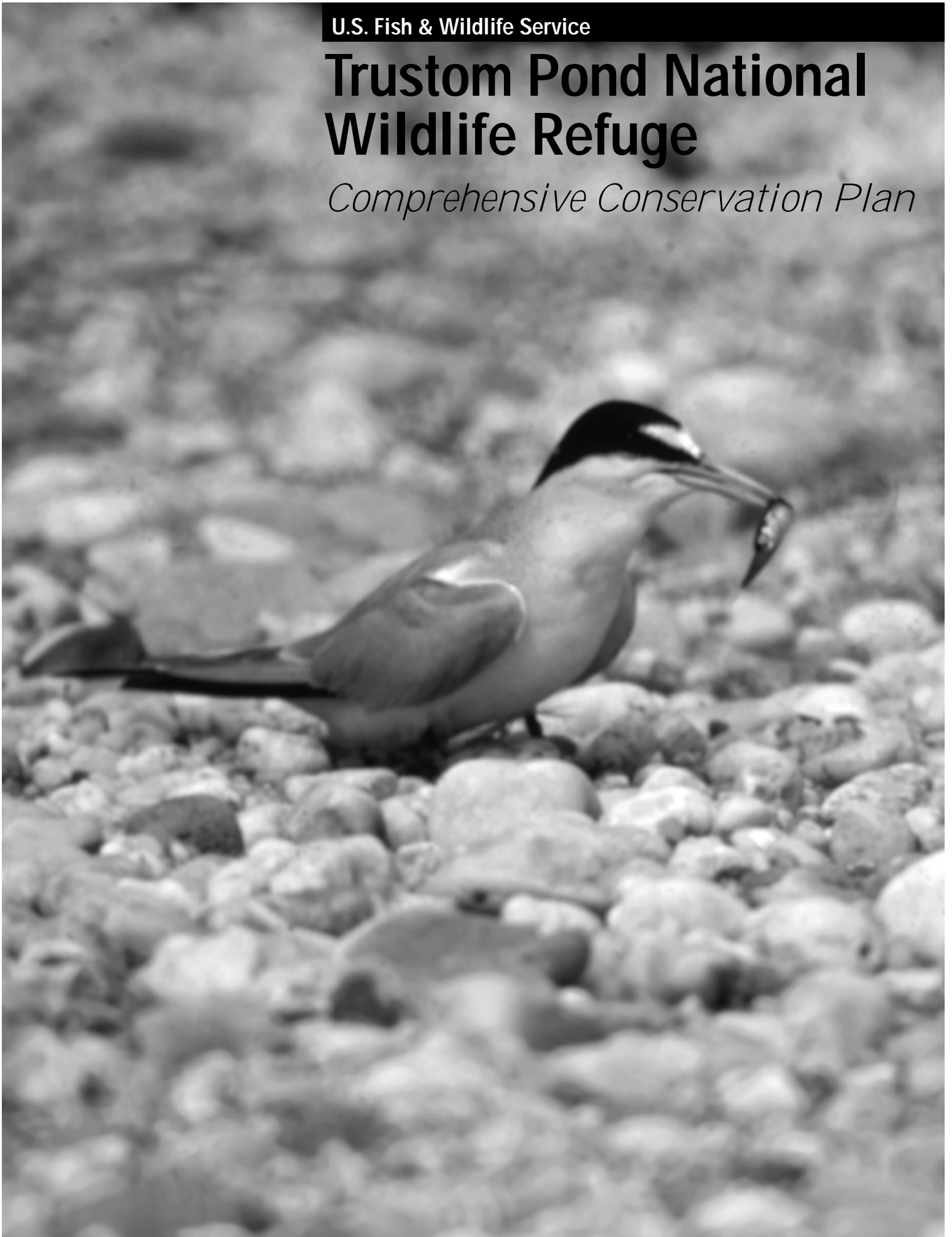


U.S. Fish & Wildlife Service

Trustom Pond National Wildlife Refuge

Comprehensive Conservation Plan





U.S. Fish & Wildlife Service

Comprehensive Conservation Plan

*Trustom Pond National
Wildlife Refuge*

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Cover photo: Least tern, William Kolodnicki, USFWS

May 2002



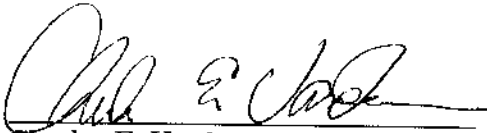
This goose, designed by J.N. "Ding" Darling, has become a symbol of the National Wildlife Refuge System.

The *U.S. Fish & Wildlife Service* is the principal federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 93-million acre National Wildlife Refuge System comprised of more than 500 national wildlife refuges and thousands of waterfowl production areas. It also operates 65 national fish hatcheries and 78 ecological services field stations. The agency enforces federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

Comprehensive Conservation Plans provide long term guidance for management decisions; set forth goals, objectives, and strategies needed to accomplish refuge purposes; and, identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

Comprehensive Conservation Plan Approval for Trustom Pond National Wildlife Refuge

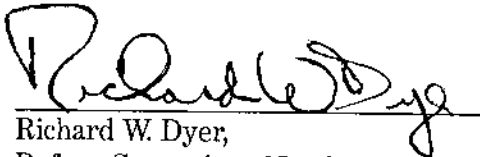
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8/13/02
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Owl on a refuge entrance sign

USFWS photo

Introduction and Background

- Refuge Overview
- Purpose of and Need for a CCP
- Mission
- Refuge Purpose
- National and Regional Mandates Guiding this CCP
- Existing Partnerships

Introduction

This Comprehensive Conservation Plan (CCP) is the culmination of a planning process that began in February 1998. Numerous meetings with the public, the state, and conservation partners were held to identify and evaluate management alternatives. A draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA) was distributed in December 2000. This CCP presents the management goals, objectives, and strategies that we believe will best achieve our vision for the refuge, contribute to the National Wildlife Refuge System Mission, achieve refuge purposes and legal mandates, and serve the American public.

Refuge Overview

Trustom Pond National Wildlife Refuge (Trustom Pond Refuge) is located on the south coast of Rhode Island in South Kingstown, Washington County (see Maps 1-1 and 1-2). The main body of the refuge is bordered by private land and the community of Green Hill to the west; by Matunuck Schoolhouse Road to the north; and by private land to the northeast and east. East of its main body, the refuge also owns a separate 52-acre parcel, bordered by private farmland to the west and east, Matunuck Schoolhouse Road on the north, and Card Ponds Road on the south.

In 1974, Mrs. Ann Kenyon Morse donated the first 365 acres to the refuge. In 1982, The Audubon Society of Rhode Island donated 151 acres. The refuge now includes 787 acres in either fee title or conservation easement. The Land Protection Plan (Appendix E) expanded the refuge acquisition boundary by 1,283 acres. The refuge may now acquire up to 1,536 acres from willing sellers within the newly expanded acquisition boundary.

The Purpose of and Need for a CCP

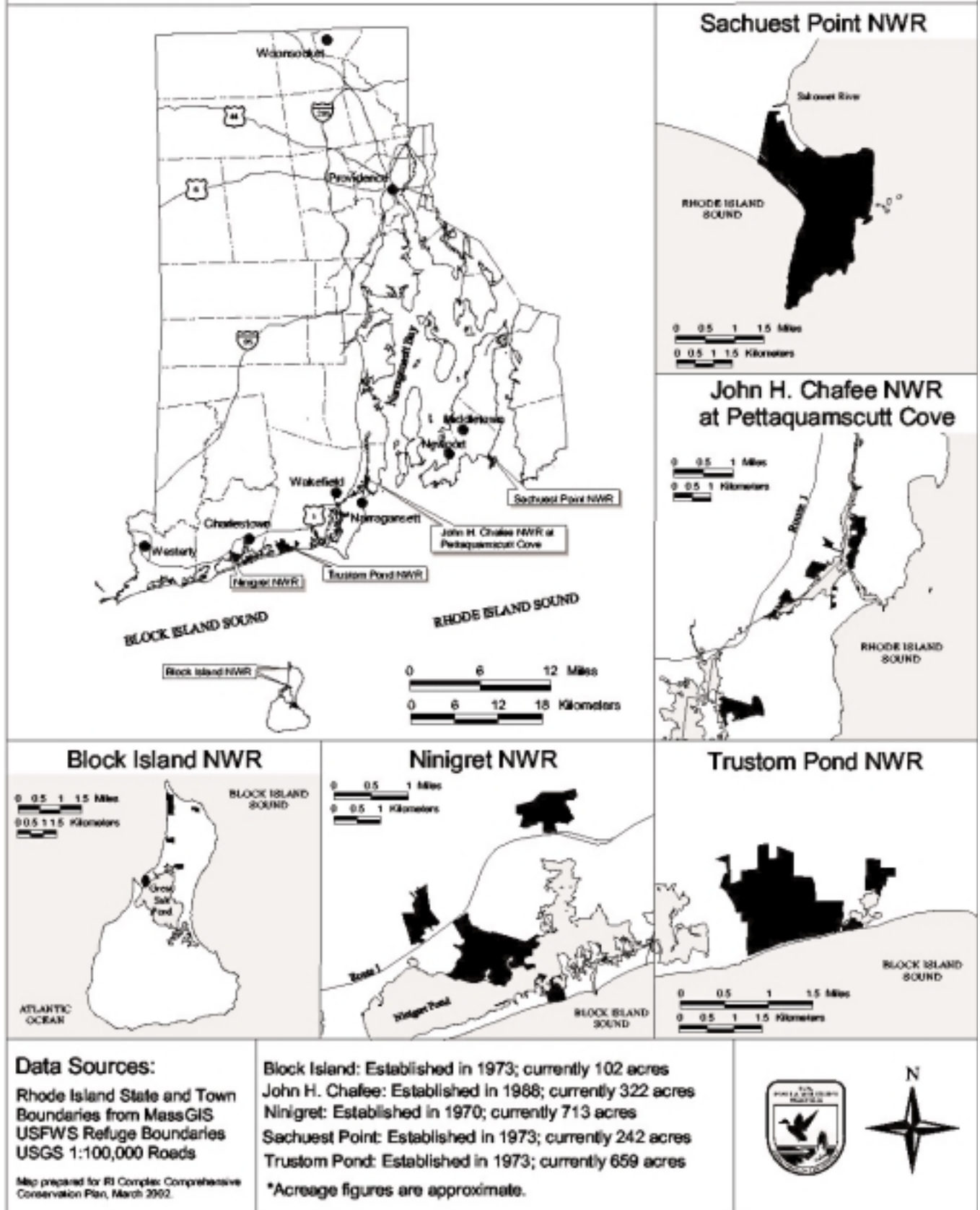
Developing a CCP is vital to refuge management. The purpose of this CCP is to provide strategic management direction over the next 15 years, by...

- Providing a clear statement of desired future conditions for habitat, wildlife, visitor services, and facilities;
- Providing refuge neighbors, visitors, and partners with a clear understanding of the reasons for management actions;
- Ensuring refuge management reflects the policies and goals of the Refuge System and legal mandates;
- Ensuring the compatibility of current and future public use;
- Providing long-term continuity and direction for refuge management; and
- Providing direction for staffing, operations, maintenance, and developing budget requests.

The need to develop a CCP for Trustom Pond Refuge is two-fold. First, the 1997 National Wildlife Refuge System Improvement Act (Refuge Improvement Act) requires that all national wildlife refuges

Rhode Island National Wildlife Refuge Complex

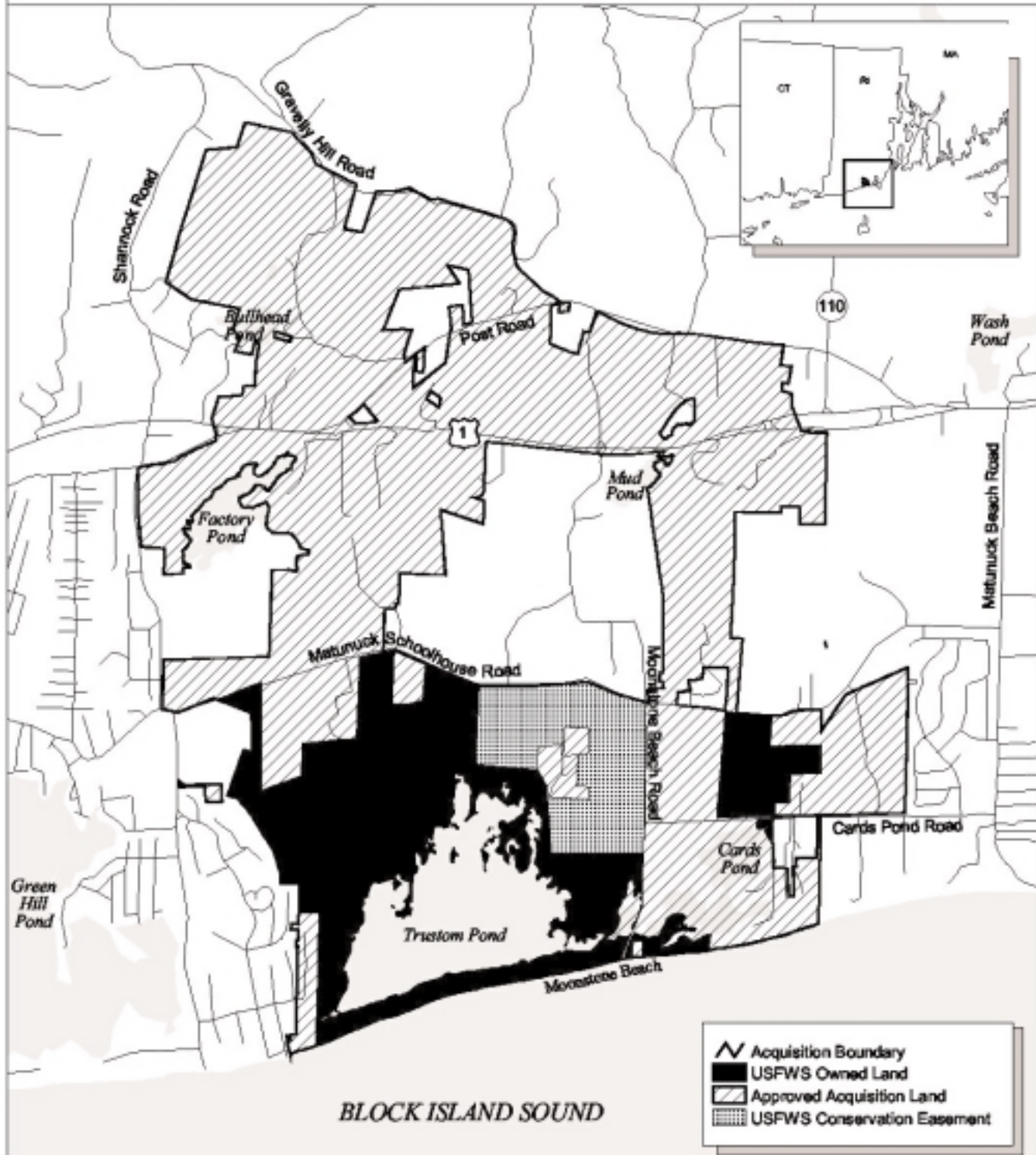
U.S. Fish & Wildlife Service Current Ownership



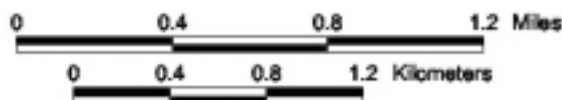
Trustum Pond National Wildlife Refuge

Current Ownership and Approved Acquisition Boundary

Rhode Island NWR Complex Comprehensive Conservation Plan



Compiled by the US Fish & Wildlife Service, Region 5 Cartography & Spatial Data Services Branch, Watley, Massachusetts using Town of South Kingstown (2006), and USFWS (2007) data.
 Map prepared for Rhode Island NWR Complex Comprehensive Conservation Plan, May 2007.
 Not to be used for legal purposes.



"...working with others, to conserve, protect and enhance fish wildlife, and plants and their habitats for the continuing benefit of the American people."

– Mission, U.S. Fish & Wildlife Service

"...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

– Refuge System Mission, Refuge Improvement Act; Public Law 105-57

have a CCP in place by 2012 to help fulfill the mission of the Refuge System. Second, the Refuge Complex lacks a master plan that establishes priorities and ensures consistent, integrated management among its five refuges.

The U.S. Fish and Wildlife Service and its Mission

The Service, part of the Department of the Interior, manages national wildlife refuges and national fish hatcheries. By law, Congress entrusts the following federal trust resources to the Service for conservation and protection: migratory birds and fish, endangered species, inter-jurisdictional fish, wetlands, and certain marine mammals. The Service also enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

The National Wildlife Refuge System and its Mission

The Refuge System is the world's largest collection of lands and waters set aside specifically for conserving wildlife and protecting ecosystems. More than 534 national wildlife refuges, in every state and a number of U.S. Territories, protect more than 93 million acres. Over 34 million visitors annually hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretive activities on refuges.

In 1997, Congress passed the Refuge Improvement Act, establishing a unifying mission for the Refuge System, and a new process for determining compatible public use activities on refuges. The act states that, first and foremost, the Refuge System must focus on wildlife conservation. It further states that the mission of the Refuge System, coupled with the purpose(s) for which each refuge was established, will provide management direction for each refuge.

On public use, the act declares that all existing or proposed public uses must be compatible with each refuge's purpose. It highlights six wildlife-dependent public uses as priorities that all CCPs must evaluate: environmental education and interpretation, fishing, hunting, and wildlife observation and photography. Each refuge manager determines the compatibility of an activity by evaluating its potential impact on refuge resources, insuring that the activity supports the Refuge System mission, and ensuring that the activity does not materially detract from or interfere with the refuge purpose.

Refuge Purposes

The establishment purposes for Trustom Pond Refuge are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," and for

"(1) incidental fish and wildlife oriented recreational development;
(2) protection of natural resources; and
(3) conservation of endangered or threatened species."

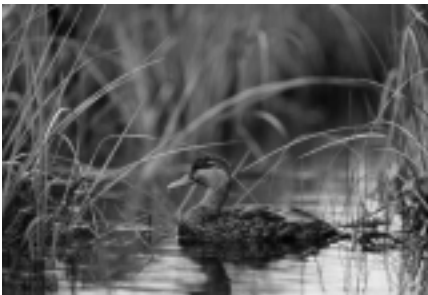
– Migratory Bird Conservation Act of 1929 and
Refuge Recreation Act of 1962

National and Regional Mandates Guiding this CCP

This section highlights Service policy, legal mandates, and existing resource plans, arranged from the national to the local level, that directly influenced development of this CCP.

The *Digest of Federal Resource Laws of Interest to the USFWS* lists the various federal laws, Executive Orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources (online at <http://laws.fws.gov/lawsdigest/indx.html>). The Service Manual and Refuge Manual contain Service policies and guidance on planning and day-to-day refuge management. The draft CCP/EA was written to fulfill compliance with NEPA.

North American Waterfowl Management Plan (May 14, 1986)



Black duck. USFWS photo.

This plan outlines a strategy among the United States, Canada, and Mexico for restoring waterfowl populations by protecting, restoring, and enhancing habitat within 11 U.S. Joint Venture Areas and three species Joint Ventures: Arctic Goose, Black Duck, and Sea Duck. Partnerships among federal, state and provincial governments, tribal nations, local businesses, conservation organizations, and individual citizens protect that habitat. The Refuge Complex lies within the Atlantic Coast Joint Venture, which has identified 13 priority focus areas totaling 3,226 acres of both wetlands and adjacent uplands for protection in Rhode Island (Atlantic Coast Joint Venture 1988). Three priority focus areas in the Refuge Complex are Trustom Pond, Ninigret Pond, and the Pettaquamscutt (Narrow) River.

Since black ducks winter in Rhode Island, the goals and objectives of the Black Duck Joint Venture apply to managing the Refuge Complex. The Black Duck Joint Venture has identified the coastal salt marsh habitats along the mid-upper Atlantic coast as important wintering habitat.

Partners In Flight Landbird Conservation Plan: Physiographic Area 9, Southern New England (draft, October 2000)

In 1990, Partners in Flight (PIF) was conceived as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industry, and other citizens dedicated to reversing the downward trends of declining species and “keeping common birds common.” The foundation of PIF’s long-term strategy for bird conservation is a series of scientifically based Landbird Conservation Plans. The goal of each PIF Landbird Conservation Plan is to ensure long term maintenance of healthy populations of native landbirds.

The PIF Program is developing a plan for the Southern New England Physiographic Area, using existing data on habitat loss, landbird population trends, and the vulnerability of species and habitats to threats, to rank the conservation priority of landbird species. The plan will identify focal species for each habitat type from which population and habitat objectives and conservation actions will be determined. We utilized this draft document for the list of priority species to consider in management. A revised draft of the plan was released in October 2000, and we will use the final plan, when finished, to further guide management.

