

## Chapter 4



USFWS

*Nekton sampling in refuge shallow estuarine habitats*

# Management Direction and Implementation

- Introduction
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- Refuge Goals, Objectives, and Strategies
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## Introduction

This comprehensive conservation plan includes an array of management actions that, in our professional judgment, work toward achieving the purposes of the refuge, its vision and goals, and state and regional conservation plans. In our opinion, it will effectively address the key issues, and is both reasonable and practicable.

In all program areas, this CCP will enhance the quality and sustainability of current resource programs, develop long-range and strategic step-down plans, promote partnerships, and preserve, manage, and restore habitat.

## Relating Goals, Objectives, and Strategies

We presented our goals in chapter 1. This chapter details them further into objectives and strategies. We considered a range of possible management objectives that would help us meet our goals. Essentially, objectives are incremental steps we take to achieve a goal; they further define the management targets of each goal in measurable terms. Objectives provide the basis for determining more detailed strategies, monitoring refuge accomplishments, and evaluating our successes. Service guidance in “Writing Refuge Management Goals and Objectives: A Handbook” (November 2003), recommends that objectives possess five properties: (1) Specific, (2) Measurable, (3) Achievable, (4) Results-oriented, and (5) Time-fixed.” Their initials form the acronym “SMART.”

The objectives we considered ranged from those that require only minimum levels of funding and staffing to those that require considerable increases in funding, staffing, and developing infrastructure and partnerships. Some of them relate directly to managing habitat, while others relate to meeting population targets tied to species recovery or other regional plans. We developed them in collaboration with other New England refuges in a habitat management plan (HMP). This chapter also describes that process.

We include a rationale in every objective, so you can understand its context and why we consider it important. We will use the objectives in this CCP in writing refuge step-down plans, including its habitat management plan. We will measure our success by how well we achieve those objectives.

Finally, we developed strategies for each objective. Strategies are specific actions, tools, techniques, considerations, or a combination of those, which we may use in achieving the objectives. Most likely, we will carry them over directly into subsequent, step-down plans; but, we may revise some of them in the process of developing those plans. Unless otherwise noted, refuge staff will implement all of the actions described in this chapter, assuming that appropriate staffing is available.

## General Refuge Management

We primarily developed our management direction hierarchically from goals to objectives and strategies. However, we also found that many actions we wanted to highlight either relate to multiple goals or represent general administrative or compliance activities. We present them in this section.

## Habitat Management Plan

A habitat management plan (HMP) for the refuge is the first step in achieving the objectives under goals 1 through 3. For example, it establishes what specific strategies are necessary to enhance, restore, and manage important habitats and minimize impacts on significant species assemblages.

It also describes the timing of those actions, and identifies how we will measure our success. We drafted a HMP at the same time as the CCP so their habitat objectives would be consistent. We are still developing specific habitat prescriptions for each management unit of the refuge. However, appendix E includes the range of management prescriptions that the refuge likely will use during the 15-year periods of the CCP and HMP.

**Inventory and Monitoring Plan**

Completing an inventory and monitoring plan (IMP) for the refuge is also a priority. That plan is vital for measuring our success in meeting our objectives. It will outline the methods we will use to assess whether our original assumptions and proposed management actions are, in fact, supporting our habitat and species objectives. The results of our inventory and monitoring will provide more extensive information on the status of refuge wildlife and habitats and allow more informed management decisions.

**Fire Management Plan**

Service policy mandates a fire management plan (FMP) for refuges that have “vegetation capable of sustaining fire.” The fire plan addresses wildland and prescribed fires, with guidelines on the level of protection needed to ensure safety, protect facilities and resources, and restore and perpetuate natural processes. We have revised the refuge FMP, first approved in 1997. The refuge completed the revision in 2005, and was approved in 2007. We prepare step-down prescribed burn plans each year.

**Land Protection**

We will increase our land acquisition and cooperative land protection program. This includes the acquisition of the 3,833 acres not yet acquired in our original approved boundary, and an expansion of 5,558 acres that includes a new division (York River). That action will provide increased management capability and habitat protection in the existing divisions. All of the lands approved for acquisition support trust resources of concern in coastal Maine. Please note that, although we know precisely the total amount of land we will add to the refuge, we cannot estimate precisely the exact breakdown into each habitat category. Of the 5,558 acres, 4,318 are approved as easements and the balance as fee title acquisitions. We will offer clear opportunities for compatible public use activities on fee title lands, and may offer opportunities on selected easement lands. Maps 4-1 to 4-11 in this chapter illustrate our newly approved expansion areas in relation to existing and proposed public use opportunities on refuge lands. See appendix A, “Land Protection Plan” (LPP) for more detailed maps and information about the acquisition areas approved for each division.

The expansion will encompass one more town, bringing to 12 the number of communities in the refuge planning region. We will remove from the original approved boundary 101 parcels totaling 164 acres that are no longer suitable for Service acquisition. We will also consolidate the Moody, Lower Wells, Upper Wells, and Mousam River divisions into one, the Wells Bay Division. Those four divisions are biologically and physically linked, and managing them as one will prove more efficient and more effective in fulfilling our mission. In addition to Service acquisition, we will work with our land conservation partners in supporting our collective watershed protection.

**Valuable Wildlife Habitat**

**35,000 acres in southern Maine**

Our Gulf of Maine Program mapped valuable habitats for federally listed endangered and threatened species, declining migratory songbirds, shorebirds, waterfowl, and anadromous fishes in southern Maine and throughout the U.S. portion of the Gulf of Maine watershed (USFWS 2001). In southern Maine, those lands with highest value for wildlife encompass about 35,000 acres. That analysis guided the proposed expansion of the acquisition boundary for the Rachel Carson refuge. The 5,558-acre and 11,397-acre expansions proposed in alternatives B and C of our draft CCP/EA, are part of the 35,000 acres the Service identified. We selected the top 25 percent of lands proposed for acquisition based on their highest aggregate habitat values (e.g., ecological diversity) and the conservation potential of specific parcel sizes.

<b>Refuge Revenue Sharing Payments</b>	Annual refuge revenue sharing payments to the 11 towns in which refuge lands lie will continue as law and policy allow. Future payments will be made in accordance with approved, appraised values, considering new acquisitions, and the level of congressional appropriations each year. Please refer to chapter 3 for additional information on refuge revenue sharing payments.
<b>Outreach and Partnerships</b>	We will enhance our outreach and partnerships with local communities, expand the role and numbers of our Friends Group, and strengthen our relationships with our neighbors and elected officials to build support for our management priorities in surrounding communities. All of our management strategies support partnerships to the fullest extent possible. They are vital in successfully managing all aspects of the refuge, from land protection to habitat and species management to public use. Appendix L lists many of our partners.
<b>Friends Group Support</b>	We will continue to support the Friends of Rachel Carson association. We expect that group to provide us with valuable assistance in implementing the management strategies in this final CCP.
<b>Volunteer Opportunities</b>	This CCP will continue our successful volunteer program. Volunteers perform thousands of hours of work in administration, public use, and the biological program, and have enhanced our ability to complete many tasks associated with refuge management.
<b>Existing Facilities Maintenance</b>	The periodic maintenance and renovation of existing facilities is a critical need to ensure safety and accessibility for refuge staff and visitors. Appendix E lists new construction projects from our Refuge Operating Needs System (RONS) database and projects from our Service Asset Maintenance Management System (SAMMS) that identify repairs, replacements, and other work needed for existing facilities and equipment.
<b>Refuge Facilities</b>	We will replace the existing headquarters/visitor contact facility to accommodate existing, essential, and new permanent staff and seasonal workers and to gain public support; construct a maintenance facility to improve the maintenance efficiency of refuge infrastructure and biological operations; and build a pole shed to protect vehicles and equipment from weather and vandalism. The facilities are integral in successfully achieving all of the objectives described below in all of our goals (see the inset on the following page).
<b>Permitting Special Uses</b>	<p>We will continue to allow existing, compatible, approved special use permits, including cultural resource investigations and on-refuge research when it benefits the refuge. The refuge manager evaluates all requests for special use permits individually for their appropriateness and compatibility. At a minimum, all commercial activities and all research projects require special use permits unless new information indicates they are no longer compatible. We will encourage research projects that improve or strengthen natural resource management decisions on the refuge. Research on species of concern and their habitats will continue to be a priority. The refuge manager may also consider research that does not relate directly to refuge objectives, but contributes to the broader enhancement, protection, or management of native species and biological diversity in the region and beyond.</p> <p>We may grant permits for rights-of-way and, in cases of risk to human health, permit mosquito/fly control in accordance with Service policy. Rights-of-way and boat launch activities will be allowed only after we issue a special use permit. The specific decisions associated with rights-of-way or boat launches may trigger the need to document an environmental analysis under NEPA for each case.</p>

### Refuge Facilities—History and Current Needs

Rachel Carson refuge began in 1966 as an unstaffed satellite of Parker River refuge in Newburyport, MA. The first staffed position at the refuge was established in 1977, at a small cabin off Drakes Island Road in the Lower Wells Division. A new office/residence was built in 1980 at its current location on Route 9 in the Upper Wells Division. Three staff occupied a one-room office.

Between 1989 and 1990, a new office was constructed to accommodate the three staff, with private offices for the manager and assistant manager, a general work area for the administrative staff, a small visitor contact area, a garage and a workshop. In 1996, the building was modified, adding approximately 300 square feet for a new visitor contact area and converting the garage into office space for a staff that had grown to four positions.

In 1997 the addition of a visitor services specialist increased the permanent refuge staff to five. That staff continued to grow, adding three permanent positions, two permanent seasonal positions, and as many as seven temporary positions, a YCC crew, and a co-located Wildland-Urban Interface (WUI) coordinator. We converted the maintenance area into offices and built an 18x30-foot addition for staff space. In 2003, the staff total swelled to 22 (10 permanent, 12 seasonal). The present building offers crowded office and work space, no additional file storage, only one bathroom, inadequate parking for visitor, staff, work vehicles, and inadequate space to host meetings with partners. The only parking available is for the Carson Trail, which has a limit of 15 vehicles.

The refuge needs a new administrative facility to provide safe, adequate facilities for permanent and seasonal staff, and to increase the overall efficiency of operations. The existing headquarters site, although convenient for the 100,000-plus annual visitors to the Carson Trail, cannot accommodate any additional building or parking because of its proximity to two rivers. A new administrative facility may include co-location with the Service's Gulf of Maine Coastal Program, other Service programs, and possibly other federal agencies. The facility would include a visitor contact area of sufficient size to accommodate and provide information to the approximately 300,000 refuge visitors as well as an estimated 100,000 to 200,000 additional visitors expected at the refuge. The Service's "Suite of Facilities" criteria will be used to determine the appropriate facility.

Executive Order No. 13123, "Greening the Government Through Efficient Energy Management," calls for the federal government to have 20,000 solar energy systems at federal facilities by the end of 2010. The new facility would incorporate various green technologies, such as recycled materials, porous materials for roads and parking, and solar energy. The facility would demonstrate the federal commitment to energy conservation in government facilities, and provide a modern example of Rachel Carson's legacy.

A maintenance facility is also essential to accommodate refuge vehicles and equipment and serve as a refuge workshop. On-going projects now must be moved out of the way to accommodate new or emergency projects. Deliveries of supplies and materials must be placed on the floor, often filling work space or creating obstacles. Current vehicles are wedged among pine and oak trees that occasionally fall down in storms. In 2003, a tree with a diameter between 18 and 24 inches nearly fell on three or four vehicles with a combined value of almost \$100,000. A pole building would be constructed to accommodate the more than \$600,000 worth of vehicles and equipment now subject to the salt air as well as an annual snowfall over 72 inches. The existing maintenance facility is a storage building that would continue to provide storage.

