Indicators:</b> Accessible, safe, and attractive facilities to support the major functions of the Reserve (as described in NOAA guidance documents) and for use by the public</p>	
<p><b>STRATEGIES:</b></p>	<p><b>ACTIVITIES</b></p>	<p><b>Performance Measures</b></p>
<p>Construct a water quality and monitoring lab as a 500 square-foot addition to the field research facility.</p>	<p>Design and construct a water quality and monitoring lab as a 500 square-foot addition to the field research facility.</p>	<p>The Reserve will have a water quality lab to better access the water quality trends in Narragansett Bay.</p>
<p>Provide a meeting room and a natural history laboratories at the field research station.</p>	<p>Provide a meeting room and a natural history laboratories at the field research station.</p>	<p>The Reserve will have a new meeting room to better serve the public.</p>
<p>Improve the facilities that make up the administrative center for the Reserve.</p>	<p>Demolish the existing garage that has become a safety hazard</p>	<p>The garage will be demolished.</p>
<p>Maintain Reserve equipment, buildings, marine facilities and Reserve grounds (including trails, roads, and firebreaks)</p>	<p>Mowing trails and firebreaks, repairing road, maintaining Reserve docks, boats, heavy equipment, and building complex)</p>	<p>Grass on trails will be short to reduced Lyme disease risk, all vehicles (including boats) will be kept in operational condition, docks will be maintained in a safe condition</p>