Northeast Areas Study: Significant Coastal Habitats of Southern New England and Portions of Long Island, New York (USFWS 1991)

Recognizing the biological and economic importance of the coast's living resources and natural values to the region and the Nation, in 1990 Congress funded a study to identify coastal areas in southern New England and Long Island whose fish and wildlife habitat need protection and whose natural diversity needs preservation. The Northeast Coastal Study identifies species of regional importance, and describes regionally significant habitat complexes. It specifically describes significant or unique habitat, threats to sustaining the habitat complex, and considerations for conserving and protecting it. We utilized this study in the development of our land protection strategies. Near Trustom Pond refuge, the study identifies areas north and east of Trustom Pond and Green Hill Swamp (Washington County, RI)

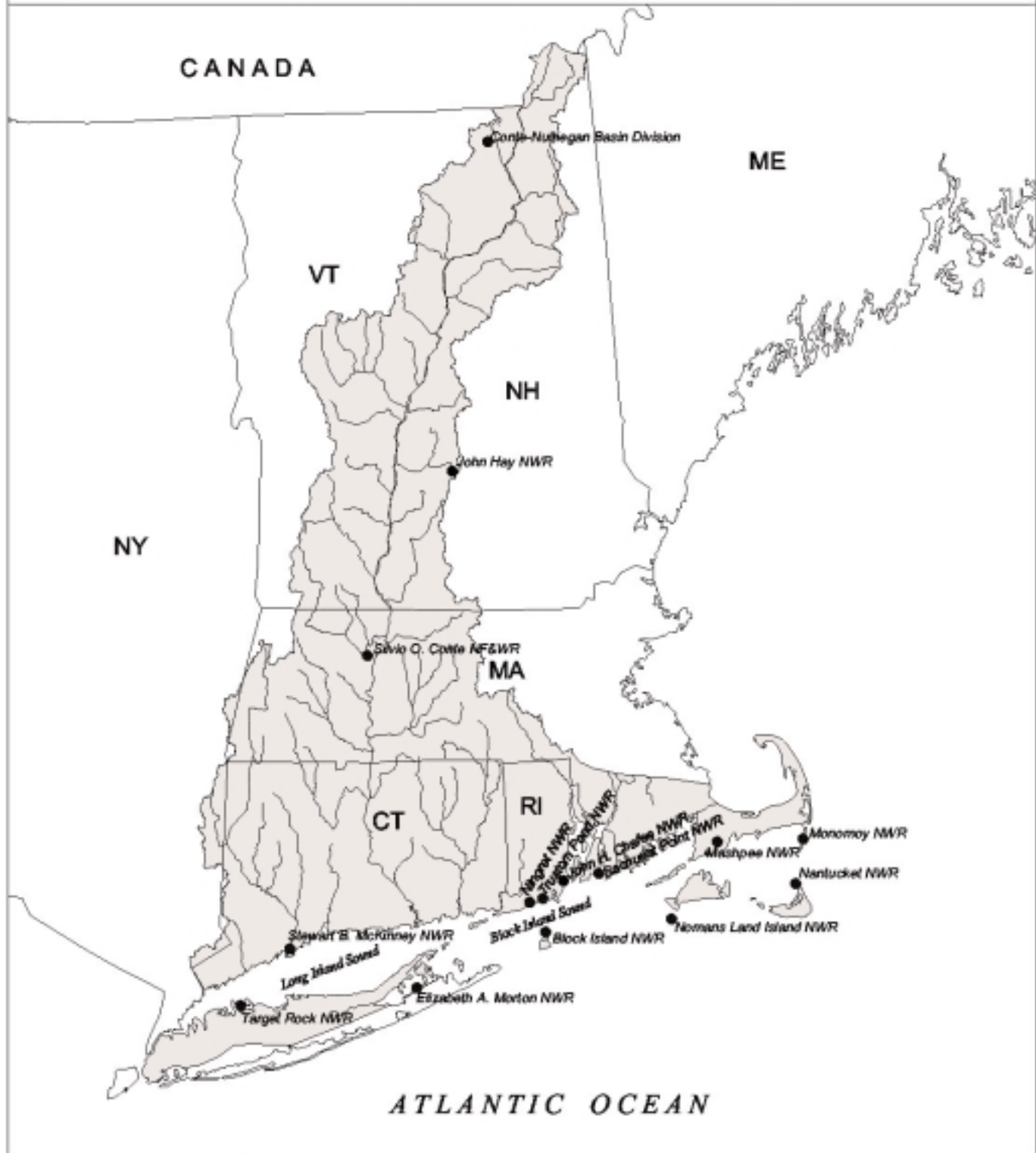
Connecticut River/Long Island Sound Ecosystem Priorities, 1997

During the last decade, we have emphasized ecosystem conservation, particularly the role of refuges within ecosystems, and their ability to affect the long-term conservation of natural resources. Implementing an ecosystem approach to resource management is one of our top national priorities. We have initiated new partnerships with private landowners, state and federal agencies, corporations, conservation groups, and volunteers, to form 52 ecosystem teams across the country, typically using large river watersheds to define ecosystems. Those teams work on developing goals and priorities for research and management within each ecosystem.

The Refuge Complex lies within our Connecticut River/Long Island Sound Ecosystem (Map 1-3). A team composed of Fish and Wildlife Service personnel and representatives from six State Fish and Wildlife Departments developed a Priority Resources Plan (July 1996) that identifies seven priorities, each involving numerous action strategies:

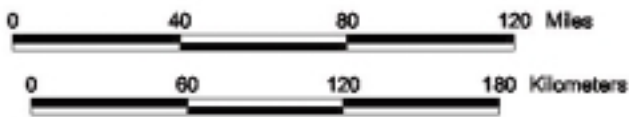
1. Protect, restore, and enhance listed and candidate populations...with special emphasis on beach strand species, coastal sandplain habitat, and Connecticut River species.
2. Protect, restore, and enhance anadromous and interjurisdictional migratory fish populations...with special emphasis on Atlantic salmon, American shad, shortnose sturgeon, and river herring.
3. Reverse the decline of migrant landbirds...with special emphasis on grassland and forest interior species.
4. Protect, restore, and enhance populations of colonial nesting waterbirds, shorebirds, and waterfowl...with special emphasis on coastal areas and major rivers.
5. Protect, restore, and enhance wetland habitats.
6. Manage refuge lands to protect, restore, and enhance native communities and trust resources.
7. Develop a public that values the fish and wildlife resources...understands events and issues related to these resources, and acts to promote fish and wildlife conservation.

Connecticut River/Long Island Sound Ecosystem Comprehensive Conservation Plan



Data Sources:
 USGS 1:2,000,000 Hydrography & States,
 All other data provided by USFWS & Co.
 New England RYR Right Coastal Program.

Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 June 2002
 Not to be used for legal purposes.



Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan, 1996



Piping plover. USFWS photo.

The piping plover is the only Federal- listed endangered or threatened species that currently breeds on refuge lands within the Rhode Island Refuge Complex (Trustom Pond Refuge). The primary objective of the revised recovery program is to remove the Atlantic coast piping plover population from the List of Endangered and Threatened Wildlife and Plants by:

- Achieving well-distributed increases in numbers and productivity of breeding pairs; and
- Providing for long-term protection of breeding and wintering plovers and their habitats.

The Revised Recovery Plan describes detailed “Recovery Tasks” needed to meet the recovery objective. The Rhode Island Refuge Complex is specifically mentioned in the following tasks:

- Draw down or create coastal ponds, where feasible, to make more feeding habitat available.
- Reduce disturbance of breeding plovers from humans and pets.
- Develop mechanisms to provide long-term protection to plovers and their habitat.

The Recovery Plan incorporates management guidelines for recreational activities in piping plover breeding habitat, which were developed by our Ecological Services Division in 1994. While not regulatory, these recommendations continue to serve as our best professional advice for complying with the Endangered Species Act. We utilized these same guidelines in developing management actions.

Regional Wetlands Concept Plan – Emergency Wetlands Resources Act 9 (USFWS 1990)

In 1986, Congress enacted the Emergency Wetlands Resources Act to promote the conservation of our nation’s wetlands. The Act directed the Department of Interior to develop a National Wetlands Priority Conservation Plan identifying the location and types of wetlands that should receive priority for acquisition by federal and state agencies using Land and Water Conservation Fund appropriations. In 1990, the Service’s Northeast Region completed a Regional Wetlands Concept Plan identifying a total of 850 wetland sites in the Region warranting consideration for acquisition due to wetland values. Wetland values, functions, and potential threats for each site were cited; 24 sites within the State of Rhode Island were listed.

Protecting Our Land Resources: A Land Acquisition and Protection Plan, Rhode Island Department of Environmental Management, May 1996

The purpose of this State plan is to assist agencies within the Rhode Island Department of Environmental Management (RI DEM) in protecting land to support their primary mission, “...protection of the integrity of natural resources essential to the environmental, economic and social welfare of the citizens of Rhode Island.” Its

framework provides strategies to permanently protect five critical State resources: agriculture, forestry, drinking water, recreation, and natural heritage and biodiversity. It includes evaluation criteria for selecting and prioritizing lands.

Special Area Management Plan – Salt Pond Region, November 1998

This plan details management strategies for implementing the program standards of the State of Rhode Island Coastal Resources Management Council (CRMC) in the Salt Pond Region. The Salt Pond Region SAMP includes eight objectives. Six relate to Trustom Pond Refuge:

1. To maintain the exceptional scenic qualities of the Salt Pond Region, and a diversity in the mix and intensity of the activities they support.
2. To prevent expansion near areas of the salt ponds that are contaminated by potentially harmful bacteria or eutrophic conditions.
3. To ensure the groundwater will be unpolluted.
4. To preserve and enhance the diversity and abundance of fish and shellfish.
5. To restore the barrier beaches, salt marshes, and fish and wildlife habitats damaged by past construction or present use.
6. To create a decision-making process appropriate to the management of the region as an ecosystem.

Existing partnerships

Throughout this CCP, we use the term “partners”. In addition to our volunteers, we receive significant help from the following partners:

- Southern New England/New York Bight Coastal Ecosystems Office (FWS)
- Ecological Services, New England Field Office (FWS)
- Friends of the National Wildlife Refuges of Rhode Island
- Rhode Island Department of Environmental Management (RI DEM)
- The Nature Conservancy, Rhode Island and Block Island Offices
- University of Rhode Island, Department of Natural Resources Science (URI)
- Audubon Society of Rhode Island
- Rhode Island Coastal Resources Management Council (RI CRMC)
- Local land trusts
- Narragansett Indian Tribal Council



Public Open House on CCP, Rhode Island

USFWS photo

Planning Process

- The Comprehensive Conservation Planning Process
- Issues, Concerns, and Opportunities

The Comprehensive Conservation Planning Process

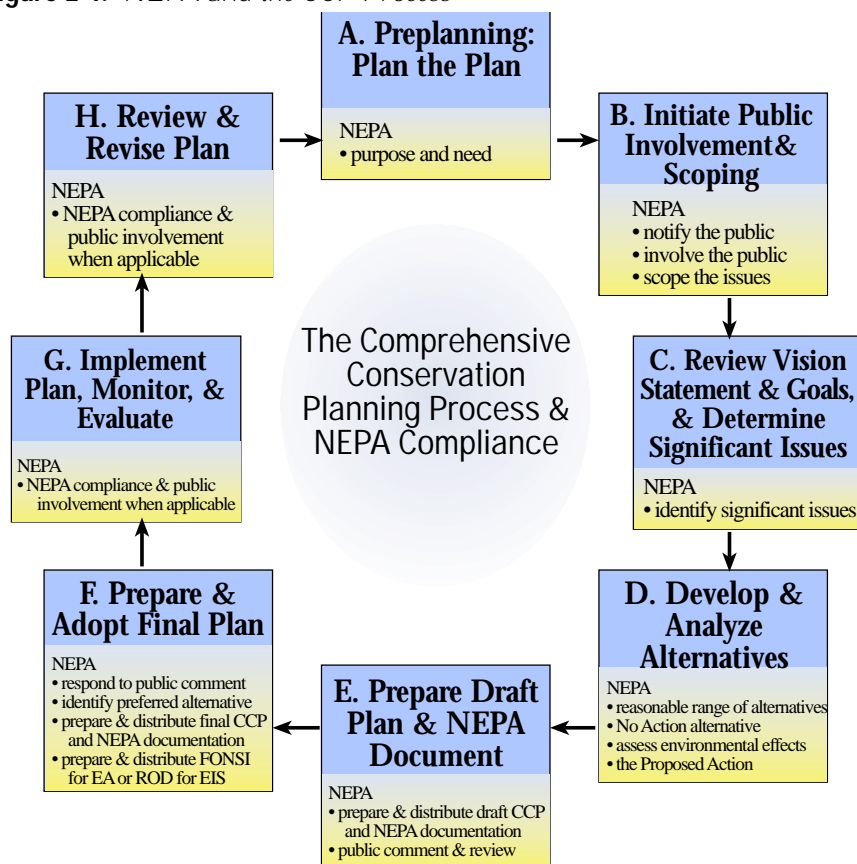
Given the mandate in the Refuge Improvement Act to develop a CCP for each national wildlife refuge, our Northeast Regional Office began the planning process for the Refuge Complex in February 1998. Figure 2-1 displays the steps of the planning process and how they incorporate National Environmental Policy Act (NEPA) requirements.

First, we focused on collecting information on natural resources and public use at the Refuge Complex, and developed its long-term vision and preliminary goals, including issues associated with each of its refuges. Next, we compiled a mailing list of more than 2,000 organizations and individuals, to ensure we would be contacting a diverse sample of the interested public.

Recognizing that not everyone could attend the open houses planned for April and May 1998, we developed Issues Workbooks in March, to encourage even more people to provide their written comments on topics related to managing the Refuge Complex. We offered the workbooks to everyone on our mailing list, including adjacent landowners, and made workbooks available at refuge headquarters, local libraries, and on the Internet from the Region 5 Home Page (<http://northeast.fws.gov>). We received 150 completed workbooks. Those responses and public input at our meetings have influenced our formulating issues and developing alternatives on resource protection and public use.

In April and May 1998, we began a series of public meetings: five

Figure 2-1. NEPA and the CCP Process



Open Houses in the communities of Middletown, South Kingstown, Charlestown, and Block Island invited public comments on goals and issues. We advertised the meetings through news releases, radio broadcasts, and notices to our mailing list. From 15 to 40 people attended each meeting. We also organized 15 informational meetings with state and federal agencies, non-profit conservation groups, town planners, conservation commissions, and sporting clubs.

Public responses suggested more than 50 additional areas where lands warranted protection, typically along the coast. We evaluated those lands for their potential as national wildlife refuges, using criteria such as the presence of threatened, endangered, or other trust species and their habitats, the presence of wetlands, our ability to manage or restore the areas, existing threats to their integrity, and their size and location.

We distributed a Planning Update to everyone on our mailing list in September 1998. This newsletter summarized public comments from meetings and workbooks, described policy guidelines for managing public use on refuges, and identified the long-term vision and goals for the Refuge Complex.

Once the key issues had firmed up, we developed alternative strategies by May 1999 to resolve each one. We derived the strategies from public comment, from follow-up contacts with partners, or from the planning team. We distributed a second Planning Update newsletter in May 1999, updating everyone on our planning timelines and our decision to start a separate Environmental Assessment for the visitor center/headquarters.

We released the draft CCP/EA in December of 2000 for a 51-day comment period. We held public hearings and open houses in February of 2001. A summary of public comments is included in Appendix B. The land acquisition component of this planning process is contained in the Land Protection Plan (Appendix E).

Each year, we will evaluate our accomplishments under this CCP, including the completion of more detailed step down plans. Monitoring will reveal whether resource objectives are being met, and whether we need to change our strategies. We will modify the CCP documents and associated management activities as needed, following the procedures outlined in Service policy and NEPA requirements. This CCP will be fully revised every 15 years, or sooner if necessary.

Issues, Concerns, and Opportunities

From the Issues Workbooks, public and focus group meetings, and planning team discussions, we developed a list of issues, concerns, opportunities, or any other items requiring a management decision. Then we sorted them into two categories: “Key issues” and “Issues and concerns considered outside the scope of this analysis”.

Key issues, along with goals, formed the basis for developing and comparing the different management alternatives that were analyzed in the draft CCP/EA.

Some issues and concerns were outside the scope of this analysis. These issues were identified in the draft CC/EA, but we will not address them further in this final CCP.

Key Issues

Public and partner meetings and further team discussions produced the following key issues.

- 1. Protection of endangered and threatened species and other species and habitats of special concern.*

This is the most important issue facing the refuge. Protecting federally listed endangered and threatened species is integral to the mission of the Refuge System. Other federal trust species are also of primary concern, including migratory birds, anadromous fish, and certain marine mammals.

In the forefront of this issue is management for piping plover, a Federal-listed threatened species. Piping plover nest on the beaches at Trustom Pond Refuge. Threats from coastal development, disturbance by humans and pets, and predation are the major factors contributing to the species decline (Piping Plover Atlantic Coast Population, Revised Recovery Plan, 1996). Protecting piping plover presently requires an intensive effort by refuge staff who monitor plover nesting, manage public use and access on beaches, control predators at nest sites, and provide environmental education and interpretation about the natural history of piping plover and barrier beach protection.

Consistently each year, predators are one of the most significant factors affecting chick survival in Rhode Island. Also, since 1993, humans have caused three incidents of piping plover nest destruction: two were acts of vandalism directed at destroying nests and eggs; the third may have resulted from joyriding on the beach. Campers often leave trash, which attracts predators to a nesting area, and often unleash their dogs, who chase adult plover off nests.

Some responses raised the continuing issue of restricting public beach use. Some feel we could do more to provide for piping plover by restoring habitat, or by working with the Rhode Island Coastal Resources Management Council (CRMC) to close beach intertidal areas.

Service staff help coordinate piping plover monitoring on nine beaches in southern Rhode Island, as well as on the refuges. This requires tremendous time and resources, both presently limited. Funding for plover work along the South Shore is inconsistent from year to year, and totally dependent on non-Service funding sources, typically foundation grants. However, the benefits derived have been clearly evident in increased nesting attempts and productivity on many sites.

Other federally listed species discussed are the seabeach amaranth (threatened), and sandplain gerardia (endangered), two plant species that may be considered for future reintroduction.

Appendix A lists species and habitats of special management concern. The list includes the status of all plants, wildlife, fish, and rare natural communities known to occur in Rhode Island that are federally listed as endangered or threatened, were candidates for listing, or are otherwise of management concern. Combined with location information, we used that list to identify additional land protection needs and opportunities. We know very little about many of these species' presence on or use of refuge habitats. The alternatives in the draft CCP/EA differed in their strategies for managing these species and habitats. Addressing this issue will help achieve Goal 1: Protect and enhance federal trust resources and other species and habitats of special concern.

2. Restoration and maintenance of coastal sandplain and maritime natural communities, including grasslands and shrublands (less than 60 years old).

While it is true that the Northeast landscape was primarily forested prior to rapid agricultural settlement in the 1800's, grasslands

quickly became a dominant part of the landscape in the 19th century. Grassland-dependent species responded in kind and became established. Over the last several decades, however, coastal grasslands and sandplain shrublands, coastal maritime grasslands and shrublands, and agricultural fields and pastures, have been in rapid decline in New England due to a combination of development, changes in agricultural technology, succession to forest as farms were abandoned, and lack of a natural disturbance such as fire (Vickery 1997).

In Rhode Island, the State's farmland dropped nearly 50 percent between 1964 and 1997, from 103,801 to 55,256 acres. An additional 3,100 acres of farmland will be lost in the next 20 years if current sprawl patterns continue (Common Ground 2000). As a result, few large, contiguous grasslands and shrublands are left; only smaller, fragmented, and isolated habitat patches remain (< 75 acres).

These smaller areas are unsuitable for many focus species, including once-common grassland birds such as grasshopper sparrow and upland sandpiper. Grasshopper sparrows have declined by 69 percent in the past 25 years, according to Breeding Bird Survey data (Vickery 1997). Our best available information suggests that grasslands should ideally be managed in 100 acre or larger patches. Smaller grassland habitat patches are much less productive for grassland birds, and could serve as "sinks", where species try to nest, but because of increased predation and other factors, productivity and survival is severely limited.

Other grassland and shrubland species have declined dramatically as well. Many of Rhode Island's State-listed plant and animal species are dependent on these habitat types.

Tremendous potential exists for refuge staff to become involved in restoring habitat on private lands. Grassland and shrubland restoration offers opportunities for our staff to provide technical expertise to local communities. The alternatives in the draft CCP/EA compared different levels of restoring and maintaining these habitats and providing technical assistance to private landowners. Addressing this issue will help achieve Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

3. Protection and restoration of the beach strand ecological community.

Beach strand habitat is in critically short supply due to its loss and degradation by development and shoreline de-stabilization. Meanwhile, the demand for recreational uses in these areas intensifies. The result is an alarmingly high rate of habitat loss and the decline of virtually all beach strand plant and animal species. Federally listed species such as the piping plover, roseate tern, northeastern beach tiger beetle, and seabeach amaranth depend on this habitat. Alternatives in the draft CCP/EA compared different strategies for protecting it. Addressing this issue will help achieve Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

4. Management of Trustom Pond.

Many consider Trustom Pond one of the jewels of Rhode Island's South Shore because of its aesthetic and ecological values. This 160-acre pond, which lies fully within Trustom Pond Refuge, is the only coastal pond in Rhode Island not flanked by development. Diverse waterfowl and wading birds use the pond year round. Many shorebird species use its shoreline during migrating and breeding seasons. Despite its apparent habitat values, important long-term concerns about water quality, invasive species, and the quality of shoreline habitat remain. Most of the sources suspected of contributing to increased nitrogen and coliform bacteria levels in Trustom Pond are off the refuge.

Resolving these remaining concerns will require a cooperative, watershed-based approach. Although we focus on Trustom Pond, these same water quality and habitat degradation concerns pervade all the coastal salt ponds in Rhode Island. Cooperating with state agencies, local towns, land trusts, and non-governmental groups such as the Coastal Salt Pond Coalition, would provide opportunities for refuge staff involvement and technical exchange to manage similar issues in other coastal salt ponds. Future management of Trustom Pond will be ecosystem-based, recognizing that the health of adjacent upland vegetation contributes to its viability and ecological integrity.

Some responses supported active management of Trustom Pond to improve its habitat quality for certain species; however, there could be trade-offs with other species. For example, increasing open mudflats to promote foraging habitat for piping plover and other shorebirds, may reduce the habitat quality for anadromous fish and certain waterfowl. These trade-offs need to be further evaluated and their implications understood. The alternatives in the draft CCP/EA evaluated different strategies to better understand and balance competing concerns and opportunities for resolving this issue. Addressing this issue will help achieve both Goal 1: Protect and enhance federal trust resources and other species and habitats of special concern, and Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

5. Protection and restoration of wetlands.

The well documented values of healthy wetlands include fish and wildlife habitat, flood protection, erosion control, and water quality maintenance. Despite laws and regulations to protect them, wetlands throughout Rhode Island have been rapidly declining since the 1960's through conversion to agriculture, residential and industrial development. Rhode Island has developed more land in the last 34 years than in its first 325 years (Common Ground May/June 2000). The more recent growth had occurred outside the urban areas, and threatened the remaining wetlands.

Estuarine wetlands consisting of tidal salt and brackish waters are of particular concern. Invasive species are dominating refuge wetlands and threatening their biodiversity.

Non-point pollution and sources off-refuge are impacting water quality and the health and productivity of these wetlands. The alternatives in the draft CCP/EA compared different levels of

management for restoring wetlands and for cooperatively managing entire watersheds. Addressing this issue will help achieve Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

6. Control of invasive, non-native, or overabundant plant and wildlife species.

Each of the five refuges has an extensive distribution of invasive plant species. These plants are a threat because they displace native plant and animal species, degrade wetlands and other natural communities, and reduce natural diversity and wildlife habitat values. They outcompete native species by dominating light, water, and nutrient resources. Once established, getting rid of invasive plants is expensive and labor-intensive. Unfortunately, their characteristic abilities to establish easily, reproduce prolifically, and disperse readily, make eradication difficult. Many of these plants cause measurable economic impacts, particularly in agricultural fields. Preventing new invasions is extremely important for maintaining biodiversity and native plant populations. The control of existing affected areas will require extensive partnerships with adjacent landowners and state and local governments.

Thirteen invasive plant species affecting the natural communities within the Refuge Complex are considered of high management concern. The most prevalent are *Phragmites*, purple loosestrife, Asian bitterweet, autumn olive, and Japanese honeysuckle. Other species such as Japanese knotweed and multiflora rose are increasing on the Refuge Complex, and likely to become an issue soon.