We will promote partnerships with local universities and colleges, the USGS, and other federal and state research agencies. The refuge manager will determine on a case-by-case basis whether they can directly support a project through funding or in-kind services (e.g., housing or use of other facilities), field assistance, or through sharing data and records.

All present and future researchers on the refuge will be required to submit a detailed research proposal following Service policy in the Refuge Manual, chapter 4, section 6. Special use permits must also identify a schedule for progress reports (at least annually), criteria for determining when a project should cease, and publication or other final reporting requirements. Service divisions and state agencies may be asked to review and comment on research proposals. Research

results will be shared within the Service, with the MDIFW, and elsewhere as appropriate.

Some projects, such as depredation and banding studies, require additional Service permits. We will not approve them until they have met all the requirements for Service permits and Endangered Species Act consultation. Instances may arise when the refuge manager finds a special use request unsuitable for refuge lands. In those instances, he or she may decline to issue the permit.

## Refuge Goals, Objectives, and Strategies

The following goals, objectives, and strategies include an array of management actions that, in our professional judgment, work best toward achieving the purposes of the refuge, the mission of the System, our vision and goals for the refuge and the goals of state and regional conservation plans. In our opinion, they will also most effectively address the major issues raised during the planning process. We judge them reasonable and practical.

### **GOAL 1. Perpetuate the biological integrity and diversity of coastal habitats to sustain native wildlife and plant communities, including species of conservation concern.**

## Background

Southern coastal Maine contains a greater diversity of upland plant and animal species than any other part of the state. Yet, this biologically rich area is the most densely populated part of Maine, and is experiencing continued rapid growth (Trust for Public Land and USFWS 2001). The refuge divisions, distributed along 50 miles of Maine's southern coast, lie in the heart of that region.

The refuge and the Scarborough Marsh State Wildlife Management Area encompass about 85 percent of all salt marsh habitat in Maine. Residential and industrial development is encroaching on these areas and affecting their fragile integrity (Trust for Public Land and USFWS 2001). Habitat conversion to urban and suburban uses, agriculture, gravel pits and fragmentation from roads and suburbanization are the primary factors affecting biological diversity in southern Maine (Gawler et al. 1996).

Over 90 percent of the salt marshes in the Northeast were parallel-grid-ditched by 1938 for mosquito control (Bourn and Cottom 1950). On several divisions, the refuge has implemented salt marsh restoration since 1996, primarily plugging ditches to restore pools and salt pannes. Recent efforts have also included partnerships on several projects to restore tidal flow, eradicate invasive plants and remove fill from impaired marshes.

Climate change currently threatens vital coastal marshes, where salt marsh accretion processes may not always keep pace with projected rises in sea level. That can lead to marshes becoming too flooded, resulting in extensive plant mortality, peat erosion and loss of elevation. If erosion is significant the marsh may be converted to open water or mudflat.

In other instances, where salt marshes accrete at the same pace as the sea level rises, but there are no low-lying upland areas adjacent, marshes may be "squeezed out" between rising sea levels (loss due to flooding) and an inability of marsh vegetation to "jump" steep elevation grades, particularly those posed by seawalls or other shoreline structures. A recent phenomenon, sudden wetland dieback, also is causing a decrease in salt marsh vegetation. The extent, cause and duration of that problem remain unknown. One such dieback area has been located within a refuge salt marsh.

The refuge supports other coastal habitats in addition to salt marshes, including dune grassland, beach, subtidal and intertidal mudflat, marine open water, tidal river, maritime shrubland, and upland forest. Those habitats provide critical buffers for the salt marsh and critical habitat for many aquatic and upland species of conservation concern.

Thirty-six species of shorebirds have been reported using the Maine coast primarily as staging areas in long-distance migration. The numbers of migrant shorebirds peak between mid-May and early June and between mid-July and mid-September (Tudor 2000). Shorebirds using the Maine coast face potential impacts from recreational disturbances of foraging and nesting birds, oil spills, resource extraction affecting shorebird food supplies, habitat loss to development, predators, and contaminants (Clark and Niles 2000).

### **Objective 1.1—Salt Marsh**

Manage, protect, and restore the integrity of 3,844 acres of salt marsh, including a mix of high and low salt marsh vegetation composed of less than 5 percent overall cover of invasive plants, and pool and panne habitat consistent with local reference sites, to ensure that the quality and natural function of the marsh are sustained and provide breeding, wintering and migrating habitat for species of conservation concern, including sharp-tailed sparrows, American black ducks, marsh and wading birds, migratory shorebirds, and catadromous fish.

#### **Rationale**

The *Spartina* salt marsh and dune grassland along with several other natural communities form a coastal dune-salt marsh ecosystem in southern Maine. The *Spartina* salt marsh or salt hay is a community dominated by expanses of saltmeadow cordgrass (*Spartina patens*), smooth cordgrass (*S. alterniflora*), and black-grass (*Juncus gerardii*).

Salt marsh (*Ammodramus caudacutus*) and Nelson's (*A. nelsoni*) sharp-tailed sparrows are species of highest conservation priority in PIF Area 9 and 28. Both sparrows are distributed throughout the salt marshes on the refuge. The two sparrows are different in song, morphology, and habitat, with some interbreeding and overlap in range. The salt marsh sharp-tailed sparrow occurs almost exclusively in salt marshes, while the Nelson's also uses inland fresh and brackish marshes. The range overlap extends from Parker River, Massachusetts, north to Weskeag River, Maine (Hodgman et al. 2002).

Partners in Flight lists the salt marsh sharp-tailed sparrow as a "species of continental importance for the U.S. and Canada," and includes it in the top category of watch list species in need of immediate conservation action due to multiple causes for concern across its entire range. The U.S. and Canada population estimate is 250,000 individuals with a continental objective to increase the population by 100 percent (Rich et al. 2004). More than 90 percent of the salt marsh sharp-tailed sparrow global breeding population is in the northeastern United States. (Dettmers and Rosenberg 2000). Nearly the entire range of the northeastern population of the Nelson's sharp-tailed sparrow occurs in PIF Area 28. The BCR 14 population and habitat objectives for Nelson's sharp-tailed sparrow are to maintain the current population at ~50,000 individuals and maintain existing amounts of salt marsh. Maine's population is estimated at 10,000 individuals with 5,000 hectares (~12,355 acres) of suitable habitat needed to support that population size at an average density of 1.0 hectares (2.5 acres) per pair (Dettmers 2004).

Flooding, particularly new moon tides, is thought to be the primary cause of nest failure for both species, although predation may also be a factor. Shriver et al. (2002) discovered mercury contamination in sharp-tailed sparrows on the coast of Maine. Salt marsh sharp-tailed sparrows had 41 percent greater blood mercury

levels than Nelson's sharp-tailed sparrows. Of the five marshes studied, Popham Beach and Ogunquit had the highest blood mercury levels, York intermediate, and Scarborough and Weskeag the lowest consistently for both species (Shriver et al. 2002). More information is needed on the distribution and abundance of sharp-tailed sparrows on the refuge and the factors (e.g., habitat characteristics, environmental contaminants, predation) that affect their populations.

The American black duck (*Anas rubripes*) is a globally vulnerable watch list species and is considered one of the highest priority species of concern according to the Atlantic Coast and Eastern Habitat Joint Ventures and among the state and provincial agencies where it occurs. Coastal salt marshes provide breeding habitat for black ducks, and coastal marshes, estuaries, and sheltered coves are especially important to wintering black ducks for foraging and shelter (Dettmers 2004). During fall migration, modest numbers of black ducks appear in salt marshes and bays throughout the refuge (<200 at each site). The numbers of wintering waterfowl increase: aerial surveys detect more than 1,000 black ducks using marshes throughout the refuge. That usage tends to be moderate but consistent among the divisions.

Many other species of wading birds, waterfowl, and shorebirds forage in the salt marsh during migration and in the breeding season. During the summer of 2004 intensive fall shorebird surveys were conducted. Eight sites were surveyed weekly through the summer and into the fall. A total of 58 bird species were recorded; 26 were shorebird species. Average numbers of birds detected during one survey ranged from 278 at Biddeford Pool, 175 at Oxcart Lane, to a low of 9 off of Mile Road in Wells. The three most common species detected were the semipalmated sandpiper, black-bellied plover and semipalmated plover.

The willet (*Catoptrophorus semipalmatus*) recently expanded its breeding range into southern and mid-coastal Maine (Tudor 2000). Willets typically nest in the high salt marsh and occasionally use fields, brushy areas, and sphagnum bogs. Willets are common throughout the refuge, and nest in several divisions. Northern harriers (*Circus cyaneus*) are common foragers in the salt marsh during migration. Common mummichogs (*Fundulus heteroclitus*) and other small fish live entirely within estuaries, tolerating low oxygen, high water temperatures, and high salinity. Mummichogs in turn are important prey for birds and other fish (WNERR 2002).

Management issues include maintaining and restoring all salt marsh habitat on the refuge; monitoring focal species populations; protecting marshes from

### Invasive Species Management

Up to 46 percent of the plants and animals federally listed as endangered species have been negatively impacted by invasive species (Wilcove et al. 1998, National Invasive Species Council 2001). Northeast region Refuges initiated an effort to systematically identify, locate, and map invasive plant species occurring on refuge lands leading to an effective integrated management plan. Refuges will use this information to guide the development of control, monitoring and evaluation projects.

Rachel Carson refuge will manage invasive species through means consistent with the Rachel Carson legacy. Carson campaigned against the indiscriminate use of chemicals, yet she recognized the need to use substances to maintain the health of natural and human communities. The refuge will use science-based information to determine the best techniques for controlling invasive species, while avoiding unintended consequences of control efforts. The refuge will promote alternative environmentally benign pest management strategies to encourage healthy, sustainable ecosystems. In some circumstances chemical control of invasive species may be necessary to maintain vital wildlife habitats or populations. In such circumstances, the refuge will follow best management practices in recognition of our namesake's message in Silent Spring.

siltation, eutrophication, and other forms of pollution; preserving water quality and wetland function with adequate upland buffer; removing tidal restrictions; and minimizing human disturbance. Landscape/ecosystem level threats include oil spills and other chemical contamination, sudden salt marsh dieback, the effects of sea level rise, and invasive species.