Several wildlife species occur on the Refuge Complex that are known, or suspected to be, adversely affecting natural diversity. Issues surface when these species directly impact federal trust species or degrade natural communities. Mute swans are non-native, invasive species that aggressively drive native waterfowl and shorebirds away from nesting areas, compete with them for food, degrade water quality when they spend extended periods of time molting on coastal ponds, and are sometimes aggressive towards humans.

Native species such as deer, red fox, gull, and small predatory mammals such as mink, skunk, and weasel can be a problem when their populations exceed the range of natural fluctuation and the ability of the habitat to support them. Excessive numbers of deer are a threat to rare plant communities on the Refuge Complex, and excessive browse lines are evident on two refuges. Adjacent landowners are also concerned about deer impacts on landscaping, the increase in vehicle-deer collisions, and the threat of Lyme disease.

Red fox, gull, and some small mammals are voracious predators that can adversely impact other native wildlife populations. Occurrences have been documented of herring and black-backed gull, red fox, and weasel preying on piping plover and the state-listed least tern.

Fox easily habituate to humans, and were being hand-fed at Sachuest Point Refuge. Many people fear fox and other mammals because they can carry rabies. These predators are particularly troublesome when their populations exceed natural levels. Control

measures for each species are controversial, and may include lethal removal, visual and audio deterrents, or destroying eggs, nests, or den sites.

The alternatives compared different strategies for managing invasive species. Addressing this issue will help achieve Goal 1: Protect and enhance Federal trust resources and other species and habitats of special concern, and Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

7. Protection of biologically significant areas through acquisition and/or cooperative management.

Public meetings, partner meetings, and workbook responses expressed a great deal of support for the protection of additional fish and wildlife habitat in southern Rhode Island. That support runs across the State, as Rhode Islanders consistently vote ballot measures to maintain open space and protect fish and wildlife habitats. Many people mentioned that their support stems from their concern over the rapid pace of development on the South Shore. As we stated earlier, development in non-urban areas of Rhode Island has increased dramatically over the last 30 years. It is now the second most densely populated State in the country. One estimate predicts that current sprawl patterns will ensure the loss of all its rural areas before 2100 (Common Ground 2000). The Rhode Island Office of The Nature Conservancy has noted that the conservation actions taken during the next 5 to 10 years will be the most important for the majority of Rhode Island towns (The Nature Conservancy 2000).

This dramatic increase in development has changed land use patterns and practices, significantly modifying natural landscapes. As natural lands (those with sustainable native species populations and intact ecological processes) become isolated and fragmented into smaller pieces disconnected from other natural areas, their ability to support a full complement of native species is adversely affected. Cut off from larger populations, species and plant communities within these natural areas face the problems of limited genetic exchange, a decreased ability to support diverse populations, and lost capacity to recruit new individuals. Ultimately, the number of native species declines and exotic species gain a stronghold. It is precisely this diminished ability of natural areas to support diverse species with different habitat requirements that leads to a decline in biodiversity. While some species can tolerate fragmentation, as they prefer "edge habitat," many others, including "interior" dependent species, require larger, contiguous natural areas or functional corridors linking patches of natural habitat. This ability to protect and sustain larger natural areas and corridors, coupled with the protection of unique or rare species or communities, is critical to maintaining biodiversity.

A landscape or ecosystem approach to protecting land is also critical in the recovery of threatened and endangered species. Piping plover serve to illustrate this point. They have a fairly strong fidelity to certain nesting areas and typically return to them most years. Shifting of pairs between nesting areas has been observed when disturbances or habitat conditions affect their ability to nest. Barrier

beaches are dynamic ecosystems, and their nesting conditions can change dramatically from year to year. While 1999 was a good nesting year on Moonstone Beach (Trustom Pond Refuge), in 2000, the beach consisted entirely of cobble with virtually no sand for nesting. The piping plover pairs from 1999 appeared to have shifted to the Ninigret Conservation Area. Without consideration of these shifts in habitat use across a landscape, management for these species would be ineffective.

Some individuals preferred that the Service acquire and manage federal trust resources, and that the Refuge Complex continue to acquire these sites from willing sellers. Others emphasized partnerships to cooperatively protect and manage important habitats not currently on refuge land. Still others recommended a combination of Service acquisition and cooperative management to provide the greatest long-term benefit to resources. At public meetings and in our workbooks, many responses suggested specific areas needing protection, particularly wetlands threatened by development. Some individuals we spoke with especially supported our acquiring land occupied by endangered or threatened species.

The alternatives in the draft CCP/EA offered various levels of Service land acquisition, ranging from lands within the currently approved acquisition boundaries only, to a considerable expansion of each refuge's acquisition boundary. They also evaluated our increased involvement in cooperative land protection off-refuge. Addressing this issue will help achieve Goal 3: Establish a land protection program that fully supports accomplishment of species, habitat, and ecosystem goals.

8. Assurance of access to credible information about resources regarding the Refuge Complex to ensure management decisions are based on the best available science.

We need to determine and prioritize what information reasonably could be collected to facilitate decision-making using the best available science. In particular, many individuals expressed concern over the lack of information available to fully evaluate impacts to wildlife and habitats from excessive public use. Others questioned the effectiveness of management actions that have not been adequately monitored and evaluated. Several university researchers and other partners encouraged our staff to prioritize baseline inventory needs, establish monitoring protocols to better evaluate management actions, and identify information needed to determine each refuge's contribution to the ecosystem.

Implementing the Service's Policy on Maintaining the Biological Integrity, Diversity, and Environmental Health of the National Wildlife Refuge System will require us to ascertain the natural conditions for each refuge and identify the natural communities, species, and ecological processes that are rare, declining, or unique. Opportunities to cooperate in collecting this information could be developed once the priorities have been identified. Addressing this issue will help achieve all the goals identified for the Refuge Complex.

9. Management of public use and access.

The Refuge Improvement Act and Service policy require our enhanced consideration of opportunities for six priority wildlife-dependent uses (see above). Some level of each occurs on the Refuge Complex. Only those uses that are compatible with a refuge's purpose may be allowed. According to Service policy, all refuges are closed to any use until formally opened through the compatibility determination process.

The Act also directs refuges to phase-out existing uses determined to be incompatible. Non-wildlife-dependent uses exist on all the refuges, and some have been occurring for years. Examples include jogging, sunbathing and swimming, bicycling, and dog walking.

Public meetings comments and workbook responses make it clear that public use on refuges is extremely important to most people. More than 90 percent of the workbook responses ranked environmental education and interpretation and wildlife observation and photography very high as desirable public uses. Rarely, however, was there consensus on other public uses or just how much of each type to allow. Public opinion spans the entire spectrum from those wanting to open up refuges to non-wildlife-dependent activities, to those who want to close refuges to all public use to maintain an undisturbed sanctuary for wildlife.

The alternatives in the draft CCP/EA compared different levels and combinations of wildlife-dependent public use. Addressing this issue will help achieve Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

10. Hunting.

Hunting surfaced late in the scoping process as a key issue, perhaps because, initially, few viewed it as a possibility on the Refuge Complex. This issue was raised by Service personnel, by RI DEM biologists, and by individuals both for and against expanding hunting opportunities on the Refuge Complex. Those in support primarily are interested in deer hunting on all refuges, waterfowl hunting on Chafee Refuge and Ninigret Refuge, and pheasant hunting on Block Island. Advocates of hunting refer to its inclusion as one of the six priority public uses that "...shall receive priority consideration in refuge planning and management" (1997 Refuge Improvement Act).

Parts of Trustom Pond Refuge were hunted prior to acquisition by the Service. Presently, 20 acres of upland field on the refuge remain open to migratory bird hunting. RI DEM has expressed its interest in any new opportunities for hunting because rapid residential development in Rhode Island is confining public hunting opportunities to fewer and fewer areas.

The Service views managed or administrative hunts in areas where there are overabundant deer populations as an effective tool for regulating them. The overabundance of deer is a concern in Rhode Island, reflected in increased numbers of vehicle-deer collisions,

increased complaints about deer browsing on commercial and residential landscape plantings, visible impacts on native vegetation, and higher concern about contracting Lyme disease.

Those opposed to hunting cited concerns with public safety, disturbance and harm to other wildlife species, and the impact to visitors engaged in the other five priority public uses. The latter results from the likelihood that significant portions of the refuges, due to their small sizes and configurations, would be closed to other activities during hunting. Some expressed the opinion that the refuges should function as a sanctuary for all native species, and that hunting is incongruous with that function.

Alternatives in the draft CCP/EA offered varying levels of hunting opportunities, from no hunting at all, to opening four refuges during State-regulated seasons for deer, waterfowl, and pheasant. Addressing this issue will help achieve both Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems, and Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

11. Opportunities for environmental education.

Responses so frequently mentioned increasing environmental educational opportunities across the Refuge Complex that our planning team decided it warranted special recognition. More than 90 percent of the workbook responses ranked environmental education and interpretation as one of their top three interests. The alternatives in the draft CCP/EA compared different levels of environmental educational opportunities and the different levels of partnerships so integral to implementing them on each of the five refuges. Addressing this issue will help achieve Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

12. Provision of staffing, operations, and maintenance support sufficient to accomplish goals and objectives.

The Refuge Complex lacks adequate funding and personnel to provide the programs and services desired by the public and to effectively meet the goals for this CCP. The alternatives in the draft CCP/EA compared different funding and staffing levels based on their proposed management strategies for dealing with the issues. Addressing this issue will help achieve Goal 5: Provide Refuge Complex staffing, operations, and maintenance support to effectively accomplish refuge goals and objectives.

13. Increasing the visibility of the Fish and Wildlife Service.

Our lack of visibility on refuges was brought up repeatedly at public meetings and in the workbooks. Many people felt strongly about the need for more refuge staff to be present during peak visitation to increase resource protection and improve visitor services. Other recommendations to increase visibility included more visitor contact stations, increasing wildlife interpretation and

environmental educational opportunities, a better location for a headquarters office, developing a Refuge Complex visitor center, improving existing visitor facilities (e.g., kiosks, interpretive signs on trails, etc.), increasing support for a volunteer program, and increasing community involvement.

Some people expressed an interest in seeing refuge staff enforce public use policy more consistently. Others argued it was unnecessary for Service personnel to be armed while patrolling beaches. The alternatives in the draft CCP/EA compared different levels of promoting our visibility and providing these services. Addressing this issue will help achieve both Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems, and Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

14. Need for improved facilities.

The Refuge Complex lacks a facilities plan establishing current and future needs for staff operations and visitor services. Many of its current facilities are inadequate. Its headquarters does not have enough office space to accommodate even current staff, and the visitor services area is limited to one rack of literature in the reception area. The alternatives in the draft CCP/EA compared opportunities for new or improved facilities to accommodate staff work space, increase the visibility of the Service and the Refuge Complex, and improve visitor services, including environmental education and interpretation. We completed an Environmental Assessment for the new Refuge Headquarters and Visitor Center in February 2001. Addressing this issue will help achieve Goal 5: Provide Refuge Complex staffing, operations, and maintenance support to effectively accomplish refuge goals and objectives.



Shorebirds
USFWS photo

Refuge and Resource Descriptions

- Geographic/Ecosystem Setting
- Socioeconomic Setting
- Refuge Complex Administration
- Refuge Resources
- Cultural Resources
- Public Uses

Geographic/Ecosystem Setting

Landscape Formation

The movement of glaciers across New England created the land forms seen in Rhode Island today. The last of those great ice sheets occurred during the Wisconsin glacial period. Approximately 15,000 - 20,000 years ago, the glacier was in a state of equilibrium, where the melting rate of ice equaled the glacial rate of movement (Bell 1985). As the climate warmed 12,000 - 15,000 years ago, the glacier began its retreat, depositing pronounced land forms along its outermost edge. The southern coast of Rhode Island, including Block Island, is the farthest point the Wisconsin glacier reached in its southeastern frontal movement. The retreating glacier deposited rocks pushed by the front of its ice sheet in piles called moraines. These terminal or end moraines formed sinuous ridges up to 200 feet high. Block Island is part of the terminal moraine that includes Nantucket and parts of Long Island.

A second prominent moraine lies inland, the low ridge referred to as the Charlestown or Watch Hill moraine, stretching east to west parallel to U.S. Route 1. Glacial action also created other features in today's landscape: recessional moraines, outwash plains, kettle hole ponds, glacial lake deposits, deltas, and submerged gravel shoals. Prominent headlands like Sachuest Point are composed of glacial till, a mixture of silt-sized grains to boulder-sized deposits by the melting glacier.

Melting ice sheets caused the sea to rise rapidly across Block Island and Rhode Island Sounds until it reached its present level approximately 4,000 years ago. Wave action parallel to the shore continued to erode glacial deposits, creating the barrier spits. As the spits formed, they almost entirely sealed off the low-lying areas between the headlands and the ocean, forming coastal lagoons connected to the sea by narrow inlets. These became the coastal salt ponds we see today. Through the 1700's, all of the coastal salt ponds had direct, seasonally open connections to the ocean (RI CRMC 1984). The effects of erosion through time have shifted the salt ponds and barrier spits gradually landward (RI CRMC 1998).

The bedrock formations of southern Rhode Island include the Blackstone series of metamorphic rock along its southern coastal border (including most of Westerly, Charlestown and South Kingstown), granite rock of various ages (including most of Narragansett and Middletown and parts of Westerly and Charlestown), and Pennsylvanian sedimentary rock in most of south central Rhode Island (including Richmond, much of South Kingstown, and most of Hopkinton). Most of the soils around the refuges are fine sandy loams or silt loams.

Historical Influences on Landscape Vegetation

The upland forests of southern Rhode Island are classified by Kuchler (1964) as oak-hickory forest; while most of northern Rhode Island is classified as oak-pitch pine forest. Historic land use practices promoted this forest type.

As early as 12,000 years ago, Native Americans began occupying the area. Documented evidence places the first intensive occupation of the salt pond region during the late Archaic period (5,000 to 3,000 years ago). Native American camps from more than 4,000 years ago are known to have existed at one location along the shore of Ninigret Pond. However, societies of that time were primarily hunter-gatherer with little agriculture; broad changes to landscape vegetation probably did not occur.

During the Woodland Period 3000-450 years ago, larger, semi-permanent or recurrently occupied camps became coastal settlements. Fortified villages are known to have existed in some locations. Maize horticulture became prominent, which likely resulted in small clearings. Larger clearings and burnings to control the movement of deer and upland birds may have occurred, and the first pronounced clearing of land along the coast for settlements, game management, and agriculture. Much of this land was cleared by cutting and burning, which favored resprouting by hardwood species like oak, hickory, and red maple.

The role fire may have played in shaping landscape vegetation is not well known. Evidence of fire has been observed in charcoal layers at Ninigret Refuge. Soil cores dug at most points on the refuge reveal charcoal below the historic farmers plow zone, approximately 10 inches soil depth. The dates attributed to these fires, coupled with their locations, suggest early Native Americans used fire extensively and purposefully.

Although small areas of land were cleared and more or less permanently settled by early Native Americans, it was European settlement and expansion in the 1600's that exponentially escalated the conversion of forests to agriculture. The eighteenth century Rhode Island plantation era "...required massive land clearing of the forests that had dominated the landscapes for the last 8,000 years" (USFWS 1999). During the mid-nineteenth century, an estimated 85 percent of southern New England was converted to field and pasture. Any woods remaining often were managed for firewood (Jorgensen 1977).

A detailed report on the archeological history of the Refuge Complex is available from the Refuge Complex office on request (Jacobson USFWS).

Contemporary Influences on the Landscape

The major natural disturbances affecting the coastline today are hurricanes and winter ice-storms. Hurricanes have the greatest impact, by far. The straight border of barrier beaches separated from the mainland by tidal wetlands and coastal salt ponds characterizes a coastline influenced by frequent storms. Wind and waves pick up loose sand and sediment and move it along the shoreline or back out to sea, allowing occasional overwash of barrier beaches and breaching of coastal ponds. Overwash, tidal currents, longshore currents, and rip currents are all mechanisms transporting sediment along the barrier beaches (RI CRMC 1998).

Fall and winter storms combining wind, rain, and waves are the predominant physical process shaping this landscape today. “Nor’easters” are well known along the New England coast in winter; winds generated offshore from the southeast, can actually be more destructive to the south shore, because of its exposure to the open ocean. The draft Salt Pond Region Special Area Management Plan describes the geologic, wave, and wind action for the South Shore, including details on how sediment movement constantly reshapes this dynamic landscape (RI CRMC 1998).

The Great New England Hurricane of 1938 was the most recent 100-year storm, one of immense power along the coast. Not only did winds reach speeds up to 240 miles per hour, but also a spring high tide created a storm surge between 10 and 15 feet. Storms of this magnitude are suspected to have occurred only four other times in recorded history: 1635, 1683, 1815, and 1821 (Bell 1985). Smaller hurricanes are less powerful but more frequent than the hurricane of 1938. Hurricanes in 1944, 1954, 1955, 1960, 1976, and Hurricane Bob in 1991 each left their mark on the coastline.

Human influences on sustaining the form and function of coastal landscapes and ecosystems over the long term are predominantly negative. Attempts to stabilize the beach system by constructing jetties or breach ways and planting beach grass have greatly affected the natural dynamics of this system by interrupting the natural flow of waves and sediment. In fact, the breach ways connecting the ponds to the ocean and one pond to another are the single greatest human impact on the ecology of coastal ponds (RI CRMC 1984).

Introducing non-native, invasive plants, diverting or draining coastal wetlands for development, converting uplands for residential use, and spilling oil are other significant human impacts on the coastal landscape. Recent studies indicate that the greatest threats to Rhode Island’s estuaries and coastal salt ponds are septic systems and road runoff (RI DEM 1996). More studies are needed to establish the extent to which each of these factors influences Refuge Complex ecosystems.

On Rhode Island’s upland landscape, a combination of management and natural succession has allowed forests to make a comeback. The State Division of Forest Environment estimates that 300,000 acres of privately owned forest plus 45,000 acres of State-managed forest make up 45 percent of the State’s land area. Their estimate places 80 percent of the privately owned forest in tracts from 1 to 10 acres in size, which are difficult to manage as forest and are rapidly being converted to residential areas (RI DEM 1996).

Ecosystem Delineations

The Service emphasizes an ecosystem approach to conservation, typically using large river watersheds to define ecosystems. Rhode Island falls within the Connecticut River/Long Island Sound Ecosystem (Map 1-3).

Another commonly used delineation of ecosystems was developed by Bailey (USDA 1978, expanded 1995). These ecologically based map units often are used in landscape-level analyses. An ecoregion is first divided into a domain, then a division, a province, a section, and a

subsection. Each level defines in greater detail its geomorphology, geology, soil, climate, potential vegetation, surface water, and current human use. Each of these resource attributes has implications for resource management. For example, opportunities to restore native grasslands may be limited by soil types, potential vegetation, and the extent of human impacts on the natural environment. Rhode Island falls within the Humid Temperate Domain, Hot Continental Division, Eastern Broadleaf Forest Province, and Lower New England Section.

Climate

Cold winters and warm summers with a moderating ocean influence characterize Rhode Island's climate. Winter temperatures average 30° F, with lowest temperatures ranging between -10° F and -20° F. Summer temperatures average 70° F, and peak in the 90s. Annual precipitation averages 44 to 48 inches, evenly distributed throughout the year. Thunderstorms occur throughout the summer (USFWS 1989).

Air Quality

The Clean Air Act establishes Class I, II, and III areas with limits on the amount of "criteria air pollutants" that can exist in pre-defined geographic areas. Examples of criteria air pollutants are smog (primarily ground-level ozone), particulate matter, and carbon monoxide. Class I areas allow very little additional deterioration of air quality (e.g. Wilderness Areas); Class II areas allow for more deterioration; and Class III areas allow even more. All of Rhode Island is currently classified as a Class II area. The U.S. Environmental Protection Agency (EPA) has designated the entire State a serious non-attainment area for ozone. That designation resulted in stricter automobile emissions standards designed to reduce emissions by 24 percent between 1990 and 1999.

Socio-economic Setting

The Refuge Complex lies close to some of the largest population centers on the east coast. The New York City metropolitan area, population 8.5 million, is 2.5 hours to the southeast. Metropolitan Boston, population 3.2 million, is 2 hours to the north. Hartford, with a population of 140,000, is 1.5 hours to the northwest, and Providence, population 161,000, is 45 minutes to the north (U.S. Census Bureau 1996 estimates; 1990 U.S. Census).

According to those estimates, the population of Rhode Island is about 1 million; 94 percent live in metropolitan areas (cf. the national average of 80 percent) and 6 percent in rural areas. South County, which includes Ninigret Refuge, Trustom Pond Refuge, and Chafee Refuge, has the fastest growing population and the highest number of building permits issued annually (RI CRMC 1998). South County population figures between 1990 and 1996 increased 7.4 percent, 4.6 percent, and 5.3 percent respectively in Charlestown, Narragansett, and South Kingstown, while Middletown's population decreased by 1.4 percent. The Town of New Shoreham, which includes Block Island, had a population increase of 10.8 percent. The population for the entire state of Rhode Island decreased by 1.3 percent over the same period (<http://www.riedc.com>).

The Refuge Complex directly contributes to the economies of Charlestown, South Kingstown, Narragansett, Middletown, and New Shoreham through Refuge Revenue Sharing payments. The Federal Government does not pay property tax; it does pay refuge revenue sharing directly to cities and towns each year, based on the fair market value of refuge lands. The revenue sharing formula calculates three-quarters of 1 percent of the fair market value of refuge lands as the maximum amount payable each year. An appraisal updated every five years keeps their fair market value current. The actual amount of revenue sharing paid each year varies, depending on what portion of the maximum amount Congress appropriates that year (rarely the maximum). Figure 3-1 depicts Refuge Revenue Sharing payments to those towns for the fiscal year 2000.