### **Strategies**

*Within 5 years of implementing the CCP*

- Continue to monitor salt marsh restoration sites
- Identify areas of salt marsh for restoration and implement restoration as resources permit
- Identify and permanently protect high-priority salt marsh habitats
- Continue invasive species (e.g., purple loosestrife, phragmites) monitoring and control using mowing, biological (e.g., beetles), tidal restoration, and hand pulling methods
- Identify high-density areas of sharp-tailed sparrows and continue ecological studies of these birds
- Work with partners each year to control and manage storm water runoff
- Conduct fall shorebird surveys each year and contribute to the International Shorebird Survey (ISS)
- Plan for oil spill response
- Determine mercury and other contaminant exposure for sharp-tailed sparrows in Maine coastal marshes
- By 2009, work with LMRD and others to develop criteria to identify and rank salt marsh restoration projects; begin implementation of the priority ranked projects
- Identify and protect high-priority salt marsh habitats and acquire from willing sellers approximately 344 acres of salt marsh in addition to the acres remaining in the original approved refuge boundary
- Initiate and support research targeted towards improving the management of sharp-tailed sparrow populations
- Monitor populations of breeding sharptailed sparrows on the refuge using a standardized point count protocol, evaluate population trends and densities on refuge and ensure salt marshes that currently have high densities of breeding sharp-tail sparrows continue to provide suitable habitats for these individuals
- Nominate high quality salt marshes with exceptional numbers of breeding Saltmarsh Sharp-tailed Sparrows for inclusion as Globally Important Bird Areas Program.
- Identify and protect high-priority salt marsh habitats through careful review of special use permits and coordination with and education of neighboring landowners and municipalities
- Expand efforts to determine mercury and other contaminant exposure for sharp-tailed sparrows in Maine coastal marshes

- Annually conduct shorebird surveys and contribute to International Shorebird Survey (ISS) and the Program for Regional and International Shorebird Monitoring (PRISM) efforts
- Install and monitor SETs (Sediment Elevation Tables with feldspar marker horizons) to determine if Refuge salt marshes are keeping pace with sea level rise and to ascertain the potential effects of increasing water levels.
- Restore salt marsh health to increase the ability of natural marsh accretion processes to keep pace with sea level rise. Tidally restricted (road-crossed) or impounded marshes (N. Pool PKR) subside and are at most risk for destruction due to sea level rise.
- Acquire lands adjacent to salt marshes to ensure long-term salt marsh integrity and viability and to encompass salt marsh formation and migration processes over the long term.
- Support research to document, analyze and quickly restore areas where sudden wetland dieback has reduced vegetation before long-term damage has occurred.
- Hire a biologist (GS 9, RONS 02007)

*Within 5 to 10 years of implementing the CCP*

- Evaluate (extent and vegetation type) and maintain vegetative buffers around salt marshes to meet biological objectives
- Analyze current population trends of sharp-tailed sparrows based on research by Shriver (2003)
- Partner with others to conduct studies of mercury exposure pathways and other contaminants, such as polychlorinated biphenyls, and their effects on sharp-tailed sparrow productivity
- Evaluate the appropriate level (i.e., frequency, intensity) of surveys for monitoring waterfowl or identifying concentrations of waterfowl
- Seek opportunities to study turnover rates of migratory shorebirds on the refuge
- Develop a targeted monitoring program for high-priority bird species

*Within 15 years of implementing the CCP*

- Restore 2/3 of priority ranked salt marsh projects

**Objective 1.2—Dune Grassland, Beach, Rocky Shore, Subtidal and Intertidal**

Protect 1,100 acres of naturally functioning dune grassland, beach, sand, rocky shore, and mudflat habitat composed of >95% native vegetation or bare substrate, to benefit nesting, feeding and staging migratory birds and other marine flora and fauna.

**Rationale**

Dune grassland is dominated almost exclusively by dune grass (*Ammophila breviligulata*), the plant that anchors the highly exposed sand dune formations. Dune grass dies off if not stimulated to grow by shifting sand (Maine Natural Areas Program 2001a). Dune and fore dune are essential habitat for breeding piping plover (*Charadrius melodus*) and least tern (*Sterna antillarum*), provide staging areas for roseate tern (*S. dougallii*), and migratory habitat for shorebirds, including semipalmated plover (*Charadrius semipalmatus*).

Plovers and other shorebirds forage in intertidal mudflats during migration. Twenty percent of Maine's semipalmated plover population uses beach habitat during migration in southern Maine (Clark and Niles 2000): much of that on the refuge. Migrating shorebirds exhibit a high degree of site tenacity for staging areas and require minimal human and animal disturbance at roosting sites that include beaches and sand spits.

Coastal Maine provides critical habitat for fall migrating shorebirds. Shorebirds feed on the mudflats as they follow the tides in and out. Twice a day they spend high tide roosting on rocky shores or sand spits. The U.S. Shorebird Conservation Plan (USFWS 2004b) lists the U.S. and Canadian shorebird populations that are highly imperiled or of high conservation concern. Black ducks also follow the tide in, foraging on invertebrates in the intertidal rockweed and foraging on the mudflats as the tide recedes. Up to 60 different marine animals and plants use rockweed at low tide. As the tide comes in, tiny air bladders along the rockweed stem and branches cause the plant to rise and sway with the current, creating an undersea nursery for as many as 31 fish species. Juvenile herring, pollock, and winter flounder, among other fish species, use rockweed "forests" to escape from predators and feed on invertebrates. Common eiders use rockweed as brood-rearing habitat, feeding on amphipods and periwinkles among the wrack (Daigle and Dow 2000). Loss of habitat, rockweed harvesting, and potential impacts from oil spills are major management concerns for this ecosystem.

Submerged aquatic vegetation (SAV) habitat, located in subtidal areas serves as structure, cover, and forage for a variety of trust species (waterfowl, fish) and other vertebrates and invertebrates. In southern Maine, beds of eelgrass (*Zostera marina*) or widgeon grass (*Ruppia maritima*) are typically found in tidal channels, shallow coastal waters, and salt marsh pools. Submerged aquatic vegetation is threatened by the repercussions of watershed development including nutrient enrichment and sedimentation. Dredging also represents a direct impact to existing SAV beds. Past harvesting efforts have threatened macroalgae (e.g., rockweed, kelp) beds.

Management issues in this habitat type include disturbance to nesting, foraging and roosting birds from recreational and commercial activities, predation on nesting plovers and terns, loss of habitat, effects of resource extraction on prey availability, oil spills, contaminants, and flooding.

### Strategies

*Within 5 years of implementing the CCP*

- Annually provide information to beachgoers, clambers, and other beach/dune users about environmentally sustainable use of these habitats
- The refuge will work with others to review dredging and beach nourishment projects
- Inventory, identify, and protect shorebird roosting sites
- Restrict access to roost sites as needed to ensure protection
- Support water quality monitoring efforts by conservation partners to ensure high-quality subtidal and intertidal mudflats
- Assess the condition of dune grassland habitat to determine if active management is needed to maintain its ecological integrity
- Use voluntary agreements, conservation easements, and fee simple acquisition to protect 75 acres of these habitats in addition to the acres remaining in the original approved refuge boundary

**Objective 1.3—Piping Plover**

Protect beach berm and associated dune edges, wash overs, and intertidal areas for nesting, staging and feeding piping plovers to maintain a productivity level of at least 1.5 chicks per nesting pair over a five year period, consistent with regional population goals.

**Rationale**

The piping plover is federal-listed threatened and state-listed endangered in Maine. The birds nest above the high tide line on open sand, gravel or shell-covered beaches, especially on sand spits and blowout areas in dunes. They congregate later in summer to feed in the “splash zone” and in wrack piles at the high tide line. More than two-thirds of Maine’s 30 miles of beaches have been lost as nesting habitat for piping plovers because of human development including houses, seawalls, and jetties. Even in the suitable habitat remaining, beachgoers may crush nests or chicks or leave garbage that attracts predators. Piping plover nesting, feeding, and brood-rearing habitats were given additional legal protection in 1995, when Maine designated them as Essential Habitats (McCollough et al. 2003).

On average, approximately 30 percent of piping plovers within the State of Maine nest on lands owned or managed cooperatively by the Refuge. An additional 20 percent to 40 percent of the state’s nesting plovers occurs on beaches that lie adjacent to refuge rivers and marshes but are managed by the towns of Wells and Ogunquit. Crescent Surf Beach is the premier plover beach the refuge holds an easement on and manages, but plovers nest on Goosefare Brook and Marshall Point beaches as well. Since 2000, the refuge has assumed primary responsibilities for managing and monitoring plovers at four sites adjacent to refuge lands. That involves cooperating with private landowners, the Maine Audubon Society, state partners, and the Wells National Estuarine Research Reserve to protect nesting plovers on their lands. Piping plover pairs managed by the refuge have ranged from a high of 18 in 2003 to a low of 6 in 1995. Recently, plovers declined dramatically in the state. In 2005, the refuge had eight pairs of plovers nesting on beaches it manages. Six of the eight pairs nested on refuge land. The piping plover recovery plan has a recovery objective of 1.5 chicks per pair average over 5 years (USFWS 1996).

In 2003, productivity on beaches the refuge managed fell sharply due to crow predation. Productivity has not rebounded, although on average productivity is higher on Refuge managed beaches than in the remainder of the State. In 2005, 8 plover pairs nested, 5 nests were successful, 18 chicks hatched, and 8 fledged. That is well below the 1.5 chicks per pair necessary for population growth. Nesting success was particularly low at Crescent Surf Beach because of predation and heavy storms in May. The refuge uses several techniques to boost productivity, including the control of predators such as crows and foxes, symbolic fencing, and public outreach. Beachgoers occasionally disturb nests, vandalize fencing or bring dogs onto refuge lands. The refuge staff monitors the beaches and educates the public about the protection necessary to meet piping plover recovery goals. We also work with willing landowners of beach front to protect nesting plovers.

**Strategies**

*Within 5 years of implementing the CCP*

- Continue monitoring the productivity of piping plover nests
- Continue fencing, signing, and patrolling nesting areas
- Continue controlling predators where necessary using lethal (e.g., trapping, shooting) and non-lethal (e.g., live trapping, scarecrows, and effigies) deterrents
- Continue working with private landowners to protect plovers on nesting beaches

- Continue on-site public outreach and education on nesting beaches
- Recruit and train volunteer plover stewards
- Actively participate in statewide plover monitoring and conservation
- Provide information to beachgoers, clammers, and other beach/dune users about piping plovers
- Use voluntary agreements, conservation easements, and acquisition to protect piping plover habitat
- Conduct on-site and off-site educational programs focused on piping plover conservation
- Hire a biologist (GS 9; same position as in objective 1.1)
- Hire a park ranger-law enforcement officer (GS 5/7; RONS 01008)
- Manipulate habitats by mechanical or prescribed fire to increase the area of sparsely vegetated habitats when nesting habitat is not provided by natural processes such as nor'easters.
- Initiate management-oriented trapping patterned after the state's Drakes Island deer hunt, when necessary, for the protection of plover and other threatened and endangered species.

**Objective 1.4—Least Tern**

Protect beach berm and associated dune edges, wash overs, and intertidal areas for nesting, staging and feeding least terns to maintain a productivity level of at least 0.5 chicks per nesting pair over a ten year period.

**Rationale**

The least tern is a state endangered species in Maine and is listed as a bird of high conservation concern for BCR 30. They arrive on the nesting grounds in late April and early May, and build their nests on open sand, gravel, or shell-covered beaches above the high tide line. Least terns feed on small fish from shallow open water, stream and river outlets, tidal ponds, and salt marshes adjacent to nesting areas. By late July and early August, adults and juveniles are congregating and foraging in bays, estuaries, rivers, creeks, and salt marshes (McCollough et al. 2003).

Least terns are affected by the same habitat loss and human disturbance noted above for the piping plovers, but are more difficult to protect from predators and are more sensitive to disturbance by people and predators. Least tern nesting, feeding, and brood-rearing habitats were given legal protection in Maine by designating these areas as Essential Habitats in 1995. In Maine, the least tern population has fluctuated between 39 (in 1982) and 157 pairs (in 2003) (McCollough et al. 2003).

Crescent Surf beach is generally home to the State's largest colony of least terns. The colony size at Crescent Surf has ranged from 157 pairs to 50 pairs in recent years. The Refuge manages the area specifically to benefit both least terns and piping plovers and provides key habitat for this species in Maine. Early season crow predation and late season owl and coyote predation depressed productivity in 2005. The refuge uses several techniques, including hazing, fencing, trapping, and shooting to control diurnal predators such as crows and foxes. Least terns also nest at Laudholm Beach, Goose Rocks, Higgins, and Reid State Park.

**Strategies**

*Within 5 years of implementing the CCP*

- Continue fencing and signing nesting areas
- Continue controlling predators where necessary using deterrents both lethal (e.g., trapping, shooting) and non-lethal (e.g., trapping, scarecrows, and effigies)
- Continue on-site public outreach and education on nesting beaches
- Conduct minimal monitoring to estimate population size and productivity
- Recruit and train volunteer tern stewards
- Use voluntary agreements, conservation easements, and acquisition to protect least tern habitat
- Hire a biologist (GS 9; same position as in objective 1.1)
- Hire a park ranger-law enforcement officer (GS 5/7; same position as in objective 1.3)

*Within 5 to 10 years of implementing the CCP*

- Develop a monitoring protocol for least tern productivity and population size
- Coordinate with partners to support and participate in statewide monitoring

**Objective 1.5—Tidal River, Estuary, and Bay**

Through an active role in local and state partnerships, maintain water quality of open water habitat in tidal rivers, estuaries and bays to provide resting and foraging habitat for waterfowl, marsh and wading birds and other birds of regional conservation priority including the American black duck, common eider, common tern and roseate tern, and to sustain fish nurseries and native plant and invertebrate communities.

**Rationale**

The refuge was established around a series of tidal rivers and associated estuaries along Maine’s southern coast. These coastal habitats are teeming with wildlife throughout the year. Terns, waterfowl, and waterbirds forage in the tidal creeks. The tidal rivers of the refuge support several federal trust fish species that are in decline, including alewife (*Alosa pseudoharengus*), American eel (*Anguilla rostrata*), blueback herring (*Alosa aestivalis*), rainbow smelt (*Osmerus mordax*), bluefish (*Pomatomus saltatrix*), and Atlantic menhaden (*Brevoortia tyrannus*).

Recent information shows that American eels utilize marine, estuarine or freshwater streams to mature, with some eels moving between habitats, possibly to utilize estuaries for maximum growth. Today, Maine and the Scotia/Fundy area of Canada continue to have an active glass eel fishery. Despite these threats the American eel remains over most of its historic range and glass eels continue to recruit to the United States and Canada in significant numbers. The Rachel Carson refuge provides Maine with an area of protection from glass eel harvest, helping to ensure that the American eel continues to inhabit the waters of Maine. In addition, the refuge provides productive estuarine habitat used by the American eel for improved growth. Efforts to remove barriers would provide eels with more of their historic habitat while restoring this important species to these ecosystems.

Black ducks, common eiders, scoters, mallards, red-breasted mergansers, buffleheads, and loons are the most common wintering water birds that forage in the areas of open water in the bays and rivers. Management issues include habitat

degradation through the development of adjacent and upstream upland habitat, oil spills, storm water discharge, and contaminants.

Protecting the water quality and ecological integrity of habitats in Maine's tidal rivers and estuaries requires a partnership among government, civic groups, conservation organizations, and residents throughout the entire watershed. The Wells National Estuarine Research Reserve (WNERR) developed a series of watershed conservation strategy reports for seven watersheds in southern Maine, providing a baseline of existing information on these watersheds (WNERR 2003).

### Strategies

#### *Within 5 years of implementing the CCP*

- Promote land conservation annually with conservation partners to maintain the ecological integrity of coastal Maine watersheds
- Seek volunteers to complete minimal waterfowl and shorebird surveys
- Enhance and support the collection of water quality and quantity data to establish baseline conditions and measure and track water quality and quantity trends
- Annually conduct waterfowl aerial and ground count surveys
- Acquire lands from interested landowners in the York River watershed
- Promote land conservation efforts with conservation partners to maintain the ecological integrity of coastal Maine watersheds
- Document in-stream flow for Refuge rivers; maintain adequate in-stream flows to support native biota
- Hire a biologist (GS-9; same position as in objective 1.1)
- Hire a refuge operations specialist (GS 5/7)

#### *Within 5 to 10 years of implementing the CCP*

- Establish regional partnerships and dedicate staff and time to maintain water quality in tidal rivers and estuaries
- Acquire more information on the ecology and condition of tidal rivers in the refuge to guide the management of anadromous and catadromous fish and other wildlife species of concern

#### *Within 10 to 15 years of implementing the CCP*

- Develop and distribute educational information on the ecology and wildlife use of tidal rivers, estuaries, and coastal watersheds
- Identify existing submerged aquatic vegetation (SAV) habitat within and immediately adjacent to refuge waters
- Draft a monitoring and restoration plan for SAV habitat

### **Objective 1.6—Maritime Shrubland**

Manage 135 acres of maritime shrubland dominated by shadbush, bayberry, elderberry, and other fruiting shrubs to provide nesting and migratory habitat for land birds of conservation concern including eastern towhee, wood thrush, other fruit-eating fall migrants, and New England cottontail.

### **Rationale**

The loss and degradation of naturally maintained shrublands has been extensive throughout the region. Coastal states have the primary responsibility for most of the native shrubland habitat in the region (Dettmers 2003, Litvaitis 2003). Shrub-dominated communities persist the longest at high elevations and in areas exposed to marine salt spray (Latham 2003). Although fragmented by roads and development, coastal Maine supports persistent maritime shrublands, a thin band of vegetation that transitions to salt marsh.

The suite of birds associated with naturally occurring shrublands and early successional forests in the northeastern United States accounts for about 15 percent of the total species diversity of the breeding avifauna in the region. Shrubland-associated birds (e.g., brown thrasher, prairie warbler, willow flycatcher) consistently rank near the top of lists of species showing population declines. Vegetation structure, microhabitat conditions, and landscape context are the most important habitat features for birds, rather than specific plant species (Dettmers 2003).

During the breeding season, many migrant land birds shift from a largely insectivorous diet to a diet high in fruits. That shift is particularly well documented in thrushes, vireos, wood-warblers, mockingbirds and their relatives (Parrish 2000). Parrish captured red-eyed vireos, a highly frugivorous migrant, over 10 times more frequently in coastal maritime scrub than in old orchard habitat on Block Island. Observations of migrant land birds feeding on fruits show that they can spend less time and encounter more prey while foraging on fruit, an important implication for a bird's energy budget (Parrish 2000).

Coastal habitats support large concentrations of migrating songbirds, including young of the year. The use of an area as a migratory stopover depends, in part, on its quality (e.g., presence of fruiting shrubs) and its location in relation to ecological barriers (such as large bodies of water). Habitat management and restoration for migrating songbirds may be most beneficial near ecological barriers where migrants are concentrated and may be competing for limited resources. Structurally diverse habitat types generally support greater numbers of migratory species than habitats with low vegetative complexity (Parrish 2000, Petit 2000).

The restoration and maintenance of naturally occurring shrublands is recommended as a priority for coastal states. Managing small patches (< 10ha) as shrubland habitat can be more effective for many of the shrubland breeding birds than managing such relatively small patches for other habitat types such as grassland or forest because of the relatively low patch size sensitivity exhibited by many shrubland birds compared to some of the grassland and forest birds. Consolidating and clustering patches and maintaining some large patches of shrubland habitat will provide habitat for a range of wildlife, including migratory songbirds, American woodcock, and New England cottontail (Dettmers 2003, Litvaitis 2003). Creating a "checkerboard" of small habitat patches should be avoided where possible (Petit 2000).

For further discussion of habitat needs of the New England cottontail see objective 3.1. Maritime and dry shrubland habitats contain invasive species of shrubs including honeysuckles, buckthorn, and others that bear fruit and provide cover. Removing these invasive shrubs could reduce the habitat suitability for some species in the short term. An assessment is needed prior to removal to determine the short and long term effects of removal and options for restoring native shrubs.

**Strategies**

*Within 5 years of implementing the CCP*

- Assess current extent of maritime shrubland habitats as current mapping technologies are not able to quantify
- Identify areas and methods for shrubland restoration and management
- Expand bird monitoring to include new survey points in maritime shrubland during the breeding season and fall migration
- Continue to work with partners to protect and enhance maritime shrublands for the benefit of species of conservation concern

*Within 5 to 10 years of implementing the CCP*

- Develop plans for invasive species control including options for restoring native shrubs and maintaining habitat suitability for species of concern
- Determine important areas on the refuge for spring and fall migrating land birds
- Acquire from willing sellers 35 acres of maritime shrubland

**Objective 1.7—Nearshore and Marine Open Water**

Protect nearshore and offshore marine waters and identify key sites for the benefit of wintering, migratory and breeding waterfowl and waterbirds, and anadromous fish.

**Rationale**

Although the Service will not be the lead agency, in 2000 President Clinton signed Executive Order No. 13158 on marine protected areas with a goal to strengthen the protection of oceans and coastal resources. The Order requires the Department of the Interior and the Department of Commerce to develop “a scientifically based, comprehensive national system of Marine Protected Areas (MPA) representing diverse marine ecosystems, and the Nation’s natural and cultural resources.” An inventory of potential MPAs was completed, and the refuge, due in part to its collocation with the Wells National Estuarine Research reserve, is on that list.

**“Oceans are in Crisis”**

The Pew Oceans Commission, an independent panel, reports that “oceans are in crisis” and they call for a fundamental change in how we value the oceans (Pew Oceans Commission 2003). They note three major problems with how oceans are currently used and managed: 1) a focus on exploitation with little regard for environmental consequences, 2) a focus on individual species and not on the larger ecosystems, and 3) a fragmented and overlapping governmental and regulatory framework.

“The fundamental conclusion of the Pew Oceans Commission is that this nation needs to ensure healthy, productive, and resilient marine ecosystems for present and future generations. In the long term, economic sustainability depends on ecological sustainability. To achieve and maintain healthy ecosystems requires that we change our perspective and extend an ethic of stewardship and responsibility toward the oceans. Most importantly, we must treat our oceans as a public trust. The oceans are a vast public domain that is vitally important to our environmental and economic security as a nation. The public has entrusted the government with the stewardship of our oceans, and the government should exercise its authority with a broad sense of responsibility toward all citizens and their long-term interests” (Pew Oceans Commission 2003).

The Pew Oceans Commission, an independent panel, released a seminal report in 2003 calling for a new vision in the stewardship of our oceans (see sidebar). There are many jurisdictions and sometimes competing national interests in the marine environment. States have jurisdiction over submerged lands and overlying waters from the shoreline out to the 3-mile limit. Federal territorial sovereignty extends 12 miles offshore, and the federal government controls ocean resources out 200 miles and more. More than 140 federal laws apply to oceans and marine resources (Pew Oceans Commission 2003).

The threats to the oceans include nonpoint source pollution (e.g., oil runoff from streets and driveways and nitrogen release), point source pollution (e.g., waste from feedlots and passenger cruise ships), invasive species, aquaculture (e.g., accidental escape of fish, nitrogen, phosphorus and fecal matter discharge), coastal development, over-fishing, habitat alteration from fishing gear that drag the sea floor, by-catch, and climate change (Pew Oceans Commission 2003). The Pew Commission regards runoff of excess nitrogen from farm fields, animal feedlots, and urban areas as the greatest pollution threat to coastal marine life. They document that coastal development and associated sprawl each year destroy and endanger 20,000 acres of coastal wetlands and estuaries that serve as nurseries for fish and “paved surfaces have created expressways for oil, grease, and toxic pollutants into coastal waters.”

In addition to raising alarms about the current state of our marine waters, the Pew Commission provides a detailed set of recommendations toward a more sustainable future for coastal ecosystems (Pew Oceans Commission 2003). The refuge can contribute in several key areas including confronting urban sprawl and controlling invasive species. The Pew Commission recommends several ways to address urban sprawl: (1) develop an action plan to address nonpoint source pollution and protect water quality on a watershed basis; and, (2) identify and protect from development habitat crucial for the functioning of coastal ecosystems. Another call to action by the Pew Commission is to enhance “ocean literacy” by expanding marine education. Pollution sources coming from the ocean and the land affect the refuge.

Several species of conservation concern occur in the nearshore and marine open waters of the refuge. Common and roseate terns (*Sterna hirundo* and *S. dougallii*) forage on herring, hake, and sand lance in these waters in the breeding season and when staging during fall migration. Common eiders (*Somateria mollissima*) occur year-round, while common loons (*Gavia immer*) and red-breasted mergansers (*Mergus serrator*) winter here. Alewife, American eel, blueback herring, and rainbow smelt, in decline in the Gulf of Maine, are in the nearshore waters.