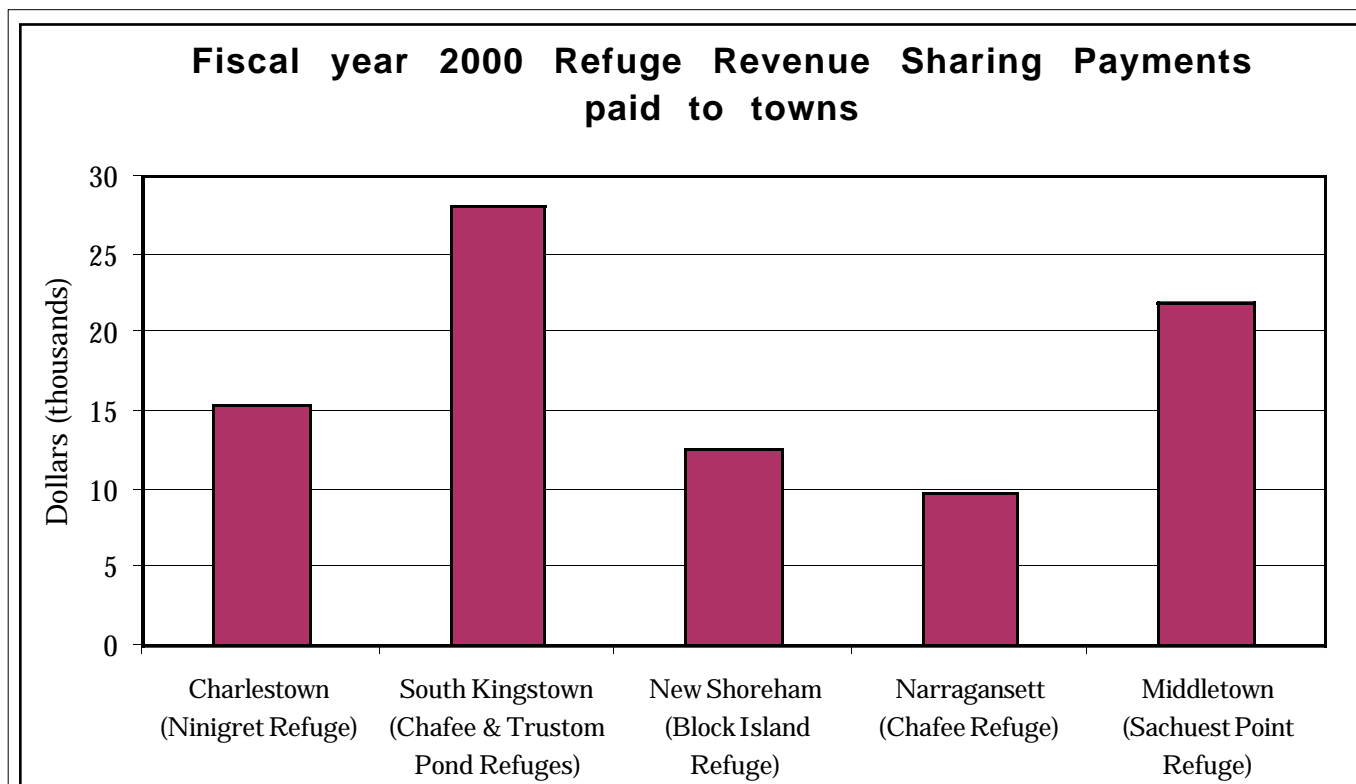


Figure 3-1. Refuge Revenue Sharing Payments made to towns in 2000.

The University of Rhode Island Department of Resource Economics (Spring 1997) reports that travel and tourism is the State's fastest growing industry. In 1996, it generated \$1.7 billion. The number of visitors to the State in 1997 increased at a rate twice the national average. Also in 1997, Rhode Island's services industry, which includes those in health, business, and education, comprised the largest wage and salary employment at 34 percent (RI EDC 1997). Between 1987 and 1997, the services industry increased by 37 percent, while the manufacturing industry decreased by 37 percent.

In all the communities surrounding the refuges, travel and tourism and the services that support them contribute substantially to local economies. According to Ann O'Neill, President of the South County Tourism Council (O'Neill 1999), the tourist season lasts from April through October, with peak activity during the summer months. Responses to our workbooks confirm that beaches and water-associated recreation are the primary attractions for visitors with destinations along the Rhode Island coast.

Current travel and tourism literature does not feature the Refuge Complex. According to Ms. O'Neill, its refuges are not well known as tourist destinations, although many visitors discover them during their visit and enjoy the scenery and open space they provide. They are small enough to explore in one day, and generally do not prompt an additional night's lodging. Ms. O'Neill stated that, since the Tourism Council is trying to showcase a greater mix of outdoor recreational opportunities in South County, the Refuge Complex will figure more prominently in future promotional material.

The greatest contribution by the Refuge Complex to the local economy comes from the values attributed to the preservation of open space (NPS 1992). We represent those values using three indicators, below: Cost of Community Services; Property Values; and Public Willingness to Pay.

Cost of Community Services compares the cost per dollar of revenue generated by residential or commercial development to that of revenue generated by an open space designation. On the one hand, residential development expands the tax base, but the costs of increased infrastructure and public services (schools, utilities, emergency services, etc.) often offset any increase in revenue. On the other hand, undeveloped land requires few town services and places little pressure on the local infrastructure. The cost per dollar of revenue generated by commercial land typically falls between those of residential and open space.

The American Farmland Trust (1989, 1992, and 1993) and the Commonwealth Research Group (1995) evaluated community revenues and expenses associated with open space vs. residential and commercial development. All available information on the New England States shows that open space and commercial development produced more revenues than costs, while the opposite was true for residential land.

Conversations with local realtors and appraisers helped us evaluate the refuges' influence on property values. Two South County realtors and one realtor/appraiser confirmed that properties adjacent to refuges generally are valued higher (Gross, et al. 1998). That value is realized through increased sales price/acre in properties adjacent to a refuge, compared to otherwise similar properties, and by how quickly those properties sell. Properties with views protected by their proximity to a refuge exhibit an even greater difference. All the realtors estimated, but none with any certainty, that properties adjacent to refuges may realize from 1- to 4-percent increases in property value. All the realtors we spoke with use a property's adjacency to a refuge as an important advertising asset.

Public Willingness to Pay is a method for estimating the monetary value of ecosystem goods and services by determining how much the public would be willing to pay, either in taxes, fees, or opportunity costs, to preserve ecosystem values. In Rhode Island, where coastal ecosystems are threatened by development-at-large, we have used Willingness to Pay to estimate the value of open space preservation.

Rhode Islanders consistently and overwhelmingly vote for bond measures to protect open space. Local and State-wide bond measures passed in 1985, 1986, 1987, and 1989, invested more than \$100 million in acquiring land for recreation and open space. A State-wide bond in 1998 passed an additional \$15 million specifically for protecting open space (RI CRMC 1998).

Refuge Complex Administration

Table 3-1. *Refuge Complex staffing levels and budgets between 1995 - 1999.*

<i>Fiscal year</i>	<i>Operations</i>	<i>Maintenance</i>	<i>Full time staff</i>	<i>Seasonal staff</i>
1995	\$216,299	\$85,700	7	3
1996	355,715	23,900	7	3
1997	350,700	97,700	8	4
1998	428,400	171,000	8	4
1999	441,900	28,000	9	2

Staffing and Budget

Annual budget appropriations are highly variable, affecting our staffing levels. Table 3-1 summarizes budget and staffing levels from 1995 to 1999. Fluctuations reflect funding for special projects, moving costs for new employees, or large equipment purchases. Most of the funding is earmarked; very little discretionary funding is available.

Resource Protection and Visitor Safety

Law enforcement officers, with full authority to enforce federal regulations, are required to ensure resource protection and visitor safety. Three permanent refuge staff have been assigned collateral duties for law enforcement at any time during the course of refuge operations, but those collateral duties draw staff time and resources away from other important programs. We typically hire up to three seasonal staff with law enforcement authority each year.

During the past 5 years, formal notices of violation averaged 15 per year. They typically involved vehicle and pedestrian trespass, vandalism, and waterfowl hunting in closed areas. Well over 100 verbal warnings are also given each year, typically for inadvertently walking or driving in closed areas, littering, walking dogs in a closed area or off-leash, bicycling in closed areas, and digging plants. In 1993, a Trail Warden program began using volunteers to assist in documenting violations. Wardens also inform visitors of public use policy and permitted activities.

Refuge Complex Office

The Refuge Complex office lies in the Shoreline Plaza strip mall in Charlestown. In addition to housing our staff, it also houses our Division of Ecological Services Southern New England/New York Bight Coastal Ecosystem Program five-member staff, an Atlantic Coast Joint Venture staff person, and Friends of the National Wildlife Refuges of Rhode Island.

An environmental assessment was written in 2000, which determined a new location for a Refuge Headquarters and Visitor Center. The new building will be located on Deer Run Road (off U.S. Route 1) in Charlestown, RI. The building is currently being designed, with construction to begin in 2003.

Contaminants

Contaminant issues have been coordinated by a combination of refuge staff, Service contaminant biologists, our Pollution Control Office, the Environmental Protection Agency (EPA), and RI DEM. Five sites on the Refuge Complex are listed in the EPA Comprehensive Environmental Response, Compensation, and Liability Information database (CERCLIS).

While conducting field surveys in a wooded portion of Trustom Pond Refuge, a University of Rhode Island biology class discovered an old farm dump that had gone undetected until 1982. The initial inspection found small piles of debris, discarded DDT canisters, and one container of pink liquid thought to be fuel. No analysis was conducted at that time. The site subsequently was listed on the Federal Facilities Compliance Docket as CERCLIS No. RID980915599.

Our Ecological Services Division began its Preliminary Assessment in the fall of 1995. They conducted a focused sampling and geophysical survey to determine if the old dump was a potential source of contamination, and an electromagnetic survey to search out buried wastes. One partly buried, rusted-out drum containing soil was found, removed, and its contents analyzed.

Their survey found trace-to-low concentrations of organochlorine pesticides sporadically present in surface soils in only one of the two small debris areas at the site. DDT slightly exceeded screening levels for ecological risk. None of the contaminants, including DDT, exceeded any screening levels for human health. The Preliminary Assessment concluded that the site did not pose a significant threat to human health or the environment (March 1996).

RI DEM requested some additional ground water analysis. Initial results on ground water sampling found slightly elevated lead levels in unfiltered samples. Subsequent analysis of filtered ground water samples found no elevated lead levels. RI DEM agreed at that point that the site did not warrant further cleanup.

On April 2, 1998, the site was archived (removed) from the EPA CERCLIS database. On April 21, 1998, EPA determined that a "No Further Federal Remedial Action Planned" decision was appropriate. EPA at that point considered RI DEM to be the lead agency overseeing hazardous waste compliance at the site. EPA did note in their April 21, 1998 decision that archived sites could be returned to the CERCLIS database if additional information or substantially altered site conditions warranted.

Refuge Resources

Physical Resources

Topography and Soils

The terrain at Trustom Pond Refuge is gently rolling and slopes south to the ocean. Slopes are generally less than 5 percent. The refuge is located on a coastal outwash plain created by glacial meltwater carrying and depositing unsorted till and sorted sand, gravel, silts, and clay. Most soils on the refuge are silt loams in the Bridgehampton and Enfield series. Other areas, which were maintained as pasture but were not cultivated, are stony loams in the Charlton series.

Hydrology and Water Quality

Trustom Pond is a 160-acre brackish coastal pond that serves as the centerpiece of the refuge, and has the distinction of being the only coastal pond in Rhode Island without houses on its shoreline. It is also the only coastal salt pond in Rhode Island that lies entirely within a national wildlife refuge, and whose waters are fully managed by the Service. The pond varies between 1 to 6 feet in depth, with substrates varying from mud to coarse sands. There is no permanent breachway; however, we mechanically breach the pond at least once a year, usually in early April, primarily to provide foraging habitat for piping plovers and other shorebirds. Natural breaching occurs periodically as an overland sheet flow during periods of extreme high water. The watershed feeding Trustom Pond is estimated at 794 acres (RI CRMC 1998).

During high water, Trustom Pond flows into adjacent Card's Pond, a 43-acre brackish coastal pond. Card's Pond averages 1.5 feet in depth. The refuge boundary includes roughly the southwestern one-sixth of its perimeter. There is no permanent breachway in Cards Pond; however, we breach it mechanically eight to ten times throughout the year, primarily in response to landowners' concerns about the high water table backing up into their septic and well systems. The watershed feeding Card's Pond, estimated at 1,820 acres is much larger than Trustom Pond's watershed (RI CRMC 1998).

Rhode Island Salt Pond Watchers, a volunteer group, has been monitoring water quality on Trustom Pond for at least 10 years. Other water quality studies have also been done, including a study conducted by the RI Department of Health (1991). Both nitrogen and bacterial contamination in the pond are concerns. The Department of Health study found concentrations of fecal coliform bacteria that exceeded shell fishing standards in both Trustom Pond and Card's Pond.

In both ponds' watersheds, most of the residential and commercial development lacks sewer systems, relying instead on individual septic systems, as is the case with Ninigret Pond. Older, failing septic systems are suspected of being the leading cause of nitrate, nitrogen, and bacteria loading in coastal ponds (RI CRMC 1998). Other likely causes include storm water runoff in the watershed, domestic pets, and the summer populations of Canada geese and mute swans, who are confined to the ponds while molting. A single mute swan can produce about 2 lbs. of manure a day!

Nitrogen loading results in extensive macro algae buildup. During the summer, both ponds are thick with macro algae and phytoplankton, which cover the bottom in a thick mat and form an anoxic zone (RI CRMC 1998). One significant impact of algal blooms is that they reduce the abundance and density of submerged aquatic vegetation (SAV) by decreasing the amount of light transmitted through the water column. SAV is a critical food source for an array of aquatic and terrestrial animals (see Vegetation, below). Since 1978, SAV beds have been declining in Trustom Pond (Harlin, et al. 1995).

Biological Resources

Wetlands

Freshwater wetlands of various types account for about 70 acres, or 11 percent, of Trustom Pond Refuge. Five freshwater ponds totaling about 8 acres occur on the refuge. The largest of these, the 4-acre "mud pond," lies along Moonstone Beach Road. The only man-made pond is a small farm pond created when the former owners of the farm dammed a small creek drainage near the present refuge maintenance facility.

Barrier beach habitat (also referred to as "beach strand" habitat)

Coastal development and shoreline stabilization have been the major causes of sand dune loss and the rapid decline of barrier beaches along the Rhode Island coast. One of the State's few remaining undeveloped barrier beaches is Moonstone Beach, 1.3 miles long. Changes in its width have been an increasing concern since 1985, when it began steadily declining (URI 1996). Without the natural processes of sand removal and replenishment, beach loss occurs. Since 1961, beach profile surveys at Moonstone and other beaches on the South Shore have documented widespread decline in sand volume. When dune habitat is lost, the barrier beaches cannot absorb large waves, and lack the volume of sand required by adjustments in beach profile during storms.

Intense summer recreational use of Moonstone Beach and other barrier beaches exacerbates the impacts on these fragile ecosystems. People continue to walk on the dunes at Moonstone Beach, despite refuge signs that prohibit it. Pedestrian traffic destroys stabilizing vegetation and contributes to dune erosion. The beach also provides important nesting habitat for piping plovers and least terns. In order to protect these species, Moonstone Beach, above mean high tide, is closed to public use from April 1 to September 15 each year.

Vegetation

Trustom Pond Refuge contains a diverse collection of vegetation cover-types (Table 3-2). Red maple swamp is the dominant freshwater forested wetland cover type. A detailed plant list for the refuge is available from the Refuge Office upon request (George 1999).

Table 3-2. Land cover at Trustom Pond Refuge, Washington County, Rhode Island (source: aerial photo interpretation by J. Stone).

Cover-type	Acreage	Percentage
Agriculture	18.9	2.9%
Developed	5.0	0.8
Exposed rock	4.2	0.7
Native emergent wetland	5.1	0.8
Native forest upland	209.3	32.6
Native forest wetland	34.8	5.4
Native grass	94.6	14.7
Native shrub upland	26.2	4.1
Native shrub wetland	7.8	1.2
Non-native emergent wetland	25.0	3.9
Non-native forest upland	0.1	-
Non-native shrub upland	13.4	2.1
Sand	18.0	2.8
Vegetated sand dunes	12.1	1.9
Water	168.0	26.1
Total	642.5	100%

Submerged Aquatic Vegetation (SAV)

Widgeon grass and sago pondweed dominate the aquatic vegetation of Trustom Pond (Harlin & Thorne-Miller 1978 and Harlin, et al. 1995). A 1995 survey found that these plant populations had decreased drastically since the original survey in 1978. In 1996, researchers found an increase in SAV abundance and diversity over 1995 levels. We need to continue monitoring SAV levels to determine the reasons for fluctuations, and outline the relationships among nutrient loading, breaching cycle, and turbidity.

Grasslands

Following completion of the Trustom Pond Refuge Grasslands Management Plan (1995), the refuge has systematically converted former hayfields and crop lands (corn and potato) to native grasses for the benefit of grassland nesting birds. We have now restored 85 acres of a targeted 125 acres of little bluestem and big bluestem grasslands on the refuge. Under a cooperative agreement with the

Meyer family, 40 acres were restored on adjacent private property, with plans to restore another 15 acres within 2 years.

The restoration process converts old fields by disking (with an offset harrow), plowing, harrowing, packing (using a roller), fertilizing, and seeding them before June. The original seed mix used was typically big bluestem (50 percent), little bluestem (20 percent), Indian grass (20 percent), and switchgrass (10 percent). Recently, the seed mix is primarily little bluestem, using the other species more sparingly depending on the topography, soils and hydrology. Weeds are chemically treated with herbicides soon after germination.

A combination of mowing and burning has maintained the newly established grasslands. An experimental burn in Field 6 in 1998 had very promising results. The burn was designed to consume dead vegetation and control weeds. Established fields are mowed twice in the first year for weed control. Horseweed and ragweed are the principle problem species. Current management strategies require that restored grasslands be mowed or burned every 3 to 5 years to control woody vegetation. We monitor during both the growing and dormant seasons using photo points and Robel pole

readings. A Trustom Pond Grasslands Progress Report (1998) makes several recommendations about the mix of seed and the timing of burning, mowing, and herbicide application (Flores 1998).

Shrublands and Forest

Shrublands and forest compose 39 percent of Trustom Pond Refuge, mostly on its western portion. Shrublands are dominated by shadbush, northern arrowwood, and bayberry, whereas forests are dominated mainly by red maple and black oak. We brush-hog approximately 5 acres of old field brush land (formerly sheep pasture), primarily composed of Autumn olive and black cherry. It is too rocky to maintain as grasslands, and is being maintained as early successional shrub habitat (< 60 years old).

Invasive Plants

Invasive species have several strongholds on the refuge. *Phragmites* is found around much of the edge of Trustom Pond, and is impacting the population there of State-listed sea pink (*Sabatia stellaris*, endangered); autumn olive is found on the edges of most fields; honeysuckle are found on the edges of shrublands and forest; and Asian bittersweet is found along hedgerows adjacent to fields. *Phragmites* dominates approximately 25 acres of emergent wetland; invasive plants dominate at least 14 acres of upland on the refuge.

Herbicide treatments and mechanical control on approximately 10 acres of *Phragmites* on the eastern side of Trustom Pond involved spraying with Rodeo and removing dead vegetation by mowing and burning. Follow-up treatments have been inconsistent, and some regrowth has occurred.

We have attempted to control autumn olive in recent years by using a farm tractor to push the shrubs over and then burning them. We have also applied cambial treatments of Garlon 3A directly to the stems.

Threatened and Endangered Species

Refuge Plover Program

Since 1982, refuge staff have protected nesting piping plover and least tern on Moonstone Beach by using different combinations of beach closures, law enforcement, biological monitoring, predator exclosures, and predator control. The colorful history of those management techniques spans public acceptance, support, protests, and lawsuits. The Compatibility Determination for Piping Plover Management on Trustom Pond Refuge (1990) and the Refuge Annual Narratives of the 1980's describe that management in detail. Before 1982, the refuge owned 2,640 feet of beachfront, but did not record nesting details, although observations in May of nesting plover have been documented. No restrictions on public use were in force at that time. In 1982, the Audubon Society transferred its former Moonstone Waterfowl Refuge to the Service, extending the refuge beachfront to 1 mile.

During the 1982 nesting season, we fenced individual, active nest sites in that mile of beach with oak posts and single strand wire, and posted warning signs. We allowed public use, including sunbathing, to continue on the remainder of the beach. During the breeding season, sunbathers would lie right up against the fencing, and both beach users and their dogs frequently trespassed in the fenced areas. All three plover pairs abandoned their nests.

In 1982, the New England Naturist Association filed a lawsuit in federal court against closing Moonstone Beach. The lawsuit was dismissed, but protests by this group and other beach users continued for several seasons.

In 1983, 1984, and 1985, we closed three-quarters of a mile of the entire beach, fencing it with double strand wire mounted on posts to prevent public use from the western refuge boundary to the eastern edge of Trustom Pond breachway. The beach closure extended from May 1 through August 31 (nesting season). We hired a Biologist Aide to monitor nest sites and inform the public about the closure. Law enforcement personnel were present on weekends. In 1985, we replaced the wire strand fencing with wire mesh fencing, to ensure that the public and their dogs would stay out. Also this year, we began trapping predators in the vicinity of plover nesting sites.

In 1986 and 1987, we posted 800 feet of beach east of the Trustom Pond breachway, in addition to the three-quarters of a mile already posted. In 1986, the piping plover became a federally listed species under the Endangered Species Act. That listing increased management concern for plover, legally obligating the refuge to ensure plover protection and restoration.

A Master Plan for Trustom Pond Refuge (January 1988) stipulates that all public use activities cease on Moonstone Beach above the mean high tide line. That plan also proposes "...to seek a management agreement with the State of Rhode Island prohibiting public use of the intertidal zone adjacent to the refuge between April 1 and August 31."

In 1988 and 1989, we fenced all of the refuge beach from April 6 to August 31, except a 137-foot section under permit to the Town of South Kingstown to operate a public beach. The RI CMRC issued the refuge a Notice of Violation for constructing a fence without filing a consistency determination. The New England Naturists Association also filed a request for a preliminary injunction in federal court to stop the fencing. The court denied the injunction (C.A. No 88-0218T). A new group, Taxpayers for Access to Moonstone Beach, surfaced with a petition requesting that the Service reopen Moonstone Beach. The beach, however, remained closed.

A Piping Plover Management Compatibility Determination (1990) for Trustom Pond Refuge acknowledged that the Master Plan of 1988 had not been fully implemented. Its findings determined that Moonstone Beach be closed to all public entry above the mean high tide line, from April 1 through September 15; that fencing be erected around the closure area; that no sunbathing or other non-wildlife-dependent recreational activities be permitted; and, that no permit be issued to the Town of South Kingstown to operate a public beach on refuge land.

The current plover management strategy at Moonstone Beach began in 1990, and includes:

- Erecting symbolic fencing to close the beach to public use above the mean high tide line from April 1 to September 15;
- Providing an outdoor exhibit with information on plover and their management;
- Erecting observation platforms for monitoring nests;
- Erecting predator exclosures around nests;
- Erecting predator drift fencing on the back side of the dunes to direct predators away from the beach nesting sites;
- Using law enforcement officers to patrol the beach during the closure period;
- Monitoring the activities of piping plover nests and chicks; and
- Controlling mammalian predators like red fox, coyote, mink, long-tailed weasel, skunk, opossum, and raccoon through selective trapping.

The Town of South Kingstown owns a 50'-wide section of beach, directly out from the end of Moonstone Beach Road.

Since 1982, when plover management began on Trustom Pond Refuge, plover nesting has increased from a low of 2 pairs to a high of 11 pairs. However, fledgling rates per pair have stayed relatively constant (see Figure 3-2).