### Strategies

*Within 10 to 15 years of implementing the CCP*

- Evaluate the level of refuge involvement and train staff as appropriate in oil spill response
- Work cooperatively with conservation partners on watershed management initiatives
- Work with partners to address and control invasive aquatic species
- Identify key sites for feeding, wintering, and breeding waterbirds.
- Identify and protect, in collaboration with conservation partners, habitat critical for the functioning of coastal ecosystems
- Develop and deliver educational materials and programs on marine ecosystems

- Identify and protect important spawning, nursery, and feeding areas for trust fish species
- Initiate at least annual communication with the Coast Guard's Oil Spill Response Team to ensure information on trust resources and issues important to the refuge are incorporated in the oil spill response plan and are addressed in an oil spill response
- Participate, as appropriate, in establishment and development of the Rachel Carson Marine Protected Area

**Objective 1.8—  
Biodiversity (Coastal)**

Conserve and maintain the refuge's coastal native biodiversity to protect plants, animals, and natural communities of conservation concern.

**Rationale**

Southern coastal Maine is home to many unique animals and plants not found in other areas of the state. Some of these species are globally rare, while others are reaching the northern limit of their range. Southern Maine is a particularly diverse area, largely due to the meeting of two distinct ecosystems: the oak-pine ecosystems of the north Atlantic coast, and the more northern softwood-dominated ecosystems of the boreal forest. The refuge lies in that transition zone, creating a unique environment unto itself. Conservation targets from both ecosystems occur on the refuge. Some of those species, such as salt marsh and Nelson's sharp-tailed sparrows, co-occur here and hybridize.

The Maine Natural Areas Program (MNAP) and the MDIFW identified and mapped several rare, exemplary, or unique natural communities and rare plants or animals at or near the refuge. Within the coastal ecosystems, these include maritime forests, salt-hay salt marsh, and coastal dune-marsh ecosystems.

Maritime forest ecosystems as described by MNAP are narrow bands of forests with stunted trees with contorted branches. Maritime forests occur along the immediate coast or adjacent to salt marsh. Remnant maritime forests are scattered throughout the refuge, with good examples occurring on the Goose Rocks, Wells, and Little River divisions. The critically imperiled pitch pine bog community occurs on the refuge, although its size and condition is unknown. These are sparsely forested peatlands with pitch pine (*Pinus rigida*) as the dominant tree species. Sphagnum covers the ground, and evergreen shrubs such as huckleberry (*Gaylussacia sp.*) are common (MNAP 1999).

The Wells and Ogunquit marsh complex is the second largest salt marsh complex in the state. It is home to many declining plant and animal species, and was identified as a focus area by the MNAP. That focus area extends from the Ogunquit marshes to just north of the Mousam River, and includes the forested areas between the ocean and Route 1. Several areas support large concentrations of sharp-tailed sparrows, pitch pine woodlands, pocket wetlands, bogs and high-quality beach habitat.

**Strategies**

*Within 5 years of implementing the CCP*

- Work with partners to conduct a comprehensive baseline botanical survey of refuge lands
- Coordinate with MDIFW and the MNAP to implement surveys for state-listed plants, animals and invertebrates that occur on refuge lands.

- Identify, protect and manage rare natural community features where they occur on refuge lands
- Control non-native, invasive species that degrade habitat function
- Focus on efforts to identify and map locations of maritime forest ecosystems and other rare plant communities
- Build on a working relationship in consultation with the MNAP on suitable management strategies to maintain these natural communities

*Within 5 to 10 years of implementing the CCP*

- Sponsor “bioblitz” event to document as many species as possible that occur on the refuge
- Identify and evaluate the size and condition of pitch pine bog communities
- Conduct a fauna and flora inventory of pitch pine bogs
- Identify, inventory, and evaluate existing pitch pine communities for health and long term viability
- Designate appropriate units to be managed for pitch pine communities
- Work with private landowners to help maintain barrier beach pitch pine communities

**GOAL 2. Perpetuate the biological integrity and diversity of freshwater habitats to sustain native wildlife and plant communities, including species of conservation concern.**

**Background**

Impacts on wetlands, including filling for development, are regulated and restricted by local, state, and federal laws. However, laws to protect the uplands surrounding wetlands, or to protect forested wetlands, are minimal. Freshwater wetlands are biologically diverse and important for many migratory birds. Yet, despite their ecological significance, they are underrepresented on the refuge. Not only are upland areas around wetlands vital for sustaining the health of a freshwater wetlands system, but also, contiguous freshwater wetlands and sufficient uplands are vital for wildlife and the health of downstream salt marsh ecosystems.

Rivers, streams, emergent wetlands, vernal pools, and other freshwater wetlands on the refuge contribute to the biological diversity of coastal Maine watersheds. Maintaining the health and function of those wetlands systems requires partnerships among the refuge and its neighboring landowners and communities. Protecting water quantity and quality to maintain habitats for wildlife species of concern requires a watershed-wide effort.

**Objective 2.1—Freshwater Rivers and Streams**

Protect more than 25 river and stream habitats, including floodplain forests, to maintain or improve current water quantity and quality and riparian habitat for the benefit of freshwater and anadromous fish, breeding and migratory birds, and downstream estuarine habitats.

**Rationale**

Freshwater rivers and streams in the refuge provide habitat for a range of aquatic and semi-aquatic organisms. Riparian areas along the waterways also provide habitat, as well as protecting water quality downstream. Young American eels are

common in the streams of the refuge. Concerned about possible declines due to commercial harvesting, variations in ocean currents, contaminants, exotic diseases and parasites, and river passage (Haro et al 2000), the American eel was petitioned for listing under the Endangered Species Act in 2004. The Service completed the 90-day review in July 2005, and found listing may be warranted. The Service is now in the process of hosting expert panel workshops to determine status of the population, threats to the population and uncertainty focusing around existing data. The Rachel Carson refuge provides Maine with an area of protection from glass eel harvest, helping to insure that the American eel continues to inhabit Maine waters. In addition, the refuge provides productive estuarine habitat used by the American eel for improved growth. Efforts to remove barriers would provide eels with more of their historic habitat while restoring this important species to these ecosystems.

Other species common in the freshwater rivers of the refuge include brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), pollock (*Pollachius virens*), winter flounder (*Pseudopleuronectes americanus*) and bluegill (*Lepomis gibbosus*). Those species use the combination of freshwater streams and estuarine channels present on the refuge to meet their life cycle needs.

Riparian habitats are areas adjacent to rivers, streams, or other water bodies, and are often areas of high species richness with dynamic and complex biophysical processes. Riparian areas provide important structural components, including large nest and perch trees for raptors and cavity trees for wood ducks and

### Stormwater Pollution

Stormwater is the water that runs along the ground or through pipes. As this water moves across lawns, driveways, roofs, roads, and parking lots it collects sediment, bacteria, chemicals, debris, and more, until it finally discharges into fresh water and salt water habitats. The Casco Bay Estuary Project finds that stormwater may be the single greatest contributor of contaminants to the bay. Nationwide, stormwater is one of the leading causes of water pollution.

The two primary sources of contaminated stormwater are point and non-point. Point sources carry stormwater through direct, identifiable means such as pipes. Non-point sources include runoff from land or groundwater seepage that enters rivers and estuaries from paved areas, malfunctioning septic systems, and other sources. National studies estimate that non-point source pollution contributes up to 60 percent of stormwater pollutants.

The most common sources of pollution from stormwater runoff throughout the refuge include residential development, construction, and roadways. Industrial, commercial, and agricultural sites contribute to stormwater runoff near some of its divisions.

Stormwater runoff can contain excessive nutrients and bacteria, causing algal blooms that deplete oxygen levels and kill fish. Animal waste with fecal coliform that can contaminate clam flats act as a source of mercury, other heavy metals, oil and contaminants in salt marshes that may become available in the food chain to sharp-tailed sparrows and other species of wildlife including waterfowl, shorebirds, and wading birds. transport the seeds of invasive species to downstream habitats

In February 2004, the Maine DEP submitted a report to the Maine Legislature titled "Improving the Effectiveness of Stormwater Management in Maine." That report was the result of a legislative mandate to provide recommendations for improving stormwater management in the state. Appendix 3 of that report lists proposed "Most at Risk" streams in the state, including the Goosefare Brook in Saco that flows through the Goosefare Brook Division.

The refuge must play an active role in the coastal communities and work with the state to encourage and implement best management practices and new technology for stormwater management near the refuge. In doing so, the refuge will reduce the adverse impacts on refuge resources and improve recreational programs for shellfishing and fin-fishing. Alternatively, more waterways on other refuge divisions will appear on "Most at Risk" stream lists.

songbirds. Many vernal pools lie in these habitats. Without forested shorelines, stream banks are more susceptible to erosion. Riparian areas help control erosion and sediment loading into rivers and streams.

Southern Maine is rapidly developing, and demands on its water resources continue to soar. Residential development, golf courses, and water bottling plants all pose a threat to our aquatic resources. The lands of several water companies in York, Wells, Kennebunkport, and Kennebunk protect water quality and quantity. However, their current technologies are not projected to be able to meet all of the future water needs of our area. In the Kennebunk, Kennebunkport and Wells Water District (KKWWD), current demand at its summertime peak is 7 million gallons per day (MGD). In droughts, approximately 3 MGD can be supplied from Branch Brook, and another 3 MGD is available from other neighboring districts. To meet longer term demands, the KKWWD may need to explore other options, such as ground water withdrawal, or supply from Saco River, Sebago Lake, or the Atlantic Ocean (KKWWD 2005).

The state is moving toward creating and implementing “Sustainable Water Use Policies.” The Department of Environmental Protection establishes water use standards for maintaining instream flows and lake or pond water levels that protect aquatic life and other uses, and establishes criteria for designating watersheds most at risk from cumulative water use. Water supply in refuge rivers and streams is crucial for protecting our trust resources and ensuring healthy, functioning ecosystems. The refuge will work to establish baseline flow rates in refuge rivers and streams to ensure we can protect its aquatic resources.

### **Strategies**

#### *Within 5 years of implementing the CCP*

- Work with municipalities on educating landowners about shoreland protection
- Provide comments on stormwater discharge management actions
- Work with partners on BMPs for stormwater management
- Partner with Maine Inland Fisheries and Wildlife or local universities to evaluate and map the distribution of wood turtles on the refuge
- Identify and remediate fish and eel passage impediments on and off refuge lands
- Hire a refuge operations specialist (GS 5/7; the same position as in objective 1.5)

#### Within 5 to 10 years of implementing the CCP

- Document baseline in-stream flow for major refuge streams
- Work with partners to protect water quality on waterways that flow through the refuge
- Strengthen partnerships between the refuge and water companies to identify areas where we can work together to protect our aquatic resources
- Evaluate the effects of invasive species carried by stormwater runoff into rivers and streams, and implement invasive species control measures
- Survey for Louisiana waterthrush on the refuge

- Partner with Maine Inland Fisheries and Wildlife or local universities to evaluate and map the distribution of wood turtles on the refuge

**Objective 2.2—Emergent Marsh, Forested and Scrub-Shrub Wetland, Vernal Pool**

Maintain 1,445 acres of emergent marsh, scrub-shrub, forested wetland, and vernal pool habitats to sustain populations of species of conservation concern including veery and willow flycatcher, Blanding’s and spotted turtles, obligate amphibians, and rare dragonflies, and to perpetuate native plant communities.

**Rationale**

The undeveloped forests and wetlands in the eastern Biddeford and northern Kennebunkport region contain high concentrations of pocket swamps and vernal pools, habitats that are becoming increasingly rare in Maine. Vernal pools offer critical breeding habitat for some species of amphibians and invertebrates, including wood frog (*Rana sylvatica*), spotted and blue-spotted salamanders (*Ambystoma maculatum* and *A. laterale*), and fairy shrimp (*Eubranchipus*). Several rare species also use these wetlands, including the state-listed endangered Blanding’s turtle (*Emydoidea blandingii*), state-listed threatened spotted turtle (*Clemmys guttata*), and state-listed endangered ringed bog haunter dragonfly (*Williamsonia lintneri*) (Maine Natural Areas Program 2001b).

Most of those species require a large area of relatively undisturbed upland habitat for nesting, foraging, and dispersal. Wood frog juveniles migrate up to 3,800 feet from the vernal pool where they hatched, while adults move up to 1,500 feet from the pool (Tracy Tarr, personal communication). Blanding’s turtles may travel more than 1 mile between wetlands (Hunter et al. 1999).

The Blanding’s turtle (*Emydoidea blandingii*) is one of the rarest turtles in the Northeast. It is believed to be declining throughout its range, and was listed as a candidate (Category 2) for federal listing throughout its range in the 1980s and early 1990s. The Northeast populations are believed to be highly vulnerable. Threats include the loss of small wetlands, habitat loss and fragmentation, road mortality, and increased nest predation in an increasingly developed landscape. The Blanding’s turtle is state-listed as threatened in New York and Massachusetts, endangered in Maine, and a species of special concern in New Hampshire. The Service considers the Blanding’s turtle a species of conservation concern, and recently increased support under Endangered Species Act Section 6 to states for research and surveys. Radio-telemetry projects showed that Blanding’s turtles use vernal pool complexes and small wetlands in the Northeast, and make significant overland movements between wetlands. Those studies emphasize the importance of conserving wetlands in a matrix of intact, upland forest. If habitat fragmentation increases, the viability of the Northeast population is at serious risk (USFWS unpublished data).

In Maine, Blanding’s turtles occur most frequently in complexes of small, acidic wetlands and vernal pools in large blocks of forested habitat (>500 acres). Blanding’s turtles are found within 1 mile of refuge lands, and likely occur on several of its divisions. These turtles spend most of their time in the water. Uplands are crucial for nesting, basking, aestivating, and for traveling overland between wetlands. Blanding’s turtles have slow reproduction, and therefore, are vulnerable to any source of mortality (McCullough et al. 2003).

This region has a high responsibility for the veery (*Catharus fuscescens*) and willow flycatcher (*Empidonax traillii*), two species of concern, as indicated by their declining population trends. The willow flycatcher prefers open habitat with scattered shrubs or forest edges, including willow thickets along streams, scrub-shrub wetlands, and brushy fields. The veery prefers moist, deciduous forest, including forested wetland with a dense understory of ferns, shrubs, and saplings.

**Strategies**

*Within 5 years of implementing the CCP*

- Participate in the development of a regional conservation plan for Blanding’s turtle with state and federal partners
- Follow vernal pool best management practices
- Assess Blanding’s turtle habitat on the refuge
- Identify and survey all vernal pools on refuge lands
- Survey vernal pools before active forest management occurs and exceed vernal pool best management practices established for Maine by harvesting when ground is dry or frozen, maintaining a minimum of 75 percent canopy cover of trees of over 20-30 ft tall within 100 feet of the pool, and maintaining coarse woody debris. For areas within 100-400 feet of the vernal pool maintain a minimum of 50 percent canopy cover.
- Protect nesting habitat for songbirds by controlling the population of white tailed deer through an active hunt program and keeping herd <16 deer per a square mile.

*Within 5 to 10 years of implementing the CCP*

- Evaluate the current distribution of Blanding’s turtles on the refuge
- Develop protection and management techniques to maintain Blanding’s turtles on the refuge
- Acquire from willing sellers 995 acres of freshwater wetlands in addition to the acres remaining in the original approved refuge boundary
- Evaluate the effects of invasive species carried by stormwater runoff into freshwater wetlands, and implement invasive species control measures
- Hire a biologist (GS 9; the same position as in objective 1.1)

**Objective 2.3—  
Biodiversity (Freshwater)**

Conserve and maintain refuge native freshwater biodiversity to protect plants, animals, and natural communities of conservation concern.

**Rationale**

The refuge hosts a diverse array of freshwater habitats, home to many common and uncommon species in streams, bogs, swales, vernal pools, and forested wetlands throughout the refuge. The MNAP and MDIFW have identified and mapped several rare, exemplary, or unique freshwater natural communities and rare plants or animals at or near the refuge. Those include Blanding’s and spotted turtles and unusual bogs that support rare invertebrates and plants. In 2004, one of the vernal pools documented on the refuge contained more than 160 spotted salamander egg masses. In 2005, the refuge documented egg masses of blue-spotted salamanders. Scrub-shrub wetlands with high-bush blueberry, winterberry, and swamp rose provide fruits for fall migrating land birds.

**Strategies**

*Within 5 to 10 years of implementing the CCP*

- Work with partners to conduct a comprehensive baseline botanical survey on refuge lands
- Coordinate with the MNAP and MDIFW to implement surveys for state-listed plants, animals and invertebrates that may occur on refuge lands.

- Identify, protect and manage rare natural community types where they occur on refuge lands
- Control non-native, invasive plants that threaten the integrity of refuge lands
- Share data from vernal pool surveys to support local and national tracking of changes in amphibian communities

Within 5 to 10 years of implementing the CCP

- Participate in state efforts to survey dragonflies and damselflies
- Sponsor an event such as a “bioblitz”, where volunteers survey refuge lands to document as many different species as possible

**GOAL 3. Perpetuate the biological integrity and diversity of upland habitats to sustain native wildlife and plant communities, including species of conservation concern.**

**Background**

Presettlement land surveys of New England from 1620 to the early 1800s provide a historical picture of the distribution of forest types. Cogbill et al. (2002) describe the presettlement forest as a regional north-to-south gradient of spruce-beech-pine-oak. Beech was dominant in northern New England, while oak dominated the forests of southern New England. Oak-pine forests with minor components of hemlock, maples, beech, and birches grew in southern coastal Maine. White oak (*Quercus alba*) and pitch pine (*Pinus rigida*) were the dominant tree species in these coastal forests (Cogbill et al. 2002).

Development has eliminated, fragmented, or degraded large areas of upland habitat in coastal Maine. Lands conserved by the refuge, Wells Reserve, and other conservation groups, towns, and landowners are critical for maintaining suitable habitat for wildlife and plants, connectivity across the landscape for animal travel and migration, and enough critical terrestrial habitat to protect the health of salt marsh, freshwater, and marine ecosystems and the trust resources they support.

The refuge also contains important transitional habitats, including maritime shrubland, dry shrubland and early successional forest. The proportion of those habitats in presettlement times is uncertain. However, coastal regions are recognized as important areas for maintaining them, particularly the more stable maritime shrublands. Many species of concern are associated with shrublands and young forests. According to the Service’s Biological Integrity, Diversity, Environmental Health policy (601 FW 3), refuges should “favor management that restores or mimics natural ecosystem processes or function....” Therefore, we combined the shrubland and grassland objectives to provide greater management capability for shrublands. Although grasslands were likely not present historically in northern New England, we will manage for a small percentage since they are recognized as providing an aspect of diversity to the region.

**Objective 3.1—Early Successional (Shrubland-Grassland)**

Manage 1,715 acres of early successional habitat, with over 85 percent consisting of shrublands with a moderate-to-high density of shrubs or trees (>10,000 stems/ha), and no more than 15 percent consisting of grasslands, to sustain Maine’s New England cottontail population, to provide nesting and feeding habitat for birds of conservation concern, including eastern towhee, blue winged warbler, prairie warbler, willow flycatcher, and American woodcock, and to provide migratory habitat for land birds.

### Rationale

A range of habitat types are included under shrubland/early successional habitat (collectively called “thicket” habitat) ranging from brushy old field conditions to regenerating forests to more naturally maintained, relatively stable shrublands associated with frost pockets, poor soils, swamps, bogs, or coastal plains. Coastal states have the primary responsibility for most of the native shrubland habitat, where thicket-dependent species likely occurred historically in their highest densities. The loss and degradation of naturally maintained shrublands has been extensive throughout the region. Many of the historic conditions which perpetuated shrublands (pre-historic grazing animals, native American burning, large beaver colonies creating beaver meadows, fires, older, mature forests, small scale agriculture and insect outbreaks) are now either non-existent or tightly controlled (Askins 1998).

The suite of birds associated with naturally occurring shrublands and early successional forests in the northeastern United States accounts for about 15 percent of the total species diversity of the breeding avifauna in the region. Shrubland-associated birds consistently rank near the top of lists of species showing population declines. Partners in Flight (PIF) identified 15 shrubland birds as species of conservation responsibility in the northeast (Dettmers 2003). The refuge lies in the breeding range of several of those species, which include eastern towhee, prairie warbler, and willow flycatcher. Shrubland-associated (and forest-associated) birds have a relatively high percentage of the species, with  $\geq 10$  percent of their total breeding population in the northeastern United States.

The New England cottontail (*Sylvilagus transitionalis*) has declined significantly in the past 40 years. In August 2006, the Service designated the New England cottontail as a candidate for Endangered Species Act protection. Currently, cottontails occur as metapopulations in a variety of habitats, including shrub-dominated wetlands, idle farm fields, powerline corridors, and other patches of early successional forest. Historically it occupied shrublands associated with rocky outcrops, stream corridors, shrub-dominated wetlands, and forests regenerating after disturbances (Litvaitis et al 2003a).

Although greatly reduced in their geographic range, New England cottontails still occur along the Maine coast from the New Hampshire border to the greater Portland area. Litvaitis et al. (2003b) searched suitable sites (about 10,000 stems or more/ha) on the refuge for New England cottontails in 2003. The remnant populations in Maine use patches that are larger, have a greater density of understory vegetation, and are more frequently associated with idle farmlands than vacant patches. This cottontail species depends on dense understory vegetation to avoid predation (Litvaitis et al. 2003a).

New England cottontails were found on 5 of 29 sites inventoried on the refuge (see Litvaitis 2003b for site numbers). Those included

- Spurwink River (site 32): a 1-ha dense scrub-shrub wetland bordered by mid-successional forest in Cape Elizabeth just beyond the refuge boundary; likely too small to support cottontails in the long term
- Spurwink River (site 35): a >2-ha patch of mixed scrub-shrub wetland and early successional forest interspersed with mid-successional forest; understory stem density exceeded 35,000 stems/ha; good long-term cottontail site
- Wells (site 49): 8 ha dominated by dense scrub-shrub and early successional forest in Wells; understory stem density exceeds 14,000 stems/ha; management is needed to maintain and expand early successional habitat; only a portion of the site is on the refuge; good long-term site, with appropriate management

- Wells (site 50): a 1.5-ha patch of moderately dense (16,000 stems/ha) scrub-shrub habitat in Wells; expansion of site is needed to sustain population
- Spurwink River (site 83): a 0.3-ha patch dominated by a moderate understory (13,000 stems/ha) of autumn olive and surrounded by grasslands at Libby Field; although too small for the long term, other suitable patches lie nearby

The New England cottontail populations associated with the Spurwink River (sites 32, 35, and 83) may be part of a metapopulation in a region south of Portland. Libby Field (site 83) has the potential to support a large, sustainable population of New England cottontails if grasslands are allowed to succeed to shrubland habitat (Litvaitis et al. 2003b). Litvaitis et al. (2003b) recommend establishing and maintaining moderate-to-large patches (>10 ha) to serve as core habitats for cottontails. Smaller patches may help a local cottontail metapopulation, but small patches won't sustain it. In addition to the Spurwink River area as a core habitat, the other area that could also serve that role is near Drakes Island and the Wells National Estuarine Research Reserve (sites 49 and 50), in collaboration with private landowners (Litvaitis et al. 2003b). It is likely that other small populations of NEC inhabit the refuge. We have unconfirmed reports of them at the Goose Rocks and Goosefare Brook divisions.