In 1999, the Piping Plover Recovery Team assessed the current condition of plover habitat in a field review of Moonstone Beach, Maschaug Beach (a.k.a. East Beach, Watch Hill), and approximately one-third of Ninigret Beach, including all of the Ninigret Refuge barrier beach (Hecht, et al. 1999). They ranked those beaches using the "Habitat Ranks and Provisional Density Objectives for Breeding Piping Plovers in Massachusetts (Mass DFW 1996). Rankings were assigned solely on physical and vegetative attributes of habitat, without regard to observed or reported sources of human disturbance or predation.

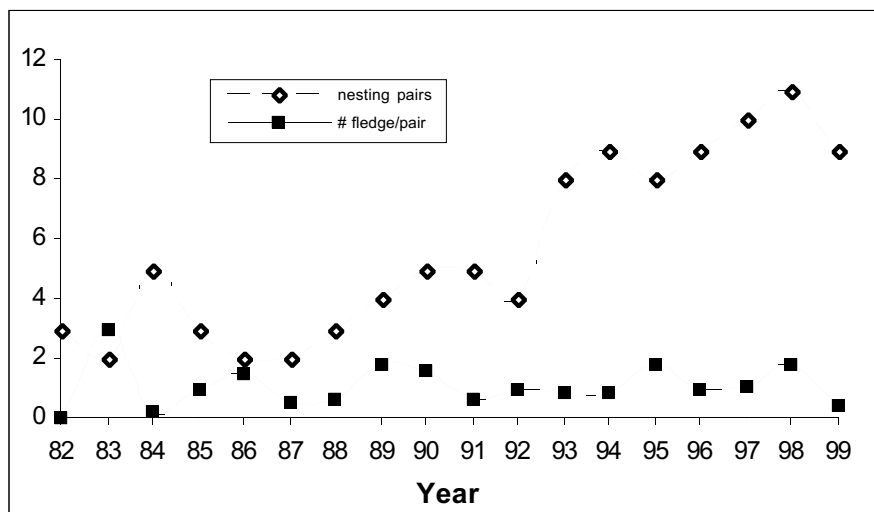


Figure 3-2. Nesting pairs and fledging rate per pair of piping plovers on Moonstone Beach, Trustom Pond Refuge. In 1999, the estimated carrying capacity of this site was 10 nests (Hecht 1999).

The Team estimated that Trustom Pond had a "provisional abundance objective" of 10 nesting pairs. This should be interpreted as the current carrying capacity based on the existing physical attributes only. Hecht noted the carrying capacity is subject to rapid change due to storms, changes in sand deposition and erosion forming processes. As such, this number is a guideline and should not be considered a maximum. The Revised Recovery Plan

(1996) also lists an estimated carrying capacity of 10 pairs.

Significant information needs for effectively managing plover remain, primarily related to the control of mammalian predators, which are the suspected major cause of plover loss at Moonstone Beach. Information on control methods, predator populations, the effects of aversive conditioning on predators, the effectiveness of dawn and dusk “guarding” of nest sites, and the seasonal availability of food for plover are all critical information needs.

South Shore Plover Program

Since 1992, refuge staff have helped monitor sites and protect piping plover on as many as nine other beaches along the South Coast. This highly successful cooperative management has resulted in a dramatic increase in the number of nesting plover and fledged chicks. The off-refuge plover protection program relies primarily on grants and cooperative funding with RI DEM. An annual report summarizes each year’s statistics for nesting pairs and productivity and other relevant information on nesting sites, disturbance, and losses. It also recommends improvements in the program. These annual reports are available from the Refuge Complex office upon request. The latest is “Rhode Island Piping Plover Restoration Project: 1999”.

Off-refuge management resembles the on-refuge program, with symbolic fencing of areas around the nest sites, exclosure fencing around each nest, monitoring nest activity, and educating the public on plovers and the problems associated with unleashed pets and litter. Since off-refuge management began in 1992, the number of nesting pairs has increased significantly at some sites. Figure 3-3 provides a summary of each site.

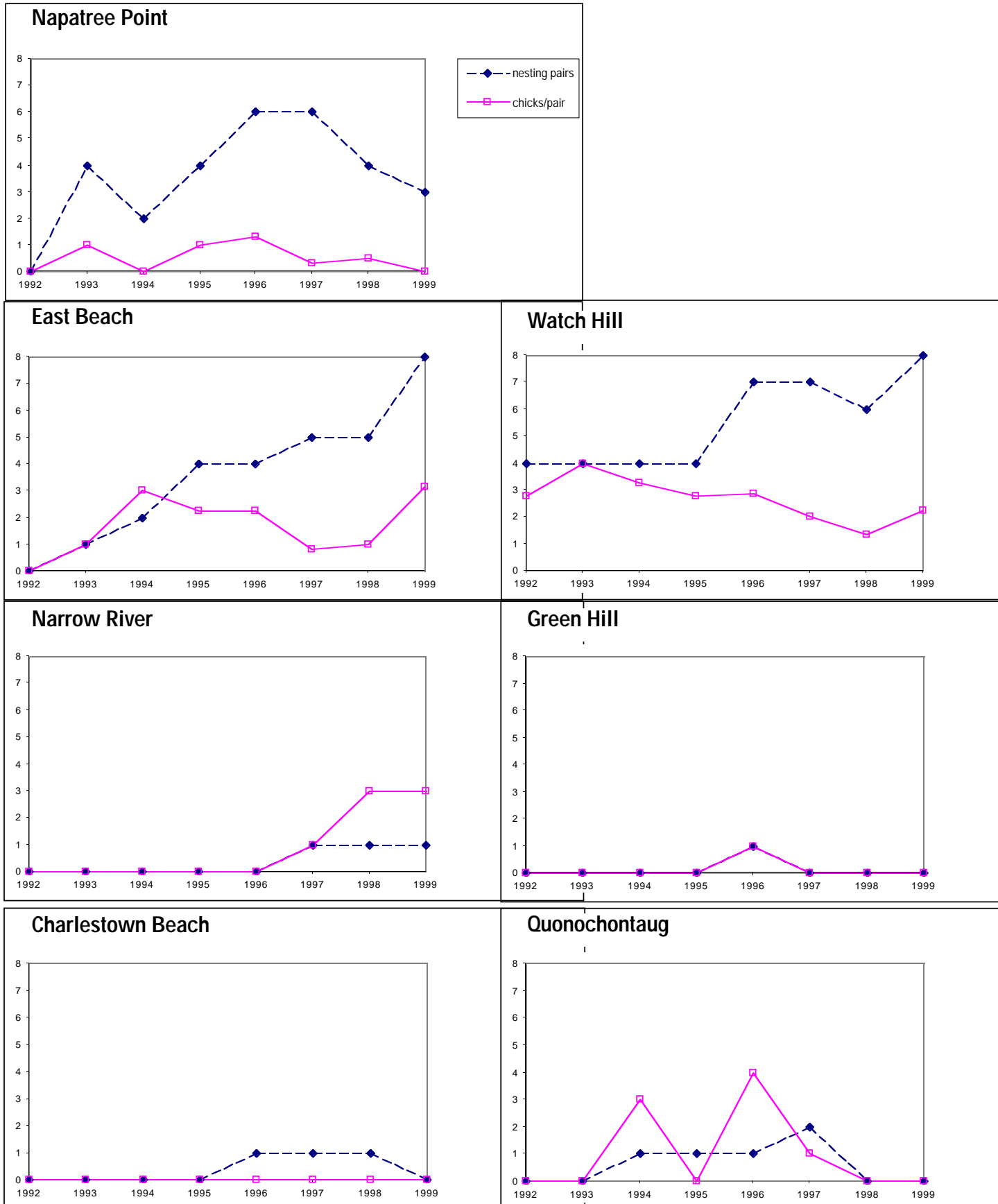
Management and protection for piping plovers is a priority for the Refuge Complex. Tremendous resources are channeled into protecting and monitoring nesting beach habitats, both on Moonstone Beach and non-refuge beaches along the South Shore. It is important to recognize that many other shorebird species benefit from piping plover management as well, especially the State-listed least tern (threatened).

Other Listed Species

Piping plover is the only federally-listed species breeding on Trustum Pond Refuge. Other endangered species use the refuge during migration: bald eagle (*Haliaeetus leucocephalus*), roseate tern (*Sterna dougalli*), and the recently de-listed peregrine falcon.

Least tern (*Sterna antillarum*), a State-listed species (threatened), has also benefitted from and responded favorably to strategies to protect nesting piping plover. At Moonstone Beach, exclosures around an entire tern colony and solar-powered electric fencing has been used to deter predators. Tern numbers on the beach have been increasing; RI DEM counted 160 individuals in 1998. Despite predator trapping, however, small mammalian predators like mink and red fox continue to significantly affect tern fledgling rates and

Figure 3-3. Nesting success of piping plovers in coastal Rhode Island from 1992 to 1999. See **Figure 3-2** for nesting success at Trustum Pond.



adult survival. The fencing appears to be effective only against dogs; small mammals are able to get through. Terns do not always nest in the fenced area, further complicating their protection.

A variety of State-listed species are also found on the refuge, predominately plants. These include wild coffee (*Triosteum aurantiacum*), hyssop-leaved hedge nettle (*Stachys hyssopifolia*), dragon's mouth orchid (*Arethusa bulbosa*), Indian grass, sea pink, and wood lily (*Lilium philadelphicum*). State-listed vertebrates found on the refuge include four-toed salamander (*Hemidactylus scutellatum*) and osprey (*Pandion haliaetus*).

Waterfowl

Trustom Pond is well known in southern New England as a premiere migrating and wintering spot for waterfowl. It is one of the few coastal ponds in Rhode Island where minimal public use near the pond

Table 3-3. Peak waterfowl numbers on Trustom Pond Refuge from 1992 to 1999.

	1992	1993	1994	1995	1996	1997	1998	1999
Snow goose	1	200	4	-	1	40	33	2
Brant	-	-	-	-	-	1	-	-
Canadagoose	885	1000	581	342	1115	1000	775	1106
Wood duck	16	18	12	2	7	3	2	2
Green-winged teal	24	25	51	52	16	39	81	96
Blue-winged teal	14	5	20	2	-	2	-	20
American black duck	249	309	360	200	104	235	210	215
Mallard	92	185	193	78	41	406	73	93
Northern pintail	4	7	2	9	12	4	18	17
Northern shoveler	-	5	2	-	-	-	3	-
Gadwall	72	35	9	15	10	5	8	11
American wigeon	46	30	37	7	20	4	8	3
Canvasback	13	82	8	7	275	54	252	44
Redhead	-	3	-	1	-	18	12	2
Ring-necked duck	3	9	2	5	4	10	7	2
Greater scaup	1260	801	332	375	420	551	470	500
Lesser scaup	1	1	-	265	196	250	568	-
Common eider	4	-	-	800	2500	75	300	75
King eider	-	-	-	-	-	-	1	1
Harlequin duck	-	-	-	1	-	-	-	-
Oldsquaw	1	-	-	-	2	-	-	-
Black scoter	18	-	35	1	275	63	90	17
Surf scoter	180	-	-	30	35	20	30	1
White-winged scoter	5	2	40	3	130	56	140	77
Common goldeneye	37	69	51	46	102	236	285	195
Barrow's goldeneye	-	-	-	-	-	-	5	-
Bufflehead	1	22	6	33	5	8	15	57
Hooded merganser	10	39	50	46	10	48	45	89
Common merganser	-	9	1	330	21	6	98	2
Red-breasted merganser		116	187	50	55	197	325	134
Ruddy duck	36	285	448	685	398	1097	776	1244
Mute swan	194	225	60	32	11	54	22	15

offers an undisturbed resting area for waterfowl. For its size, the pond attracts a significant diversity of waterfowl, some species in very large numbers. Table 3-3 displays the results of waterfowl counts on the refuge from 1992 - 1999.

Shorebirds

Other than piping plover and least tern, many shorebird species also benefit from the seasonal closure of Moonstone Beach, particularly during fall migration. Maintaining a beach closure through September 15 ensures that migrating shorebirds have an undisturbed rest area on Moonstone Beach.

Mute Swans

Mute swans are a non-native, invasive species of waterfowl introduced from Europe in the late 1800's. This species is very

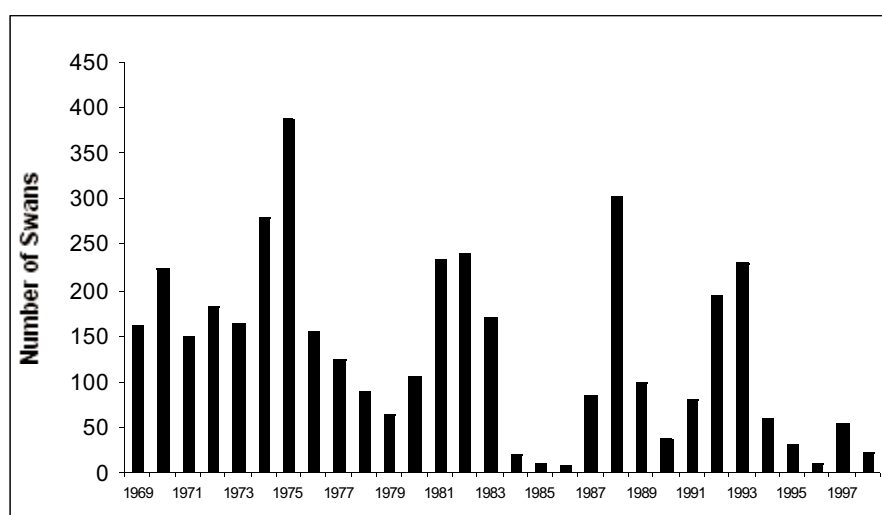


Figure 3-4. Peak mute swan use at Trustom Pond from 1968 to 1998.

aggressive during nesting season, and will kill the young of other waterfowl nesting nearby. Adult swans produce about 2 pounds of manure per day, significantly increasing nutrient loading in the pond. Although it has not been proven conclusively, it is surmised that mute swans are a significant contributor to Trustom Pond water quality problems (see SAV, above).

Mute swan populations on Trustom Pond typically average five pair during nesting season, but increase dramatically during the summer, when the birds use the pond for molting. The swans

remain flightless for several weeks until they grow new flight feathers. As depicted in Figure 3-4, mute swan numbers have been widely erratic, but generally have been declining since 1993.

Nesting mute swans have been actively controlled on Trustom Pond by adding eggs on the nest. RI DEM uses this method across the State to control swan numbers.

Grassland Birds

Trustom Pond Refuge is one of the few protected places left in Rhode Island where bobolink and eastern meadowlark still nest. In 1995, the refuge began a grasslands management program aimed at restoring up to 200 acres of former old fields, shrub lands, and crop lands to native grasslands. Both eastern meadowlark and bobolink are target species for the grassland restoration program. Upland sandpiper and grasshopper sparrow are also very desirable, but the amount of acres probably limits the ability to support breeding populations of these species. In 1997, an upland sandpiper was observed for the first time in one restored field, but we have not

documented nesting. To increase nesting opportunities for grassland birds, refuge staff developed the following objectives for the grasslands program in 1995:

- Achieve at least 90-percent coverage by native grasslands plants;
- Maintain less than 1-percent coverage by shrubs;
- Achieve a 25-percent increase in total numbers of nesting pairs of any of the following grassland nesting species: mallard, American black duck, gadwall, green-winged teal, field sparrow, eastern meadowlark, eastern bluebird, bobolink, American woodcock, and bobwhite quail.

The refuge added the following objective in 2001:

- Manage upland, native coastal sandplain grasslands and shrub habitat (less than 60 years old) in the project area, in patches at least 40 acres in size, or are otherwise contiguous with larger patches of similar suitable habitat.

Our recent understanding of grassland bird dynamics suggests that grasslands should ideally be 100 acres in size or larger. Restoration of these habitats on blocks less than 40 acres in size will not occur if the sole justification is to benefit grassland birds.

Smaller patches are much less productive and could serve as “sinks”, where grassland bird species try to nest, but because of increased predation and other factors, they do not survive.

Objectives for both vegetation and wildlife use are based on achievement over a 3-year period. Occupancy by grassland birds will depend on the maturation of the fields into suitable nesting cover.

This past year, we began to reevaluate our targeted species composition for grassland plants. Historic, early successional, native coastal sandplain habitat was likely a mosaic of young shrublands (less than 60 years old) and grasslands. As we develop our Habitat Management Plan, we will continue to consider habitat patchiness and the habitat implications for bird species.

Neotropical Migrants

Since 1993, the refuge has cooperated with the University of Rhode Island to monitor Neotropical species of interest in a red maple swamp on the refuge, using the Monitoring Avian Productivity Station (MAPS) program. Each year during the nesting season, 10 mist nets are used for 6 hours every 10 days to catch birds. This project has demonstrated that the swamp is important nesting habitat for wood thrush, veery, northern water thrush, Canada warbler, and a variety of other Neotropical species. MAPS results are available at the Refuge Complex office.

Mammals

A study by Paton, et al. (1998) found nine species of small mammals on the refuge. The most abundant species was the masked shrew, followed by the short tailed shrew, red-backed vole, meadow vole, meadow jumping mouse, star-nosed vole, water shrew, and smoky shrew. Large mammals include the usual common species: deer, fox, raccoon, mink, coyote, cottontail rabbit, woodchuck, and skunk.

In March 1999, an aerial reconnaissance of approximately three-quarters of the refuge counted 22 deer. This number was surprisingly low, since the high browse line along trails and openings indicates a much greater density, near or exceeding carrying capacity. We will work with RI DEM to determine habitat capacity for deer.

Under a partnership agreement with the Mystic Marine Aquarium, Trustom Pond Refuge has been designated the official burial site for stranded marine mammals in Rhode Island. Burial sites have all been mapped and catalogued by Mystic Aquarium for future scientific research.

Fish

Approximately 10 species of fish currently inhabit Trustom and Card's Ponds, although relative abundance cannot be determined. It is important to recognize the ecology of fish in Trustom and Card's Ponds has changed dramatically over the years with the reduction in breaching that has occurred. The large populations of smelt, oysters, white perch, and alewife that supported a commercial industry are no longer there. Some white perch, alewife, and flounder will use Trustom Pond if breaching coincides with their runs. Other species in Trustom Pond include Atlantic silver-sides, mummichogs, sheepshead minnows, banded killifish, striped killifish, herring, mullet, and pipefish (Trustom Pond draft EA/Master Plan May 1987).

Invertebrates

Information on the availability of intertidal invertebrates is significant for shorebird management. Systematic surveys of invertebrates have been done on certain portions of Trustom Pond Refuge. A 1997 summer sample of invertebrates collected at Moonstone Beach was compared to other beaches to determine seasonal abundance of invertebrates in the intertidal zone and on the beach itself. A beach invertebrate survey was also conducted during the North Cape Oil Spill Damage Assessment (1998) and during a piping plover behavior/disturbance study (Hoopes, et al. 1989). A study to determine the presence of northeastern beach tiger beetle occurred in 1996. No northeastern tiger beetles were found, but two other species of beach tiger beetle occur on the refuge.

Since 1993, several tick surveys have been done in the forested uplands of the refuge to document the presence of deer ticks carrying Lyme disease. One survey showed that Trustom Pond had the second highest density of deer ticks in the state. Surveys of Trustom Pond benthos were done during the 1970's by refuge staff. Surveys were also conducted during the North Cape Oil Spill Damage Assessment, and by the Greater Scaup Contaminants Study (Cohen 1998). Reports are on file at the Refuge Complex office.

Reptiles and Amphibians

Two studies of reptiles and amphibians on Trustom Pond Refuge have been done (Johnson 1994; Paton, et al. 1998). Johnson found 11 species of amphibians and 5 species of reptiles. Paton, et al. found 10 species of amphibian and 4 species of reptiles. Species richness

results were identical in the two studies. Both are on file at the refuge office.

The significance of the Refuge Complex for amphibians should not be underestimated. Paton, et al. (1998) states that "...the Rhode Island Refuge Complex provides critical habitat for amphibians in southern Rhode Island." These may be the only lands where these species can exist south of Route 1 due to suburbanization. Further, Chris Raithel (RI DEM) has stated that Route 1 is a complete barrier to amphibian movement, reaffirming the importance of the Refuge Complex in sustaining meta-populations of amphibians and reptiles.

An interesting result of the Paton study is that Trustom Pond Refuge has some of the largest populations of amphibians documented in Rhode Island, including four-toed salamander, spotted salamander (*Ambystoma maculatum*), and red-spotted newt (*Notophthalmus v. viridescens*).

Cultural Resources

A 1982 archaeological survey (Morenon, et al. 1983) found Trustom Pond to be of minor importance to understanding precolonial history in the area. Nine out of 19 sites examined contained evidence of prehistoric activity, but the densities were low. No sites were deemed important enough for inclusion in the National Register of Historic Places. However, areas not surveyed are considered highly sensitive for archeological deposits. Service archaeologists identified additional sites in 1996 and 1999, but neither site was investigated further, or included in the National Register.

Public Uses

Estimated public use for Trustom Pond Refuge in 2000 was 45,000 total visitor days. As stated earlier, the Refuge Complex has not established a consistent process for collecting and documenting visitation data.

Known public use activities vary seasonally, but include wildlife-dependent activities such as nature observation and photography, and environmental education and interpretation. Waterfowl and dove hunting occurs on approximately 20 acres of upland field on the eastern portion of the refuge. About 24 percent of the refuge (151 acres) is permanently closed to hunting through an Audubon Society deed restriction.

Of all these activities, only environmental education, wildlife observation and interpretation, photography, and migratory bird hunting have formerly been determined compatible with refuge purposes. Non-wildlife-dependent activities that now occur on the refuge include jogging, berry picking, horseback riding, bicycling, swimming, and sunbathing.

In 1994, the refuge manager formally determined that dog walking, jogging, swimming and sunbathing were incompatible with refuge purposes. Except during the plover nesting season, its enforcement has been inconsistent.

Vandalism to signs, noncompliance with the piping plover beach

closure, loitering in parking lots, and other inappropriate behaviors, and the threat of Lyme disease are all current issues for managing public use at Trustom Pond Refuge.

The visitor contact station was completed in 1998 through a Challenge Cost Share grant. Refuge Complex staff, volunteers, and the Friends Group designed and built the facility. It will offer a location to disseminate information to visitors, provide a base of operations for trail wardens and law enforcement staff, and provide an environmental education and interpretive site. Volunteers have staffed the visitor contact station since the summer of 1999.

School groups use the farm pond as an outdoor classroom to study pond ecology. A wooden dock with benches is available. Also, an outdoor exhibit is set up on Moonstone Beach during the plover nesting season to share information on barrier beach and dune ecology and piping plover management.