The number of displaying male American woodcock was unchanged from 2002 to 2003 in the eastern United States, according to singing-ground surveys. Longer trends show a decline of 1.3 percent per year from 1993 to 2003, and 2.3 percent per year from 1968 to 2003. Between 2002 and 2003, Maine reported an increase in the breeding population, yet the overall trend in Maine since 1968 remains negative. Recent recruitment rates (the number of immatures per adult female) are 18 percent below the long-term regional average. The major causes for these declines are thought to be the loss and degradation of habitat on the breeding and wintering grounds, resulting from forest succession and changes in land use (Kelley 2003).

The restoration and maintenance of shrublands is recommended as a priority for coastal states. Managing small patches (<10 ha) as shrubland habitat can be more effective for many of the shrubland birds than managing such relatively small patches for other habitat types, such as grassland or forest, because of the relatively low patch size sensitivity exhibited by many shrubland birds compared to some of the grassland and forest birds. Consolidating and clustering patches and maintaining some large patches of shrubland habitat will provide habitat for a range of wildlife, including birds, insects, cottontails, and racers (Dettmers 2003; Litvaitis 2003).

Populations of grassland birds are declining as grassland habitats and other agricultural conditions diminish. Norment (2002) provides an eloquent commentary on the need to approach grassland bird conservation in the Northeast with "particular wisdom and care." He notes that, despite the relatively recent (last 200 years) rise and fall of grassland habitats and associated birds in New England, the region may still be important for those species, given their continental decline and habitat loss in the core of their ranges in the Midwest.

Most of the grassland bird species (e.g., grasshopper, vesper, and savannah sparrows, and eastern meadowlark) that have declined in the region require 20 acres or more of contiguous grassland habitat (Jones and Vickery 1997). Only the bobolink (*Dolichonyx oryzivorus*) occupies areas less than 10 acres, although a viable population would require a larger grassland area. Small grasslands surrounded by forest or shrubland and isolated from each other are unlikely to provide quality nesting and feeding habitat for those birds (Laura Mitchell,

personal communication). Grasslands should be fields of at least 10 acres with mixed grass 8 to 12 inches high to benefit nesting bobolink and other grassland birds. Smaller grassland areas managed for viewsheds, terms of easements, public use or biodiversity will total less than 100 acres. We recognize the need to evaluate grassland habitat management in light of other conservation priorities and assess the resources and strategies required to maintain that habitat.

### Strategies

*Within 5 years of implementing the CCP*

- Increase work with partners to secure and expand existing New England cottontail populations around the Spurwink River and Scarborough Marsh
- Intensify efforts to monitor New England cottontail populations by conducting surveys at known and potential sites on the refuge and other suitable habitats
- Identify additional areas on the refuge and on neighboring lands suitable (small, isolated areas, where mid-successional forest patches may occur; but not replacing rare habitats or intact mature (>75 years) forests or old field habitats) for shrubland management
- By 2008, determine management actions to get appropriate habitat and landscape linkages for shrubland species
- Develop early successional management tools, including prescribed fire, mechanical cutting, forest cutting, mowing, and hydroaxing
- Hire a biologist (GS 9; same position as in objective 1.1)
- Hire a refuge operations specialist (GS 5/7; the same position as in objective 1.5)

*Within 5 to 10 years of implementing the CCP*

- Acquire from willing sellers about 1,110 acres of early successional grassland/shrubland habitat in addition to the acres remaining in the original approved refuge boundary
- Evaluate newly acquired grasslands to optimize the configuration (size and shape) of designated grassland units to benefit area-sensitive birds or determine if they should be managed as a different coertype to contribute more to other wildlife priority species.
- By 2010, in the core habitats identified by Litvaitis et al. (2003b), restore and maintain moderate (>10 ha) to large (>25 ha) shrubland/early successional patches for New England cottontail and other habitat associates
- By 2015, establish a NEC population on at least two new sites on the refuge or partner-owned lands
- Evaluate the role of invasive shrub species in providing cottontail habitat and determine the feasibility of replacing invasive plants with native shrub species

### Objective 3.2—Deciduous Evergreen, and Mixed Forest

Maintain approximately 6,700 acres of mature, deciduous, evergreen and mixed forest habitat in a gradient of dry to moist conditions, with a long term goal of the majority of trees reaching >12 inches dbh (where site capacity enables), consisting of a well-developed understory, abundant dead wood, and a multi-layered canopy to provide breeding habitat for landbirds of highest conservation concern, including wood thrush, scarlet tanager, rose-breasted grosbeak, and black-billed cuckoo.

### Rationale

Northern hardwood and mixed forests are the most widely distributed habitat type in the PIF 9 planning region. Bird species associated with that habitat occur throughout the region, yet some show declining population trends. The North American Landbird Conservation Plan identifies wood thrush (*Hylocichla mustelina*) as a species of continental importance, and calls for a 50-percent increase in the continental population (Rich et al. 2004).

The refuge is approximately 35 percent tidal, 10 percent freshwater wetlands and 55 percent uplands. Most of the upland forests consist of mixed oak and pine forest; however, hemlock, spruce and pitch pine stands occur as well as hickory and maple forests. Viburnums, winterberry, blueberry, serviceberry, Virginia rose and male berry compose much of the shrub understory. Habitats are quite diverse, containing elements from the more southern oak-pine forests and the softwood forests of the north. Southern Maine is where those two community types blend, and create a wealth of biodiversity.

The wood thrush prefers mature, moist, closed-canopy forest with a shrub-subcanopy understory, moist soil, and leaf litter (DeGraaf and Yamasaki 2001). Other birds of conservation concern in BCR 30 associated with this habitat type include black-and-white warbler (*Mniotilta varia*), rose-breasted grosbeak (*Pheucticus ludovicianus*), scarlet tanager (*Piranga olivacea*), purple finch (*Carpodacus purpureus*), Baltimore oriole (*Icterus galbula*), black-billed cuckoo (*Coccyzus erythrophthalmus*), and Louisiana waterthrush (*Seiurus motacilla*) (Rich et al. 2004). A diverse forest structure will benefit a range of species that inhabit mixed forest. Wood thrushes forage in the leaf litter and understory vegetation, while scarlet tanagers forage in the forest canopy.

### Strategies

*Within 5 to 10 years of implementing the CCP*

- Designate large forest blocks to benefit BCR 30 priority nesting and migratory birds
- Continue to work with the Maine Forest Service and other partners on maintaining forest health, including the control of invasive plants and forest pests, such as hemlock wooly adelgid and glossy buckthorn
- Evaluate the health of these forested stands to determine whether active management is needed to enhance their condition and ensure longevity. Develop stand prescriptions, including the consideration of regeneration to maintain desired species composition and stand structure. Also, evaluate the plant species composition in the understory and forest floor; a vital component of the overall habitat quality for many species of conservation concern
- Acquire from willing sellers 2,991 acres of mixed forest, in addition to the acres remaining in the original approved refuge boundary
- Protect nesting habitat for songbirds by controlling the population of white tailed deer through an active hunt program and keeping herd below 16 deer per a square mile

### Objective 3.3— Biodiversity (Uplands)

Conserve and maintain refuge upland native biodiversity to protect plants, animals, and natural communities of conservation concern.

### Rationale

Upland forests in southern Maine typically are mixed hardwood pine communities. However, species typical of more northern and southern climates (e.g., pitch pine,

hemlock, spruce, sassafras, and black tupelo) also occur on the refuge, creating a diverse upland habitat community. Upland thicket, shrubland, and sandplain grassland add to that habitat diversity and support many declining species, such as black racers and rare invertebrates. The MNAP and MDIFW identified and mapped several rare, exemplary, or unique natural communities and rare plants or animals at or near the refuge. Rare plants in upland habitats include black tupelo, sassafras, white wood aster, pale green orchis, and wild coffee. Uncommon animals include ribbon snake and Blanding’s turtle. Those natural communities, plants and animals, common and rare, provide a unique contribution to the ecological diversity of the area.

**Strategies**

*Within 5 years of implementing the CCP*

- Work with partners to conduct a comprehensive baseline botanical survey on refuge lands
- Coordinate with MNAP and MDIFW to implement surveys for state-listed plants, animals and invertebrates that occur on refuge lands.
- Control non-native, invasive plants that threaten the integrity of refuge lands
- Seek appropriate opportunities to participate in the New England Wildflower Society/MNAP rare plant monitoring program
- Hire a refuge operations specialist (GS 5/7; the same position as in objective 1.5)

*Within 5 to 10 years of implementing the CCP*

- Inventory bat populations
- Participate in the State of Maine sampling of owl populations
- Sponsor an event such as a “bioblitz”, where volunteers survey refuge lands to document as many different species as possible

**GOAL 4. Develop the Rachel Carson National Wildlife Refuge as an outstanding center for research and demonstration emphasizing land management techniques for restoring and sustaining healthy estuarine ecosystems in concert with the National Land Management Research and Demonstration (LMRD) program.**

**Objective 4.1—Research**

Identify high-priority estuarine ecosystem management research needs, develop research proposals, and facilitate and implement research projects.

**Rationale**

The techniques used in land and habitat management are constantly changing and being fine-tuned as our knowledge of species’ requirements increases and technology advances. For the LMRD sites to function as premier examples of habitat-based land management, experimenting with new management techniques is essential. Likewise, the techniques used at these sites must be validated and proven effective before they will be fully implemented by other land managers. That is best accomplished through an active, diverse research program.

Salt marsh ecosystems along the Atlantic coast have been altered and manipulated for nearly 400 years since the arrival of European settlers. Since 1600, coastal states from Virginia to Maine have lost between 9 percent and 74 percent of their wetlands. Salt marshes in the mid-Atlantic states (NJ, NY, CT, MA) and elsewhere along the Atlantic coast were extensively ditched and drained before the 1940s

### Land Management Research Demonstration (LMRD)

In 1999, Fulfilling the Promise Recommendation WH 18 launched the nationwide Land Management Research and Demonstration (LMRD) Program so that state-of-the-art land management techniques aimed at providing healthy habitats for fish, wildlife, and plants could be developed and implemented at participating national wildlife refuges (USFWS 1999). The LMRD program also seeks to bring those techniques to key audiences outside and inside the Service, through a variety of outreach methods, including tours, workshops, collaborative research projects and publications. Although the ultimate goal is to establish two LMRD programs in each region, only five existed in the country in 2005. Therefore, the Rachel Carson—Parker River LMRD program is in a leadership position to craft the future shape of the program as well as specific innovations in estuarine habitat management and restoration.

Each LMRD program was enacted on a competitive basis. Given the national concern about the threats to and importance of salt marsh, the Rachel Carson-Parker River LMRD proposal, with its focus on salt marsh and associated estuarine habitat, ranked first among 14 applications from around the nation. Rachel Carson NWR salt marshes occur south of Portland, Maine and include the Webhannet/Ogunquit system, the second largest salt marsh complex in the state. Associated estuarine waters run from tidal freshwater streams and rivers to small coastal embayments.