Trail System

Three trails compose the 3-mile trail system, the Osprey Point, Otter Point, and Red Maple Swamp trails. Viewing platforms at Osprey Point and Otter Point offer wonderful opportunities to observe and photograph wildlife. Currently, only a small section of the Otter Point trail offers barrier-free (American with Disabilities Act compliant) access to the farm pond.



Redstart

USFWS photo

Management Direction

- Refuge Complex Vision
- Refuge Complex Goals
- General Refuge Management

Refuge Complex Vision

We developed this vision statement to provide a guiding philosophy and sense of purpose for the five refuge CCPs. It qualitatively describes the desired future character of the Refuge Complex through 2015 and beyond. We wrote in the present tense to provide a more motivating, positive, and compelling statement of purpose. It has guided, and will continue to guide, program emphases and priorities for each refuge in Rhode Island.



Freshwater wetland. USFWS photo.

"The Rhode Island National Wildlife Refuge Complex protects a unique collection of thriving coastal sandplain, coastal maritime, and beach strand communities, and represents some of the last undeveloped seacoast in southern New England. Leading the way in the protection and restoration of coastal wetlands, shrubland, and grassland habitats, the Refuge Complex contributes to the long-term conservation of migratory and resident native wildlife populations, and the recovery of endangered and threatened species. These refuges offer research opportunities and provide an outstanding showcase of habitat management for other landowners."

"The Refuge Complex is the premiere destination for visitors to coastal Rhode Island to engage in high quality, wildlife-dependent recreation. Hundreds of thousands of visitors are rewarded each year with inspiring vistas and exceptional opportunities to view wildlife in native habitats. Innovative environmental educational and interpretive programs motivate visitors to become better stewards of coastal resources."

"Through partnerships and extensive outreach efforts, Refuge Complex staff are committed to accomplishing refuge goals and significantly contributing to the Mission of the National Wildlife Refuge System. This commitment will strengthen with the future, revitalizing the southern New England ecosystem for generations to come."

Refuge Complex Goals

Our planning team developed the following goals for the Refuge Complex after reviewing applicable laws and policies, regional plans, the Refuge Complex vision statement, the purpose of each refuge, and public comments. All the goals fully comply with Service policy and national and regional mandates.

Our Refuge Complex goals are intentionally broad, descriptive statements of purpose. They highlight specific elements of our vision statement and provide the foundation for our management emphasis. We identified Goal 1 as the top priority for the Refuge Complex; Goals 2-5 are not presented in any particular order.

Each goal is further refined by a series of objective statements. Objectives are incremental steps to be taken toward achieving a goal and define the management emphasis in measurable terms, where possible. Some of our objectives relate directly to habitat management, while others strive to meet population targets tied to species' recovery plans, or state or regional species plans. The strategies for each objective are specific actions, tools, techniques, considerations, or a combination of these, which may be used to

achieve the objective. Objectives will be used directly in respective step-down plans, while strategies may be revised or modified to achieve the desired outcome.

Together, the goals and objectives are unifying elements of successful refuge management. They identify and focus management priorities, provide a context for resolving issues, and offer a critical link between refuge purpose(s), and the National Wildlife Refuge System Mission.

Integral to all the objectives under Goal 1 and Goal 2 is development in 2003 of a Habitat Management Plan (HMP) for the Refuge Complex. This will be the highest priority step-down plan to accomplish. We will write the plan using current resource information, but will update it based on new information, as needed. The purpose of the HMP will be to prevent the loss or degradation of habitat types, species assemblages, or natural processes significant to the Refuge Complex. It will identify habitat management actions that, to the extent practicable, restore and sustain viable populations of our focus species. The objectives and strategies identified below will all be incorporated into the HMP.

Once the HMP is developed, the Refuge Complex will develop a Species and Habitat Inventory and Monitoring Plan in 2004. Critical elements of the biological program to be inventoried or monitored will be identified, prioritized, and scheduled. This plan will also describe inventory and monitoring procedures, determine where data will be stored, and identify the interim and final reports to include. It will provide a critical connection between the HMP and credible, adaptive refuge management.

In addition, the Region is currently developing a Regional National Wildlife Refuge System Strategic Resources Plan (SRP). This plan will establish Regional goals and objectives for species and habitats based on landscape-scale analyses. Each refuge staff will then determine their respective refuge's contribution to implementing these objectives. As such, once the SRP is completed, the objectives and strategies outlined below may be modified.

The following goals, objectives, and strategies provide management direction for the refuge over the next 15 years. Unless otherwise noted, all work will be accomplished by the Service, primarily by Refuge Complex staff.

Goal 1: Protect and enhance federal trust resources and other species and habitats of special concern.

Objective 1.1

Trustom Pond Refuge's Moonstone Beach will meet or exceed a 5-year average of 1.5 fledged chicks/pair per year (1996 Revised Piping Plover Recovery Plan). An additional annual objective is to meet or exceed the site's estimated nesting carrying capacity (estimated at 10 pairs in 1999), which may vary from year to year given the dynamics of the beach ecosystem.

Background:

The 1996 Revised Revised Piping Plover Recovery Plan describes the status, habitat requirements, and limiting factors for this federally endangered species. The major factors contributing to the species'

decline is the loss and degradation of habitat due to development and shoreline stabilization. The recovery objective is to remove the species from the List of Endangered and Threatened Wildlife and Plants by: 1) achieving well-distributed increases in numbers and productivity of breeding pairs, and 2) providing for long-term protection of breeding and wintering plovers and their habitat.

Objective 1.1 directly supports Recovery Criteria #1 and #3, which relate to maintaining a wide distribution of breeding pairs, and a consistent productivity and fledging rate. In general, we hope to achieve this by increasing the amount and duration of protection and monitoring of nesting sites, and through habitat improvements, as outlined below.

In addition, the PIF Plan for Southern New England (Physiographic Area 9; draft Oct 2000) lists several implementation strategies and management guidelines to achieve habitat objectives for piping plover, including: monitoring and research, actively deterring predators, preventing human disturbance at nesting sites, and public education. All of these are incorporated as strategies or guidelines in Objectives 1.1 to 1.5 below.

Strategies:

- Continue to coordinate each year with the Service's Ecological Services Division and RI DEM prior to the piping plover nesting season.
- Continue to install symbolic fencing along the entire length of Moonstone Beach each year to exclude public access above mean high water from April 1 to September 15.
- Continue to exclude vehicles from the beach year-round.
- Continue to hire at least 3 seasonal employees to monitor piping plover and least tern nest sites, conduct outreach, and enforce public use restrictions. Not all seasonal staff will be supported through refuge funding; some will be funded from other sources procured by the piping plover coordinator (see objective 1.2). Refuge-funded seasonal staff may also support other priority biological program activities.
- In 2003, reassess the nesting carrying capacity for Moonstone Beach, last evaluated in 1999; repeat assessments on a three year basis.

Objective 1.2

Meet or exceed a 5-year average of 1.5 fledged chicks/pair per year (1996 Revised Piping Plover Recovery Plan) on at least six of the cooperatively managed piping plover nesting sites along Rhode Island's South Shore. An additional annual objective is to meet or exceed each site's estimated nesting carrying capacity, which may vary from year to year given the dynamics of the beach ecosystem.

Background:

Nine other active or potential piping plover nesting sites occur on Rhode Island's South Shore, off refuge lands, and are monitored as a cooperative venture between the refuge and the landowners. Six of these sites have had consistent nesting attempts over the last 5 years. Our primary objective has been to protect all active piping

plover nesting sites from direct impacts and to increase productivity and fledging rates to meet the recovery goal of a five year average of 1.5 fledged chicks/pair. (This objective is also included in the Ninigret Refuge CCP because our South Shore cooperative management program is integrated between the refuges).

Strategies:



Piping plover chick. USFWS photo.

- Each year, continue to monitor piping plover activities in suitable habitat on the nine sites, beginning in early April. Install symbolic fencing around potential nesting sites to exclude public access when courtship behavior is observed. Fencing will remain in place until birds have fledged (typically by August 15). Monitoring and management actions will meet or exceed the Service's 1994 Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast To Avoid Take Under Section 9 of the Endangered Species Act (Appendix G in the 1996 Recovery Plan).
- Prior to each nesting season, continue to coordinate with, and seek support from, the Service's Ecological Services Program, RI DEM, and respective landowners.
- In 2004, develop written cooperative agreements with at least five South Shore landowners with existing plover nesting sites, in order to formalize access permissions and to promote consistent management of piping plover nest sites.
- By 2004, hire a Rhode Island piping plover coordinator* who will provide visibility and oversight to the South Shore and Refuge Complex piping plover programs, and facilitate interagency funding and cooperative management of the South Shore nesting areas.
- By 2007, coordinate with private landowners and towns to develop contingency plans in anticipation of unexpected events such as oil spills at nesting sites or the "pioneering" of new nest sites on recreational beaches.

*The Rhode Island piping plover coordinator will a) coordinate outreach and education; b) complete cooperative agreements with private landowners (see above); c) coordinate with towns to develop contingency plans (see below); d) coordinate piping plover research on the refuges; e) hire seasonal biological technicians; f) seek outside funding to help support the South Shore program; g) coordinate habitat evaluations and monitoring (e.g. determine nesting carrying capacities, habitat parameters to monitor, and predator trapping effectiveness).

Objective 1.3

Each year, minimize predation of piping plover at nesting sites in support of nest productivity and fledging objectives.

Background:

According to the 1996 Recovery Plan and experience at Rhode Island nesting sites, predation is a major factor limiting piping plover reproductive and fledging success. Predation is highly site-specific, but evidence indicates that human activities are exacerbating natural predation levels by influencing the types, numbers, and activity patterns of predators. As a result, we are managing human activities as described in Objectives 1.1 and 1.2, and also trying to influence

predator behavior at nesting sites. Our predator management includes the use of non-lethal strategies (e.g. visual deterrents, scare tactics, fenced enclosures), as well as the removal of animals.

Strategies:

- Continue to document statistics (productivity, fledging rates, nest losses, predation, etc.) in annual piping plover reports, and share information with Recovery Team Coordinator.
- Continue to minimize direct predation of piping plover at each nesting site through the use of enclosures and other non-lethal deterrents, and remove animals where it is warranted and feasible. Utilize recommended techniques in “Best Management Practices for Trapping Furbearers,” a technical report to be completed by the Fur Resources Committee of the International Association of Fish and Wildlife Agencies, when available.
- By 2005, evaluate predation statistics on managed piping plover nesting sites to determine the effectiveness of predator management, and adapt management accordingly.

Objective 1.4

Within three years of CCP completion, fully develop a piping plover outreach and education program specifically targeting people using Rhode Island beaches.

Strategies:

- Continue to maintain the interpretive panels on Moonstone Beach (and a mock nest enclosure display explaining its design and purpose) and install informational signs restricting public use.
- Continue annual coordination with the Friends Group to provide oversight, conduct public outreach and education, and help secure non-Service funding for the South Shore Piping Plover Program. With the Friends Group support, maintain informational signs and interpretive displays at six off-refuge nesting beach locations.
- Complete development of a barrier beach education kit for teachers.
- In 2003, develop an education and outreach plan for the piping plover program, which will include:
 - Identification of target audiences (e.g. beach front landowners, elected officials, tourists, and local school children);
 - Distribution of literature with RI DEM beach use permits, at beach entrance stations, and other focal points;
 - A major exhibit at the new Visitor Center; and
 - An educational program integrated with local school curriculums.
- Work with the Friends Group and other partners to develop and implement the plan and secure funding for its initiatives.
- By 2004, hire at least two additional seasonal park aids to conduct outreach and education on-site or in the communities directly affected by piping plover management.

Objective 1.5

Determine the site-specific factors affecting Rhode Island piping plover nesting success and undertake actions recommended or accepted by the piping plover scientific community.

Strategies:

- Each year, the refuge biologist will coordinate with the Piping Plover Recovery Team and other scientists to obtain new research results and share the effectiveness of management techniques.
- By 2004, work with partners to identify piping plover research needs for the Refuge Complex, with highest priority given to determining those factors most influencing chick survival on the refuges.
- By 2005, obtain funding to initiate the highest priority research project.

Objective 1.6

Within two years of CCP completion, establish annual least tern population, productivity and fledging goals for the colonies on Moonstone Beach and Cards Pond.

Background:

Least tern are state-listed as threatened in Rhode Island. They are known to nest on five beaches in southern Rhode Island, with the largest colonies occurring on Trustom Pond Refuge. They typically nest in close proximity to piping plover in the Moonstone Beach - Cards Pond area. Least tern are colonial nesters and site fidelity tends to be high; however, fidelity is influenced by predation, human disturbance, overall breeding success, vegetation cover, and colony size. Least tern are annually monitored in conjunction with piping plover on the refuge, and on off-refuge piping plover sites such as Napatree Point, East Beach-Watch Hill, Ninigret Conservation Area, and the Narrow River. On the Trustom Pond site, predation by birds and mammals has been the greatest factor consistently affecting nesting and fledging success.

Management of the colony has included enforcing the seasonal Moonstone Beach public access closure, predator exclosure fencing around the primary breeding area, chasing away problem animals, and trapping of mammalian predators.

Strategies:

- Each year, continue to place predator fencing around the least tern colony on Moonstone Beach. Adapt the fencing design to exclude smaller mammals (e.g. weasels), thereby minimizing loss of least tern to predators.
- Continue to remove predators each year, where warranted and feasible, to protect least tern eggs, chicks, and adults.
- Continue least tern surveys and reporting, in conjunction with annual piping plover surveys.
- Continue to stay apprised of the Tern Management Handbook and Status Assessment process (currently in draft; March 2002), especially new developments and recommendations on least tern management.

- In 2003, evaluate restoration opportunities on Moonstone Beach and Cards Pond to improve nesting conditions and capacity for least tern.

Objective 1.7

Maintain high quality wintering and nesting habitat for American black duck and other native, migratory waterfowl on the 160 acre Trustom Pond through management of public use and the control of invasive, non-native plant and animal species.

Background:

With no development on its shoreline and limited public use, Trustom Pond offers wintering and migrating waterfowl a place to rest virtually undisturbed. It is recognized throughout southern New England as a premiere spot to view a wide diversity of waterfowl.

The 1986 North American Waterfowl Management Plan (NAWMP) identified the black duck as a priority species of “immediate international concern.” The NAWMP’s Atlantic Coast Joint Venture identified Trustom Pond as a focus area for waterfowl management.

Unfortunately, the habitat for waterfowl is threatened by poor water quality (see objective 2.5) and invasions by non-native plants and animals such as *Phragmites* and mute swan. These species are a threat because they displace native plants and animals, reduce natural diversity, and degrade habitat conditions for focus species.

Treatments to improve water quality and eradicate invasive species are expensive and labor intensive and will require extensive partnerships with adjacent landowners, state and federal agencies, and the local government.

Strategies:

- Continue to limit public access on Trustom Pond to minimize human disturbance to wintering waterfowl.
- Continue to breach Trustom Pond approximately once per year to improve water quality and breach Cards Pond at the request of landowners, and as resources permit.
- In 2002, pursue zero productivity of mute swan on Trustom Pond (also see objective 2.7).
- By 2003, treat at least 5 acres per year of *Phragmites* or other invasive wetland plants across the Refuge Complex through mechanical, chemical, or biological treatments to improve habitat for black duck and other waterfowl. Particular emphasis will be on Trustom Pond.
- By 2005, develop an ecosystem-based approach to managing Trustom Pond. Work with local experts, including RI DEM, CRMC, and the University of RI to identify the natural coastal formation processes and dynamism that shaped the pond, and its relationship to various focus species, such as waterfowl (also see objective 2.5).

Objective 1.8

Within two years of CCP completion, establish specific habitat management objectives for those birds considered to be a high conservation priority in the PIF Plan, and for which the refuge could make an important contribution to their conservation.

Background:

PIF Plans are written for physiographic provinces with an overall goal to ensure the long term maintenance of healthy populations of landbirds. Rhode Island Refuges lie within PIF Physiographic Area 9, Southern New England. These plans identify species and habitats most in need of conservation, describe desired habitat conditions for these species, develop biological objectives, and recommend conservation actions.

Although the final PIF Plan is not available, this CCP incorporates habitat objectives for certain landbird species identified in the draft PIF Plan (Oct 2000). These include piping plover (objectives 1.1 - 1.5), shrub- and grassland-dependent coastal Neotropical migrants, and maritime marshland species. Using information from the surveys identified below and the completed PIF Plan, we will be able to refine our landbird management objectives in the near future.

Strategies:

- Continue annual bird monitoring associated with the 145-acre grassland/shrubland restoration on the refuge; conduct bi-weekly surveys during May and June each year.
- Continue coordination with the University of RI to conduct the Monitoring Avian Productivity and Survivorship (MAPS) project.
- Continue to conduct refuge-wide Breeding Bird Surveys on a 3- to 5- year interval, biweekly during the breeding season according to established protocol.
- In conjunction with development of the HMP, update refuge cover-type maps, adhering to the National Vegetation Classification Standards.
- In 2003, utilize the PIF Plan and the Regional Strategic Resources Plan (in preparation) to identify and prioritize those landbirds of highest management concern on the refuge, and assess how current management practices are impacting them. Determine which of these landbirds should be a focus for future management on the refuge, and write landbird objectives for the HMP.

Objective 1.9

Protect and improve habitat quality for shorebirds at feeding and staging areas on the refuge.

Background:

Shorebirds annually migrate hundreds or thousands of miles between breeding and wintering grounds, often in one or a few long-distance non-stop flights. As such, migration staging areas, where birds rest and accumulate fat reserves before and during flight, are vitally important to many shorebird populations. Along the east coast, beaches are key locations. Long-term declines of shorebird numbers at migration staging areas along the Massachusetts coast

have been attributed to conflicts between shorebirds and heavy human recreational use. Monitoring shorebirds during migration has not occurred consistently on Trustom Pond Refuge, so information is limited on whether it is a key staging area.

Strategies:

- Use the U.S. Shorebird Conservation Plan (once completed) to update management and monitoring strategies based on any newly identified imperiled species (draft Shorebird Prioritization System 1999).
- By 2005, determine if there are key staging areas on the refuge; if so, map in a GIS database.
- By 2006, determine potential threats and disturbances for key areas and implement a plan to reduce their impact. Use outreach and education and, if necessary, restrictions on public use and access.

Objective 1.10

Protect and sustain all marsh, wading and water bird breeding habitat on the refuge, especially maritime high marsh habitat capable of supporting salt marsh sharp-tailed sparrow.

Background:

According to the PIF Plan, maritime marsh habitat is the habitat most in need of immediate conservation attention in this physiographic area due to the large number of priority species and the tremendous pressure from human development along the coastline. Substantial threats also exist in the form of human disturbance, pollution, increasing predator populations, and invasive, exotic species. Reducing these threats is the highest conservation concern to be addressed. Restoration of high salt marsh is also a priority.

Strategy:

- Use the North American Waterbird Conservation Plan (once completed) to update management and monitoring strategies for species of conservation priority.
- By 2003, conduct saltmarsh sharp-tailed sparrow surveys in suitable habitat according to Regional protocol.
- By 2005, initiate an inventory for all other marsh and wading birds, according to Regional protocol, at all high probability sites. Determine seasonal occupancy and nesting status. If occupied habitat is located, develop a site plan.

Objective 1.11

Promote an appreciation of amphibian and reptile conservation, and actively manage to protect and sustain current populations on the refuge.

Background:

Recent studies conducted by the University of RI have revealed that Ninigret and Trustom Pond refuges are very important to the reptile and amphibian population in Rhode Island's South County area. In fact, the highest density of two amphibian species known for Rhode Island occurs on these refuges. Unfortunately, we know little about how these amphibians and reptiles utilize refuge habitats seasonally,

in particular during the spring amphibian migrations. In cooperation with the University of RI, we hope to continue inventories at Trustom Pond and Ninigret refuges.

Strategies:



Green frog. USFWS photo.

- By 2003, conduct annual anuran call count surveys according to Regional protocol.
- By 2005, develop environmental education and interpretation programs to promote the significance of the refuges to Rhode Island's herptofauna.
- By 2005, work with conservation partners, RI DEM, The Friends of the Refuges, and volunteers to identify opportunities to reduce amphibian and reptile road mortality during spring migration.
- By 2005, evaluate and incorporate recommendations (pending) made by Partners for Amphibian and Reptile Conservation (PARC) into refuge management, as warranted.
- By 2005, implement monitoring plan for the reptile and amphibian conservation areas identified in the University of RI study.

Objective 1.12

Protect, restore, and sustain rare plant sites on the refuge.

Background:

The Service has established new policy which provides guidance for maintaining and restoring, where appropriate, the biological integrity, diversity, and environmental health of refuges (FWS Manual, Chapter 3, part 601). One goal of the policy is to prevent the further loss of natural biological features and natural processes on refuges and within their respective landscapes. Included in this goal is the focus on sustaining native species and natural communities, such as those found under historic conditions, including single plant species or communities that may now be rare.

Several state listed species are found on Trustom Pond Refuge including wild coffee, hyssop-leaved hedge nettle, dragon's mouth orchid, Indian grass, sea pink, and wood lily.

- By 2005, develop, with partners, a management, inventory, and monitoring plan for the Trustom Pond Refuge sea pink and other rare plant sites. The plan will cover desired vegetation structure and composition, deer control, vegetation treatment methods (mechanical, prescribed fire, etc.), and additional research needs.
- By 2008, with the Service's New England Field Office, RI DEM, and other partners, assess the potential for establishing or restoring federal and state listed species such as seabeach amaranth, sandplain gerardia, bushy rockrose, New England blazing star, and other former candidate plant species with potential habitat on the refuge.

Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

Objective 2.1

Within three years of CCP completion, design and implement a baseline inventory on refuge lands to determine the occurrence of species and habitats of management concern (Appendix A), and to serve as a basis for future management decisions.

Background:

To keep the HMP relevant, we will need to improve our general knowledge of important refuge resources, including their presence, distribution, and condition, to insure management actions are sustaining biological integrity, diversity, and ecosystem health as required by Service policy (FWS Manual, Chapter 3, part 601).

As stated in the introduction for this chapter, a Species and Habitat Inventory and Monitoring Plan will be completed in 2004. The following strategies will be incorporated into this plan.

Strategies:

- By 2004, develop a priority list of baseline biological inventory needs to better understand and document the biodiversity on the refuge, especially the presence and distribution of species and habitat types listed in Appendix A. Aquatic resources of Trustom Pond are a survey priority.
- In 2004, begin inventories on the highest priority projects, incorporating results into the CENSUS database or other regional databases with GIS capabilities, to facilitate future analyses. Revise digital cover type maps as warranted.

Objective 2.2

Within 15 years of CCP implementation, maintain at least 145 acres as native, coastal sandplain grassland and shrubland (< 60 years old) to provide nesting habitat for landbirds of conservation concern such as bobolink, eastern meadowlark, and yellow breasted chat (PIF Plan, 10/00).

Background:

Refuge staff are actively involved in restoring native, coastal sandplain grassland and shrubland (< 60 years old) on the refuge. We are managing to restore native vegetative structure and composition and to maintain the natural physical components and processes associated with a coastal sandplain community. Since current habitat conditions are highly altered from natural, historic conditions, continuous evaluation of project effectiveness and an adaptive management response is imperative. All actively restored habitat areas are at least 40 acres in size. Ideally, we are working towards contiguous areas of 100 acres or larger to provide the greatest benefit to the widest diversity of grassland-dependent species.

With the 145 acres currently targeted, we expect to increase nesting habitat for bobolinks, yellow breasted chat, and eastern meadowlarks. Less likely, but very desirable, would be sustained nesting by grassland bird species which require larger habitat patches, such as upland sandpiper and grasshopper sparrow.

Desired native coastal sandplain grassland plant species include, but are not limited to: little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), common hairgrass (*Deshampsia flexuosa*), poverty-grass (*Danthonia spicata*), Pennsylvanian sedge (*Carex pennsylvanica*), rush (*Juncus Greenei*), wild indigo (*Baptisia tinctoria*), native asters (*Aster spp*), goldenrods (*Solidago spp.*), butterfly weed (*Asclepias tuberosa*), and dewberry (*Rubus hispidis* and *R. flagellaris*).

Desired native coastal sandplain shrub species include, but are not limited to: northern arrowwood (*Viburnum dentatum*), sumacs (*Rhus spp*), bayberry (*Myrica pennsylvanica*), high bush blueberry (*Vaccinium corymbosum*), and shadbush (*Amelanchier canadensis*).

Treatments to maintain these habitats includes the use of mechanical, prescribed fire, biological, and chemical herbicide treatments. All prescribed fires adhere to stipulations in the 1995 Fire EA. Mechanical treatments include brush hogging or hydroaxing woody vegetation, and discing, harrowing, plowing, packing, and drilling grassland fields. All herbicides used are on an approved Service list, and their use on the refuge is approved annually by the Regional Environmental Contaminants Specialist.

Strategies:

- By 2004, secure funding to complete restoration work on 145 acres on the refuge, and develop a maintenance and monitoring schedule for the project. Management tools include: mechanical manipulation (primarily brush hogging or hydroaxing woody vegetation, and discing, harrowing, plowing, packing, and drilling grassland fields), prescribed fire, biological controls, and chemical herbicide treatments. All treatments will be detailed in the HMP.
- By 2005, hire a second Maintenance Worker for the Refuge Complex to implement the habitat restoration programs for the refuges.
- By 2010, evaluate restoration acres as potential regal fritillary butterfly sites in consultation with the Service's Ecological Services Division.
- By 2015, 85% of the 145 acre restoration project should be dominated (% cover) by native grassland or shrubland (< 60 years old) species, with invasive species dominating less than 15% of the area. Target native species are identified above.

Objective 2.3

Augment refuge restoration projects and contribute to regional grassland conservation efforts by restoring and preserving at least 55 acres of privately owned grasslands adjacent to the refuge.

Background:

Native grasslands and grassland-dependent species are a concern because they are dramatically declining throughout the Northeast, especially large contiguous grasslands over 100 acres. The Refuge Complex offers relatively few areas on which to maintain large expanses of this habitat. As such, cooperative management on adjacent ownerships enhances the restoration work on the refuge by creating a larger complex for those grassland dependent species that require more than 50 acres of contiguous habitat.

Strategies:

- Continue the cooperative grassland habitat work on 40 acres of private land adjacent to the refuge. Utilize herbicide treatments, fertilizing, mowing, and some reseeding as needed with native grass-seed mixture for maintenance.
- By 2004, cooperate in the restoration of an additional 15 acres of farm field to a native grass-dominated community adjacent to Trustom Pond, using the same treatments described above.
- By 2008, implement a “cooperative extension” outreach program and develop materials to provide technical support for interested landowners and conservation partners. The program may also include on-the-ground assistance.

Objective 2.4

Increase protection and restoration of the 1.5 mile stretch of beach strand habitat on the refuge’s Moonstone Beach, and promote beach strand protection throughout South Shore communities.

Background:

Beach strand (also known as barrier beach) is one of the most imperiled habitat types on or adjacent to the Refuge Complex because of the combined impacts of development and recreation. Many species associated with this habitat type are either Federal- or state-listed as threatened or endangered due to the associated impacts of human disturbance and habitat loss. Management of these areas is extremely complex and controversial, especially when it includes restrictions on beach use. Protection, restoration, and enhancement of beach strand habitat and dependent species was identified as the number one priority in the Connecticut River/Long Island Sound Ecosystem Team Plan (July 1996).

Strategies:

- Each year, evaluate any opportunities to acquire beach strand property from willing sellers within our approved acquisition boundary. Beach strand habitat proximal to other undeveloped areas, or of a size and condition which would allow us to maintain or restore biological integrity, will continue to be the highest acquisition priority.
- By 2003, in combination with piping plover outreach and education, promote increased protection and stewardship of beach strand habitat through an intensive outreach and education campaign with the Friends of the Refuges and other partners to target beach front landowners, elected officials, and beach visitors.
- By 2003, hire two seasonal Park Aides to implement the project (same positions identified in objective 1.4).

Objective 2.5

Improve the water quality of Trustom Salt Pond and Cards Pond to maintain their significant wetland habitat values.

Background:

Trustom Pond is considered by many to be the “crown jewel” of the Refuge Complex. Its incredible resource values to shorebirds and waterfowl are well known. Past studies indicate that Trustom Pond has a very significant and diverse flora and fauna. However, both

Trustom and Cards ponds are experiencing very poor water quality, as evidenced by high nitrogen and fecal coliform bacteria levels. Algal blooms are prevalent in the summer.

These ponds have not been evaluated from an ecosystem perspective; we do not understand how the aquatic system functions and is influenced by the adjacent wetland and terrestrial communities. Past management actions, such as breaching, have benefitted some focal species, while adversely impacting others. We need to consider these tradeoffs, and other ecosystem processes and functions, in developing an integrated management plan.

Strategies:

- Continue to breach Trustom Pond approximately once per year to improve water quality and breach Cards Pond at the request of landowners, and as resources permit.
- By 2005, develop an ecosystem-based approach to managing Trustom Pond. Work with local experts, including RI DEM, CRMC, and the University of RI, to identify the natural coastal formation processes and dynamism that shaped the pond, and its relationship to various focus species, including piping plover. Also, as part of the planning process:
 - Evaluate potential for creating additional shorebird habitat through mechanical dune scarification and other techniques, along with the frequency and timing of breaching on Trustom Pond Refuge (refer to Piping Plover Recovery Plan tasks 1.242 and 1.243).
 - Investigate other potential strategies for managing the Trustom Pond breachway to maximize habitat benefits for piping plover, least tern, wintering waterfowl, and anadromous fisheries.
 - Utilize the 1999 piping plover nesting capacity habitat assessment and historical use data to evaluate habitat potential.
 - Evaluate impacts to water quality, submerged aquatic vegetation, and aquatic invertebrates, all important for wintering waterfowl.
 - Identify an implementation schedule for the proposed projects.

Objective 2.6

Within three years of CCP completion, treat at least 5 acres/year dominated by invasive, non-native plants to (1) enhance native habitat, (2) eliminate new invasions, and (3) control the spread of established plants.

Background:

Issue 6 in Chapter 1 describes the implications of invasive plants on the refuges. These plants are a threat because they displace native plant and animal species, degrade wetlands and other natural communities, and reduce natural diversity and wildlife habitat values. They outcompete native species and can readily dominate a site. Early detection and consistent efforts at eradication are critical to maintain control over affected areas, or to prevent new invasions.

Strategies:

- By 2004, identify and map current distribution of invasive, non-native plant species on the refuge.
- By 2005, prioritize treatment sites to prevent new invasions or eradicate recently established plants. Also of high priority are threatened, endangered, or rare plant sites or “pristine rare and exemplary vegetative communities” (March 1999 Invasive Plant Control Initiative, Strategic Plan for the Connecticut River Watershed/Long Island Sound).
- By 2005, establish a program to treat at least 5 acres/year on the refuge using chemical, mechanical, prescribed fire and biological treatments as necessary. Strategies will be adapted based on monitoring and new information. A maintenance worker will be hired to administer treatments; this position will be shared among the other Rhode Island refuges.

Objective 2.7

Within 15 years of CCP completion, eliminate mute swan productivity on the refuge, and reduce the presence of adults year-round.

Background:

Non-native, invasive mute swan on the refuge adversely effect water quality on coastal ponds. Mute swan also impact our ability to maintain native biodiversity, as they aggressively drive native waterfowl and shorebirds away from nesting sites and compete with them for food.

Strategies:

- In 2002, we will begin to implement the Service’s policy (Memo FWS/MBMO/98-00043; based on Flyway Council recommendations) to significantly reduce or eliminate mute swans on the refuge. Strategies will be adapted as needed to pursue zero productivity. Each year, addling eggs will continue. Adult populations will be controlled using lethal and non-lethal techniques, particularly when habitat degradation is a concern, or if native species are displaced.

Objective 2.8

Within two years of CCP completion, develop a deer management plan for the Refuge Complex to address overabundant deer populations and evaluate recreational hunting opportunities.

Background:

Overabundant deer numbers are a concern on the refuge when they degrade habitat through excessive browsing or threaten human health and safety through increased vehicle collisions and incidences of Lyme disease. Since deer are highly mobile, it is difficult to effectively control a population unless they are managed throughout most or all of their range. The refuge has not closely monitored deer activities, including their impacts to refuge habitats. However, RI DEM has reported that complaints from citizens have increased in recent years about private property damage, worries of Lyme disease, and vehicle collisions. RI DEM recommends hunting as the most effective tool to manage deer populations on the refuge.

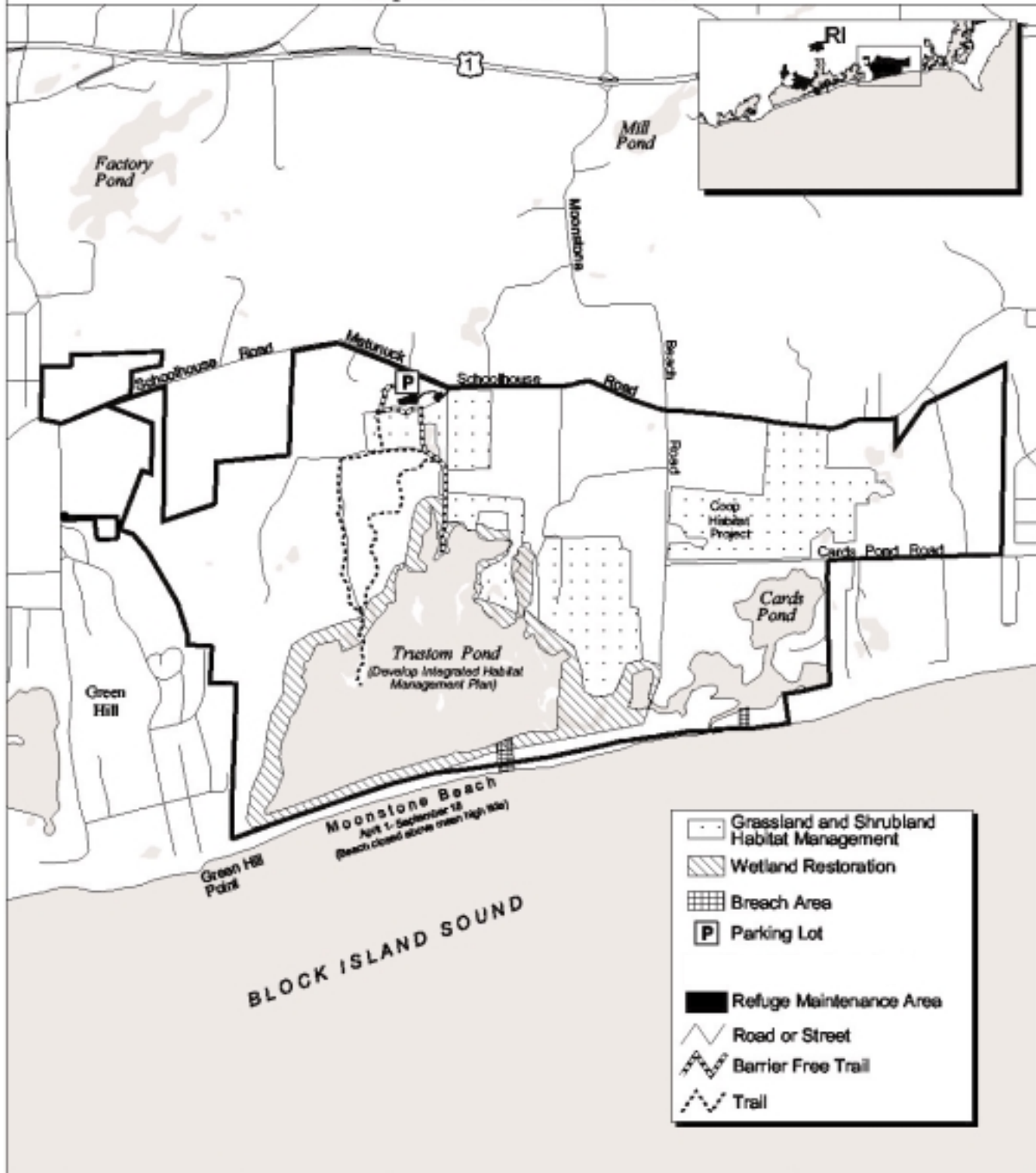
Strategies:

- In 2002, cooperate with RI DEM to develop a deer management plan and environmental assessment for the Refuge Complex. The plan will evaluate hunting to help manage deer numbers and provide a priority public use opportunity. A separate public involvement process will be initiated.

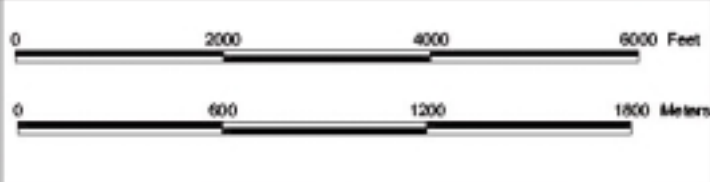
Trustom Pond National Wildlife Refuge

Habitat Improvements

Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Roads & Hydrography
 All other data provided by USFWS, RI028
 & So. New England's Right Coastal Program
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 June 2003
 Refuge boundary has been modified for clarity.
 Not to be used for legal purposes.



Goal 3: Establish a land protection program that fully supports accomplishment of species, habitat, and ecosystem goals.

Objective 3.1

Actively strive towards permanent protection of all trust resources at risk throughout southern Rhode Island.

Background:

Consistently mentioned in the PIF Area 9 Plan, the NAWMP, Joint Venture Plans, relevant Species Recovery Plans, and Ecosystem Plans is the need to protect, restore, and enhance additional high quality coastal habitats to contribute to the conservation of federal trust species. While land acquisition by the Service and other state, federal, and local partners is a primary strategy for species conservation, each of these plans also recognizes the need to work in cooperation with private landowners to achieve conservation objectives. Technical and resource support, outreach, and education will all compliment Service land acquisition efforts.

The Draft CCP/EA (Chapter 3: Developing Land Protection Strategies) described our method of identifying acquisition lands of high conservation priority on Rhode Island's South Shore. During the planning process we determined that the Service is the logical leader in coastal land and water quality protection along the South Shore and on Block Island, with the existing refuges serving as anchors. Refuge expansions will significantly increase protection of the ecological values on current refuge lands, while also expanding protection and restoration of significant coastal habitats. We completed a Land Protection Plan for the Refuge Complex which identifies specific tracts for Service acquisition. The LPP incorporates the following acquisition priorities:

- Has documented occurrences of federally listed endangered or threatened species, or other priority federal trust resources;
- Lies contiguous to existing refuge land, which could further enhance or protect the integrity of refuges by assembling the land base necessary to accomplish refuge goals;
- Connects refuge land with other protected lands within the South Shore and Block Island to help restore and promote the ecological integrity of the coastal wetland and beach strand complexes; and
- Protects and sustains important natural communities that can be managed in cooperation with other conservation partners in a manner that will contribute toward refuge goals and the conservation of federal trust resources.

Strategies:

- Continue to assist conservation partners in identifying land protection needs, opportunities, and priorities in southern Rhode Island.
- Continue to help partners seek funding sources for their land protection programs.
- Beginning in 2002, expand the refuge acquisition boundary for Trustum Pond Refuge by the acreage approved in the Land Protection Plan (Appendix E). Initiate acquisition from willing sellers, in either fee purchase or conservation easement, as identified in the LPP, of 1,536 acres of high quality habitat.

Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

Integral to all of our public use objectives is development of a Visitor Services Plan in 2004 for the Refuge Complex. This plan will provide a coordinated strategy for implementing quality visitor services programs. We will emphasize the following six priority, wildlife-dependent uses identified in the 1997 Refuge Improvement Act where they are compatible with protecting wildlife resources: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The Visitor Services Plan will also accomplish the following:

- Establish strategic goals and priorities for Visitor Services across the Refuge Complex;
- Identify target audiences and partnership opportunities for each refuge;
- Establish a methodology for determining visitor numbers, capacity limits, limits on visitor impacts to wildlife and habitats, and a means for assessing quality of visitor experiences;
- Evaluate recreational fee opportunities; and
- Establish an implementation schedule for priority Visitor Service's projects.

We will hire four outdoor recreation planners to implement the Visitor Services Plan and staff the planned Refuge Complex Visitor Center (see Chapter 5- Staffing). As new lands are acquired, opportunities to provide compatible, priority public uses will be pursued, following guidance in the Pre-acquisition Compatibility Determination (Appendix D).

The objectives below are designed to enhance existing, compatible, wildlife-dependent refuge activities.

Objective 4.1

Provide high quality surf fishing opportunities along the refuge's Moonstone Beach shoreline, while minimizing impacts to natural resources.

Strategies:

- Continue to allow surf fishing from refuge shoreline on the Atlantic Ocean from September 16 to March 31, in accordance with State regulations. This open season falls outside the piping plover nesting season and shorebird migrating season (April 1 to September 15). No vehicles are allowed on the beach year-round.
- Continue to keep Trustom Salt Pond closed to fishing year-round to maximize its use as a breeding, nesting and resting area for migratory, resident, and wintering waterfowl and shorebirds.

Objective 4.2

Increase opportunities for high quality interpretive experiences on the refuge to raise visitor awareness of the Refuge System and Trustom Pond Refuge's particular contribution to protecting federal trust resources and significant habitats.

Strategies:

- Continue to maintain the two existing kiosks, updating information to keep it relevant and current.
- Volunteers will continue to staff the Visitor Contact Station and conduct interpretive programs.
- By 2005, develop an interpretive program tiered to the Visitor Services Plan.
- By 2005, develop self-guided trail literature and construct interpretive signs for the habitat restoration project, barrier beach, and salt pond ecology.

Objective 4.3

Improve opportunities for high quality wildlife observation and photography on the refuge, while minimizing impacts to natural resources.

Strategies:

- Annually maintain the current two-trail system with one trail head and kiosk. Also, maintain the three observation platforms, two of which are on Trustom Salt Pond. Foot travel, snowshoeing, and cross country skiing are allowed in support of priority public uses.
- In 2003, eliminate unnecessary or redundant trails, or portions of trails, and restrict public use to designated trails only.
- By 2005, reconstruct Otter Point Trail to provide barrier-free access. At least one existing platform accessed by this trail will be made barrier-free. We will also develop a watchable wildlife pamphlet and species checklist.
- By 2008, evaluate opportunities to construct two barrier free photo blinds. If feasible, begin construction by 2010.

Objective 4.4

Maintain the existing, annual waterfowl hunting opportunity on a 20-acre upland field on the refuge, and evaluate opportunities for deer hunting on the refuge in 2002.

Strategies:

- Continue to allow RI DEM to administer a waterfowl hunt on 20 upland acres south of Matunuck Schoolhouse Road and east of Moonstone Beach Road.
- Continue to manage habitat in the hunt area, as outlined in a 1999 habitat management plan completed by RI DEM, but change seed mixture to produce native, cool season grasses. Annually review the plan and adapt strategies as needed to provide a high quality hunt.
- In 2002, complete a deer management plan and environmental assessment evaluating opportunities for deer hunting. A separate public involvement process will be initiated. (Also refer to objective 2.8)

Objective 4.5

Increase opportunities for high quality environmental educational experiences on the refuge, while minimizing impacts to natural resources.

Strategies:

- Volunteers will continue environmental education at the mock piping plover nest enclosure, barrier beach, and farm pond. Maintain these sites and their materials for use each year. Continue to work with the Friends Group to develop a barrier beach education kit for teachers.
- Continue to sponsor at least one "Teach the Teacher" workshop annually.
- By 2005, with partners, develop an environmental education program tiered to the Visitor Services Plan. Work with local schools to develop a curriculum associated with the existing outdoor farm pond and barrier beach classroom sites. Improve these outdoor classroom facilities to promote their use.
- By 2010, develop other curriculum-based, outdoor programs featuring coastal salt pond ecology and habitat restoration. A volunteer environmental education corps, to be shared with Ninigret Refuge, will help with implementation.

Objective 4.6

Within three years of CCP implementation, eliminate incompatible, non-wildlife dependent public uses on the refuge.

Background:

Incompatible, non-wildlife dependent activities detract from our ability to fulfill refuge purposes and often conflict with other management priorities. None of these uses are necessary for the safe, practical, or effective conduct of a priority public use, and in fact, are often disruptive to priority public uses. Limited refuge resources should not be expended to manage activities that do not contribute to the public's understanding and appreciation of the refuge's wildlife or cultural resources, or to activities that do not directly benefit these resources.

Strategies:

- By 2004, increase resource protection and management of public use by utilizing law enforcement personnel to provide more consistent and thorough outreach and enforcement of refuge regulations. In particular, the following activities will be targeted on refuge lands: violations of Moonstone Beach seasonal closure, swimming and sunbathing, bike riding, horseback riding, use of ORVs, and kite flying.
- By 2004, hire at least one additional law enforcement officer for the Refuge Complex.

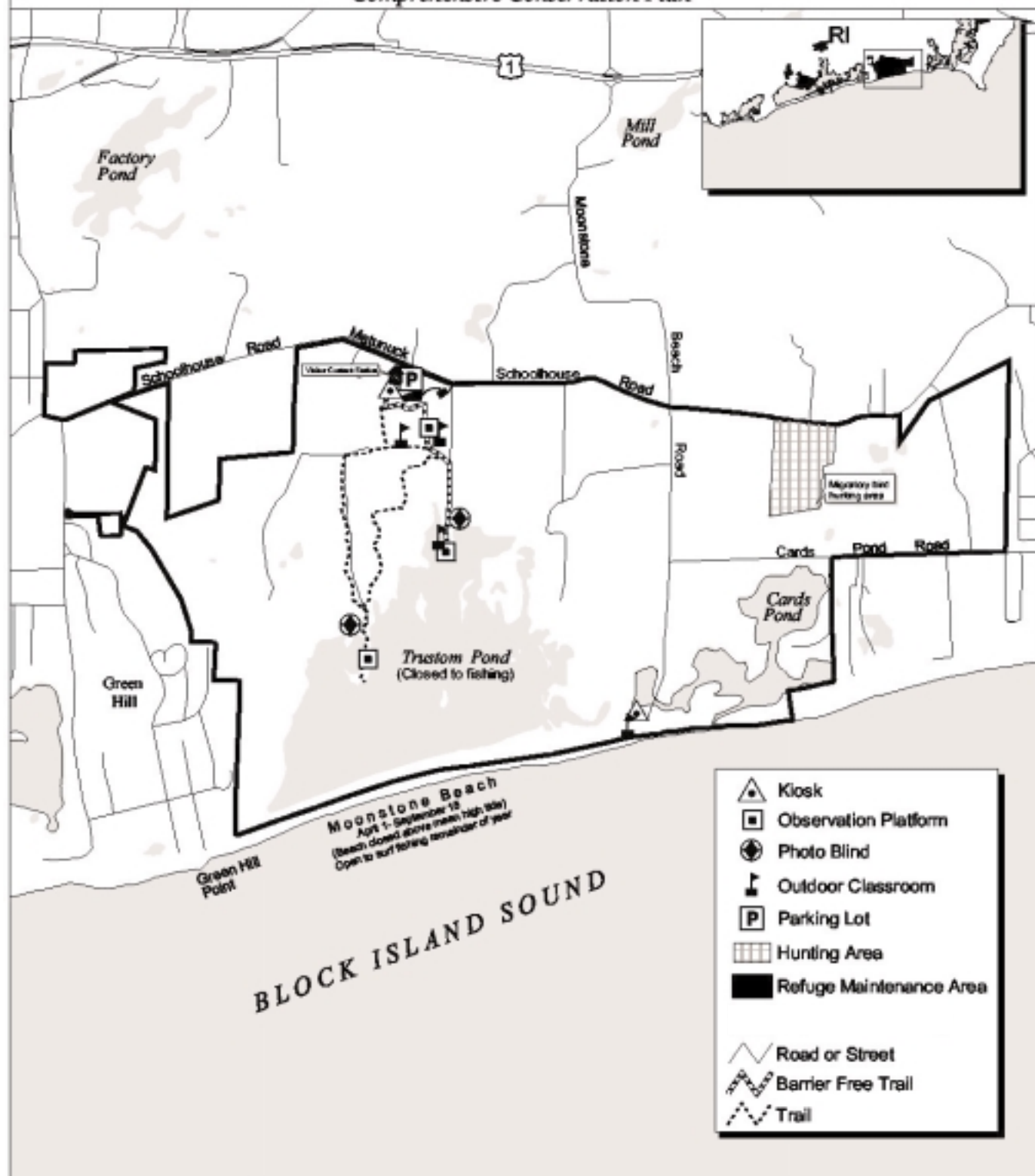
Goal 5: Provide refuge staffing, operations, and maintenance support to effectively accomplish refuge goals and objectives.

Staffing, operations, and maintenance needs are addressed in Chapter 5.

Trustom Pond National Wildlife Refuge

Public Use

Comprehensive Conservation Plan

**Data Sources:**

USGS 1:24,000 Roads & Hydrography
 All other data provided by USFWS, RI/OB
 & So. New England/WV Right Coastal Program.

Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 June 2002.

Refuge boundary has been modified for clarity.
 Not to be used for legal purposes.



General Refuge Management Direction

The following management direction applies to all of the refuge goals and across all program areas. Some of this direction is required by Service policy or legal mandates.

Maintaining Biological Integrity, Diversity, and Environmental Health

The Service finalized its policy on Maintaining the Biological Integrity, Diversity, and Environmental Health of the National Wildlife Refuge System in January 2001 (FWS manual, Part 601, Chapter 3). This policy directs us, first and foremost, to maintain existing levels of biological integrity, diversity, and environmental health on refuges. Secondarily, we will restore lost or severely degraded elements of integrity, diversity, and environmental health on refuges where it is feasible and supports refuge purpose(s). To implement the policy on refuges, refuge managers are directed to determine: each refuge's relationship between refuge purpose(s) and biological integrity, diversity, and environmental health; what conditions constitute biological integrity, diversity, and environmental health; how to maintain existing levels of all three; and how, and when to restore lost elements of all three (Chapter 3, section 3.9).

The objectives and strategies laid out in this CCP generally improve the biological integrity, diversity, and environmental health of the refuge. Management actions emphasize maintaining current species and habitat diversity, recovering endangered and threatened species, and restoring natural ecosystem processes and functions. Implementation of the CCP will increase our understanding of the refuge's current resources, sustainable natural conditions, and the effects of our management actions. In addition, our strategy of adaptive management will provide continuous improvement toward meeting this policy's intent.

Protecting and Managing Cultural Resources

By law, we must consider the effects of our actions on archeological and historic resources. We will comply with Section 106 of the National Historic Preservation Act before disturbing any ground. Compliance may require any or all of the following: a State Historic Preservation Records survey, literature survey, or field survey.

In addition to basic compliance requirements, we will undertake the following projects to better protect and interpret cultural resources on the refuge:

- By 2005, initiate a cultural resources overview of the Refuge Complex to increase the available data on cultural resources.
- Also by 2005, develop a Memorandum of Understanding (MOU) with the Narragansett Indian Tribal Council to facilitate cooperation on environmental education and interpretation, to improve our understanding of the context of natural resources, and to increase site identification and protection.
- By 2006, train at least one law enforcement officer on the refuge in regulations associated with the Archeological Resources Protection Act (ARPA).

Tribal Coordination

Increasing communication with the Narragansett Indian Tribal Council is very important for the Refuge Complex. As noted above, we plan to develop an MOU by 2005 to establish a mutually beneficial working relationship that includes cooperating in environmental education and interpretation and protecting cultural resources.

Coastal Resources Management Council Coordination

The federal Coastal Zone Management Act (16 U.S.C. §1451, as amended) requires the Service to work with the State Coastal Resources Management Council (CRMC) to insure refuge programs and activities are consistent to the maximum extent practicable with the enforceable policies adopted by the state. The CRMC's concurrence with the Service's Federal Consistency Determination on the CCP was predicated on meeting the following management direction:

- 1) **Provide Separate Consistency Determinations for Major Construction Projects.** Major construction projects such as buildings, parking lots, roads, and boardwalks, which the Service determines may effect coastal resources, will require separate federal consistency determinations for each project.
- 2) **Annual Coordination Meetings.** Refuge Complex and CRMC staff will meet at least once annually to review general plans and projects which the Service has determined may effect coastal resources. These meetings will cover proposals for the forthcoming calendar year. The objective of these meetings will be to provide CRMC staff with available details on what is being proposed and to address their concerns. It is mutually understood that some projects may not be fully developed at the time of meeting.

Refuge Revenue Sharing Payments

Annual refuge revenue sharing payments to the Town of South Kingstown will continue. Future increases in payments will be commensurate with increases in the appraised fair market values of refuge lands, new acquisitions of land, and new Congressional appropriations.

Contaminant Sites Remediation

The obvious concerns with human health and safety, and impacts to wildlife from contaminants, requires timely and thorough remediation of contaminated sites. Refuge Complex staff will continue coordinating with the Environmental Protection Agency (EPA), Rhode Island Department of Environmental Management (RI DEM), Army Corps of Engineers (ACOE), or delegated authorities, to finalize remediation plans and begin cleaning up the farm dump site on Trustom Pond Refuge.

Controlling Mosquitos

Within the past few years, incidences of mosquito-borne Eastern Equine Encephalitis and West Nile virus have elevated public health concerns about mosquito control in the Middle Atlantic States. Mosquito control has been very limited on the Refuge Complex, and has occurred only at the direct request of the State's Mosquito Abatement Office. During the last 5 years, we used two very localized applications of the larvicide Bti on two problem breeding sites. Our Regional Contaminants Specialist pre-approved those applications.

In general, we will not use larvicides on the Refuge Complex to control mosquitos. However, in cooperation with neighboring towns and the Mosquito Abatement Office, we will consider applying larvicides on a case-by-case basis, when there is an elevated public health risk. The Service is now evaluating this issue on a regional basis, and has begun preparation for an environmental impact statement. This may result in Service policy or Regional guidelines being developed and incorporated into this CCP in the future.

Permitting Special Use (including Research)

Requests for special use permits will be evaluated by the Refuge Manager on a case-by-case basis. All permitted activities must be determined appropriate and compatible through a compatibility determination. At a minimum, all commercial activities and all research projects require a special use permit. Research projects that will improve and strengthen natural resource management decisions on the Refuge Complex will generally be approved. The refuge manager will encourage partnerships with local universities and colleges to facilitate research that will help evaluate CCP objectives and strategies, or the assumptions on which they are based.

The refuge manager may also consider research not directly related to refuge objectives, but which contributes to the broader enhancement, protection, or management of native species and biological diversity within the region.

Each refuge will maintain a list of research needs to provide prospective researchers or organizations upon request. The refuge manager will determine on a case-by-case basis whether they can directly support a project through funding, in-kind services (e.g. housing or use of other facilities), field assistance, or through sharing data and records. Research results will be shared within the Service, and with RI DEM.

All researchers on refuges, current and future, are required to submit a detailed research proposal following Service policy in the FWS Refuge Manual, Chapter 4 Section 6. Special use permits must also identify a schedule for progress reports (at least annual), criteria for determining when a project should cease, and publication or other final reporting requirements. The Regional Refuge Biologists, other Service divisions, and state agencies will be asked to review and comment on research proposals.

Some projects, such as depredation and banding studies, require additional Service permits. These projects will not be approved until all Service permits and Endangered Species Act consultation requirements are met. Also, to maintain the natural landscape of the refuge, projects which require permanent or semi-permanent structures will not be allowed, except under extenuating circumstances unforeseen at this time.



Trustom Pond in winter

USFWS photo

Implementation and Monitoring

- Refuge Complex Staffing
- Refuge Complex Funding
- Step-down Management Plans
- Partnerships
- Volunteer Program
- Monitoring and Evaluation
- Adaptive Management
- Compatibility Determinations
- Additional NEPA Analysis
- Plan Amendment and Revision

Refuge Complex Staffing



Mowing. USFWS photo.

The five Rhode Island Refuges are managed as a Refuge Complex, with centrally stationed staff taking on duties at multiple refuges. A total of 26 full time personnel, one Student-to-Career Experience Program (SCEP) trainee, and 17 seasonal personnel, are needed to fully implement all five Refuge CCPs. Permanent staff serving all five refuges may be stationed at the Refuge Headquarters in Charlestown, RI, or at Sachuest Point Refuge in Middletown, RI. Some permanent and temporary staff may be stationed seasonally on Block Island Refuge. Appendix G identifies currently filled positions, recommended new positions, and the overall supervisory structure. The new positions identified will increase visitor services, biological expertise, and visibility of the Service on refuge lands.

Refuge Complex Funding

Successful implementation of the CCPs for each refuge relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Full implementation of the actions and strategies in all five Refuge Complex CCPs would incur one-time costs of \$8.9 million. This includes staffing, major construction projects, and individual resource program expansions. Most of these projects have been identified as Tier 1 or Tier 2 Projects in the National Wildlife Refuge System's Refuge Operations Needs System database (RONS). Appendix F lists RONS projects and their recurring costs, such as salaries, following the first year. Also presented in Appendix F is a list of projects in the Service's current Maintenance Management System (MMS) database for the Refuge Complex. Currently, the MMS database lists \$3.85 million in maintenance needs for the Refuge Complex.

Land acquisition costs are identified separately. The Land Protection Plan (LPP, Appendix E) expanded the Refuge Complex acquisition boundary by 2,681 acres, increasing the total unacquired acreage to 3,130. We estimate the value of these lands to be \$83 million at current, fair-market prices. In all probability, the Refuge Complex will protect these lands at a lower cost, as some parcels may be protected through conservation easements or acquired through donation or land exchange.

Step-Down Management Plans

The Refuge System Manual (Part 4 Chapter 3) lists more than 25 Step-Down Management Plans generally required on most refuges. Step-down plans describe specific management actions a refuge will follow to achieve objectives or implement management strategies. Some require annual revision, others are revised on a 5- to 10-year schedule. Some require additional NEPA analysis, public involvement, and compatibility determinations before they can be implemented. A status list of Rhode Island Refuge Complex step-down plans follows.

These plans are current :

- Fire Management Plan, 1995 (Refuge Complex); updated with annual burn plans
- Grasslands Management Plan, 1994 (Trustom Pond Refuge); will be incorporated into the Habitat Management Plan for the Refuge Complex in 2003
- Continuity of Operations Plan, 1998 (Refuge Complex)
- Animal Control Plan, 1995 (Refuge Complex); will be updated with Integrated Predator Management and Trapping Plans for the Refuge Complex

These plans are now in draft form or being prepared:

- Safety Program and Operations Plan (Refuge Complex)
- Law Enforcement Plan (Refuge Complex)

These plans exist, but we consider them out-of-date and needing revisions as indicated:

- Water Management Plan (Trustom Pond Refuge); incorporate into Habitat Management Plan by 2006
- Hunting Plan (Trustom Pond Refuge); incorporate into Hunt Plan for the Refuge Complex in 2003
- Sign Plan (Refuge Complex); expand to Facilities and Sign Plan by 2005
- Croplands Management Plan (Trustom Pond Refuge); incorporate into Habitat Management Plan for Refuge Complex in 2003

These step-down plans need to be initiated and will be completed by the indicated dates:

- Refuge Complex Habitat Management Plan (highest priority step down plan) in 2003
- Refuge Complex Hunt Plan in 2003
- Refuge Complex Species and Habitat Inventory and Monitoring Plan in 2004
- Integrated Predator Management Plan in 2004
- Refuge Complex Visitor Services Plan in 2004
- Fishing Plan by 2005
- Trapping Plan by 2004

Partnerships

The Refuge Complex staff is proud of its long history of partnerships. More than 45 partnerships have supported the refuges, including four universities and colleges, numerous departments within Rhode Island State government, town administrations, conservation commissions, school districts, conservation groups and land trusts, environmental education centers, historic preservation groups, adjacent landowners, and other federal agencies. These partnerships have resulted in

biological research, cooperative management of threatened and endangered species and declining habitats, protection of open space, and environmental education programs.

Refuge staff were particularly delighted by the establishment in 1998 of a “Friends of the National Wildlife Refuges of Rhode Island” group. The Friends are a non-profit advocacy group dedicated to supporting Refuge Complex goals within the community through public education and interpretation, project funding, and volunteer coordination. Their mission is “...[to be] devoted to the conservation and development of needed healthy habitat for flora and fauna at the National Wildlife Refuges of Rhode Island and to the provision of a safe, accessible ecological experience for our visitors....”

We will strengthen and formalize refuge partnerships to promote coordinated management and facilitate sharing of resources. Our partnership with the Friends Group is vitally important to us for community relations and for support in implementing our resource programs. Partnerships help us build support for the refuge, facilitate the sharing of information, and supplement the efforts of refuge staff.

Strategies:

- By 2002, we will conduct at least semi-annual meetings with the Friends Group to promote communication and evaluate implementation of the MOU. We will continue to actively support and promote the Friends Group’s vital efforts in funding and implementing outreach and environmental education programs, which enhance our ability to meet refuge goals.
- By 2005, develop formal agreements with current partners, such as the South County Tourism Council, local land trusts, and conservation organizations, to identify mutual goals, and opportunities for cost sharing, technical exchange and environmental education and interpretation.

Volunteer Program

Volunteers are vital to accomplishing all Refuge Complex goals. For example, in fiscal years 2000 and 2001, volunteers donated 9,332 and 10,000 hours respectively, assisting in environmental education programs, monitoring public use, maintaining facilities, and managing habitats. This translates to more than \$110,000 worth of services contributed to the refuges in 2000 and \$117,900 in 2001. Volunteers are also largely responsible for staffing the visitor contact station at Trustom Pond Refuge.

In 1999 we hired a permanent staff Volunteer Coordinator to improve the quality of the program through better coordination, supervision and training of volunteers, and to better integrate volunteers into all refuge programs. The coordinator compiles and distributes a quarterly newsletter to volunteers, refuge partners, and interest groups, keeping them informed about management activities and upcoming interpretive programs on the Refuge Complex.

Maintaining Existing Facilities

Periodic maintenance of existing facilities is critical to ensure safety and accessibility for Refuge Complex staff and visitors. Existing facilities include the Trustom Pond Refuge visitor contact station, Refuge Complex maintenance compound, and numerous parking areas, observation platforms, and trails. Many of these facilities are not currently Americans With Disabilities Act (ADA) compliant; upgrading is needed. Appendix F displays the fiscal year (FY) 2000 Maintenance Management System (MMS) database list of backlogged maintenance entries for the Refuge Complex.

We will also undertake the following strategies to improve the visibility of the Service:

- By 2003, meet with RI DOT to modify existing U.S. Route 1 directional signs. At a minimum, propose changes to the existing sign directing visitors “To Moonstone Beach”.
- By 2005, complete construction of the Visitor Center/Headquarters for the Refuge Complex, implementing recommendations for interior facility design from the August 1999 Project Identification Document. At least one Visitor Services Specialist will be hired to administer the new facility.
- By 2005, complete a Refuge Complex Facilities and Sign Plan.

Monitoring and Evaluation

Monitoring and Evaluation for this CCP will occur at two levels. The first level, which we refer to as implementation monitoring, responds to the question, “Did we do what we said we would do, when we said we would do it?” Annual implementation monitoring will be achieved by using the checklist in Appendix H for the Refuge Complex.

The second level of monitoring, which we refer to as effectiveness monitoring, responds to the question, “Are the actions we proposed effective in achieving the results we had hoped for?” Or, in other words, “Are the actions leading us toward our vision, goals, and objectives?” Effectiveness monitoring evaluates an individual action, a suite of actions, or an entire resource program. This approach is more analytical in evaluating management effects on species, populations, habitats, refuge visitors, ecosystem integrity, or the socio-economic environment. More often, the criteria to monitor and evaluate these management effects will be established in step-down, individual project, or cooperator plans, or through the research program. The Species and Habitat Inventory and Monitoring Plan, to be completed in 2004, will be based on the needs and priorities identified in the Habitat Management Plan.

Adaptive Management

This CCP is a dynamic document. A strategy of adaptive management will keep it relevant and current. Through scientific research, inventories and monitoring, and our management experiences, we will gain new information which may alter our course of action. We acknowledge that our information on species, habitats, and ecosystems is incomplete, provisional, and subject to change as our knowledge base improves.



Predator enclosure fencing.

USFWS photo.

Objectives and strategies must be adaptable in responding to new information and spatial and temporal changes. We will continually evaluate management actions, through monitoring or research, to reconsider whether their original assumptions and predictions are still valid. In this way, management becomes an active process of learning “what really works”. It is important that the public understand and appreciate the adaptive nature of natural resource management.

The Refuge Manager is responsible for changing management actions or objectives if they do not produce the desired conditions. Significant changes may warrant additional NEPA analysis; minor changes will not, but will be documented in annual monitoring, project evaluation reports, or the annual refuge narratives.

Compatibility Determinations

Federal law and policy provide the direction and planning framework to protect the Refuge System from incompatible or harmful human activities and to insure that Americans can enjoy Refuge System lands and waters. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, is the key legislation on managing public uses and compatibility.

Before activities or uses are allowed on a National Wildlife Refuge, we must determine that each is a “compatible use.” A compatible use is a use that, based on the sound professional judgement of the Refuge Manager, “...will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.” “Wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety. Except for consideration of consistency with State laws and regulations as provided for in section (m), no other determinations or findings are required to be made by the refuge official under this Act or the Refuge Recreation Act for wildlife-dependent recreation to occur.” (Refuge Improvement Act)

Compatibility determinations were distributed (in the draft CCP/EA) for a 51 day public review in early 2001. These determinations have since been approved, and will allow the continuation of the following public use programs: wildlife observation and photography, environmental education and interpretation, fishing, and hunting. A pre-acquisition compatibility determination was also reviewed and completed, and identifies which existing public uses would be allowed to continue on new properties acquired by the Refuge complex. Since releasing the draft CCP/EA, we have also distributed compatibility determinations for trapping and waterfowl hunting for a public

review period. All comments were considered and utilized in the revision. These new compatibility determinations are now final and included in Appendix D.

Additional compatibility determinations will be developed when appropriate new uses are proposed. Compatibility determinations will be re-evaluated by the Refuge Manager when conditions under which the use is permitted change significantly; when there is significant new information on effects of the use; or at least every 10 years for non-priority public uses. Priority public use compatibility determinations will be re-evaluated under the conditions noted above, or at least every 15 years with revision of the CCP. Additional detail on the compatibility determination process is in Parts 25, 26, and 29 of Title 50 of the Code of Federal Regulations, effective November 17, 2000.

Additional NEPA Analysis

The National Environmental Policy Act requires a site-specific analysis of impacts for all federal actions. These impacts are to be disclosed in either an EA or Environmental Impact Statement (EIS).

Most of the actions and associated impacts in this plan were described in enough detail in the draft CCP/EA to comply with NEPA, and will not require additional environmental analysis. Although this is not an all-inclusive list, the following programs are examples that fall into this category: protecting piping plover, restoring area-defined grasslands and wetlands, implementing priority wildlife-dependent public use programs (except deer hunting), acquiring land, and controlling invasive plants.

Other actions are not described in enough detail to comply with the site-specific analysis requirements of NEPA. Examples of actions that will require a separate EA include: construction of a new visitor center and headquarters, new deer hunting opportunities, and future habitat restoration projects not fully developed or delineated in this document. Monitoring, evaluation, and research can generally be increased without additional NEPA analysis.

Plan Amendment and Revision

Periodic review of the CCP will be required to ensure that objectives are being met and management actions are being implemented. Ongoing monitoring and evaluation will be an important part of this process. Monitoring results or new information may indicate the need to change our strategies.

The Service's planning policy (FWS Manual, Part 602, Chapters 1, 3, and 4) states that CCPs should be reviewed at least annually to decide if they require any revisions (Chapter 3, part 3.4 (8)). Revisions will be necessary if significant new information becomes available, ecological conditions change, major refuge expansions occur, or when we identify the need to do so during a program review. At a minimum, CCPs will be fully revised every 15 years. We will modify the CCP documents and associated management activities as needed, following the procedures outlined in Service policy and NEPA requirements. Minor revisions that meet the criteria for categorical exclusions (550 FW 3.3C) will only require an Environmental Action Statement.