These areas have been degraded by human alteration including increasing development (see goal 1). Nevertheless, the salt marshes and associated waters support large numbers of the Refuge's trust species including salt marsh and Nelson's sharp-tailed sparrows, willet, black duck and other waterfowl, shorebirds, and wading birds. Trust fish species include American eel and anadromous fish such as alewife, blueback herring and menhaden.

for mosquito abatement and for salt marsh haying operations. For example, by 1934 in Massachusetts, more than 3,000 miles of ditches had been dug, of which approximately 1,000 were located between Gloucester and Salisbury. By the time ditching halted in World War II, 9 of every 10 acres of salt marsh in New England had been drained. Nationwide, an estimated 105 million acres of wetlands remain, of which only 5 million acres are salt marsh. The potential and need for research into improved management and restoration is high. Research in estuarine ecosystems at this LMRD refuge will benefit many federal trust resources, including waterfowl, shorebirds, marsh and wading birds, terns, loons, anadromous and inter-jurisdictional fish and other aquatic resources.

As of 2005, we do not know the extent of SAV and macroalgae beds at the refuge. Through the LMRD, we can locate existing SAV habitat, evaluate its health, and identify potential restoration sites, applying new techniques and advancing the science and practice of managing and restoring SAV. This habitat is a resource we need to identify more clearly on the refuge, in order to protect it for use by trust species.

The work of a number of organizations relates to salt marshes and estuarine habitats. Partnering with them benefits the organizations involved (including the Rachel Carson/Parker River LMRD), salt marsh and estuarine habitats, and restoration and land management science. Present partnerships include the

National Park Service, Natural Resource Conservation Service, Environmental Protection Agency, National Oceanic and Atmospheric Agency, Wells National Estuarine Research Reserve, University of New Hampshire, University of Rhode Island, University of Connecticut, University of New England, and Ducks Unlimited. Those partnerships are often project-specific and very fluid. Our aim is to make them more long-term, to promote the advantages of working with the LMRD areas of the Rachel Carson and Parker River refuges.

### Strategies

*Within 5 years of implementing the CCP*

- Continue partnerships to further research estuarine ecosystem restoration, management and conservation
- Continue to collaborate with partners to provide financial support for research projects
- Continue research projects on the refuge to test different habitat-specific restoration techniques
- Continue to test habitat management techniques, and ensure that findings are documented, subjected to peer review, and published in appropriate journals
- Review existing work and develop a repository of information on the function and management of estuarine habitats
- Develop a methodology for evaluating the condition and restoration potential of salt marsh and ranking a list of areas to be restored
- Identify restoration methods and best management practices for areas on that ranked list
- Obtain funding to support a graduate student through such programs as the National Fish and Wildlife Foundation scholarship program
- Test and develop new habitat management techniques, and ensure that findings are documented, subjected to peer review, and published in appropriate journals
- By 2008, identify and incorporate into the design of a new administrative office building the needs of our facility to support field and laboratory research, including housing for visiting researchers

*Within 5 to 10 years of implementing the CCP*

- Expand further partnerships to advance research in restoring, managing, and conserving estuarine ecosystems
- Expand collaborations that provide financial support of research projects
- Identify existing SAV and macroalgae sites and evaluate their restoration potential

### **Objective 4.2— Demonstration (Internal and External Audiences)**

Demonstrate advances in habitat management techniques to other refuges and land managers, the scientific community, and the general public, to promote the wider application of estuarine ecosystem restoration and sustainable management.

### Rationale

The essential purpose of the Salt Marsh/Estuary LMRD program is to effectively communicate sound salt marsh management techniques, enabling visiting

land managers to understand, evaluate, and duplicate our models. The inter-jurisdictional nature of salt marshes extends that outreach component to an enormous audience. Millions of people live within a short drive of the refuges.

Target audiences primarily include land managers, particularly at all coastal national wildlife refuges. Other agencies, such as the National Park Service, permitting agencies such as the Army Corps of Engineers and Environmental Protection Agency, Massachusetts and Maine state parks and wildlife areas, planning commissions and other conservation organizations will also benefit.

The refuge has already established relationships with its 11 neighboring coastal municipalities in Maine, and will include them in its outreach. In Massachusetts, the Parker River refuge is working on a similar plan with nearby Newbury, Newburyport, Ipswich, Rowley, and other municipalities.

Interpreting our work to landowners is essential in our outreach strategies. We are now producing interpretive signs about salt marshes to complement our current salt marsh management. We will place them where visitors can learn about restoration, including the new refuge contact station that enables us to interpret the Salt Marsh/Estuary LMRD site for 260,000 people who visit the refuge.

### **Strategies**

#### *Within 5 years of implementing the CCP*

- Select appropriate restored salt marsh areas for demonstration sites
- Pursue funding each year to bring on a graduate student, two additional seasonal field assistants, and an intern
- Develop annual programs of workshops and courses designed to educate other land managers about the methods demonstrated at the refuge
- Publish research results in appropriate journals
- Develop educational materials, such as posters, videos, and publications, to explain pertinent land management techniques
- Demonstrate at least one salt marsh restoration project every 2 years by restoring tidal flow, removing fill, creating pools, plugging ditches, or restoring tidal creeks on refuge- or partner-owned lands
- Incorporate management assessment and adaptive management options in all projects using new field techniques, in order to determine their long-term effects and potential, unintended consequences. That will serve both the research and demonstration functions of the LMRD.
- By 2007, use the Internet to disseminate relevant habitat management information
- By 2008, establish library materials accessible to resource practitioners and researchers
- Hire a biologist (GS 9; RONS 02007)

#### *Within 5 to 10 years of implementing the CCP*

- Monitor the health and integrity of salt marsh habitat, including changes in marsh elevation in relation to sea-level rise or sudden salt marsh dieback

**Objective 4.3—Integration** Integrate the LMRD program with refuge operations, management programs and actions, and use adaptive management in responding to new research findings or applied management techniques.

**Rationale**

All staff will be well versed in the specific missions of the LMRDs at both the Rachel Carson and Parker River refuges, as well as the national context of this new, intense program, in order to explain LMRDs to the public in both formal and informal settings. For that to succeed, we anticipate that staff at both stations will provide input on the production of audience-specific outreach tools. Integrating the results of the LMRD program with refuge outreach programs is ideal. However, will also require short- and long-term planning with existing and proposed staff. When they present the program, they will integrate with it the message of the Refuge System and the refuges.

Because one goal of the LMRD is to demonstrate land management techniques for restoring and sustaining healthy estuarine ecosystems, refuge staff will be involved in implementing cutting-edge management techniques on refuge lands. That refuge staff understand the nature, purpose, and importance of those activities is vital. Their awareness will enable them to implement the new techniques and improve communication with the LMRD biologist on project successes and difficulties.

**Strategies**

*Within 5 years of implementing the CCP*

- Communicate the mission and basic activities of the LMRD program at both the refuge and national level to refuge staff, to keep them informed and involved in on-going projects as appropriate.
- Continue to provide material about LMRD projects to refuge staff for distribution at interpretive programs and in other outreach.
- Integrate new or refined estuarine management techniques with on-going management efforts (e.g., advances should be adopted by the refuge as part of best management practices and to demonstrate the mission of the LMRD)
- Direct LMRD staff to seek external funding for outreach, to complement assistance from outreach staff
- Continue to include LMRD information on the refuge website

**GOAL 5. Increase appreciation and stewardship of coastal Maine wildlife and their habitats by providing positive wildlife-dependent experiences for refuge visitors.**

**Background**

The refuge offers countless wildlife-related experiences. Maps 4-1 to 4-11 on the following pages illustrate existing public use opportunities and facilities available on the refuge, and those proposed in this plan. However, more visitors bring more human impacts, and we need to implement ways to minimize their potentially damaging effects on habitat and wildlife. We and our grandchildren can use and enjoy these natural treasures by following the wilderness principles of “Leave No Trace,” modified here for the refuge.

- Plan Ahead and Prepare
- Travel on Durable Surfaces

- Dispose of Waste Properly
- Leave What You Find
- Be Careful with Fire
- Respect Wildlife
- Be Considerate of Other Visitors

Recreational uses also require the maintenance, replacement, or repair of trails, observation platforms, parking areas, directional and interpretive or other signs, and printing brochures, trail guides, and maps. Visitation is expected to grow beyond its present level of 300,000 and, concurrently, the requests it brings for recreational services.

The refuge will institute a pilot recreation fee program to charge and collect an entrance fee for the refuge. The trial fee program will be established under the Federal Lands Recreation Enhancement Act (REA), 16 U.S.C. 6801 et seq. (P.L. 108–447). REA authorizes the Secretary of the Interior to establish, modify, charge and collect recreation fees at federal recreation lands and waters, including units of the National Wildlife Refuge System. REA replaces the Recreation Fee Demonstration Program and authorizes the Recreation Fee Program through 2014. At least 80 percent of the funds raised from recreation fees charged and collected on a particular refuge in this region will be used at that refuge to enhance visitor services and reduce the backlog of maintenance needs for recreation facilities, such as trail maintenance, toilet facilities, boat ramps, hunting blinds, and interpretive signs and programs. Recreation fees may not be used to pay for biological monitoring on federal recreational lands and waters under the Endangered Species Act for listed or candidate species. The remaining 20 percent of funds is sent to the region to be distributed to other refuges. In previous years, the Rachel Carson refuge has received money from these regional funds for public use facilities.

The REA instructs the Service, along with other federal land management agencies, to develop the America the Beautiful Pass, which covers the entrance fee and standard amenity fee for federal recreational lands. The new pass replaces the current Golden Eagle, Golden Age, and Golden Access Passports, as well as the National Parks Pass and will let visitors gain entrance to federal lands managed by the five participating bureaus or agencies that are open to recreation. Existing National Park passes, Golden Eagle, Golden Age, and Golden Access Passports will be grandfathered in under their existing benefits and will remain valid until expired. These passes will continue to be sold until the new pass is available. Details of the America the Beautiful Pass still need to be determined and the pass will not be available until 2007. Site-specific and regional passes, such as the Federal Duck Stamp, will remain valid and will continue to be available under this Act.

The following recreation fee program will be initiated:

- A daily entrance fee will be charged per person. Our proposed fee will be \$1 per day.
- Daily entrance fees will be collected at self-service fee collection stations.
- An annual pass for the Carson Trail at Headquarters in Wells and the Cutts Island trail in Brave Boat Harbor Division will be available for \$12.

- A 5-year Refuge Wide Pass will be available for \$250.00. This is a special use permit, with accompanying terms and conditions. This will allow access to all but the most sensitive areas of the refuge year-round. Pass holders must comply with all refuge rules and regulations and will be issued maps showing access areas.
- The Refuge Wide Pass is only available at the refuge headquarters.

The following Fishing Permit Fee Program will be implemented in conjunction with the fishing program. We will charge an annual fee of \$10 for a refuge fishing permit. This permit will be valid for all bank access areas open on the refuge. Anglers must possess a valid fishing license and comply with State regulations. There may be a need to limit fishing during certain seasons or conditions to ensure a safe, high-quality program. Details of these restrictions and any application requirements will be outlined in the Fishing Management Plan. Based upon these restrictions, purchase of a permit does not guarantee the ability to fish all refuge access sites during all seasons.

We realize that a new recreation fee program will require an adjustment period. The REA directs the Secretary of the Interior to publish advance notice in the Federal Register six months before new recreation fee areas are established. We will post a notice at the collection site informing the public of the anticipated entrance fees. We may adjust fees periodically to reflect changes in administrative costs, management goals, or public comment, and will notify the public at least six months before any such adjustment.

**Objective 5.1—  
Interpretation**

Starting in 2015, at least 90 percent of refuge visitors will be exposed to interpretive information about the refuge and its significance for wildlife conservation. They will be introduced to at least one action that benefits refuge habitat types, migratory birds and other trust resources.

**Rationale**

Interpretation is one of the most important ways we can raise our visibility, convey our mission, and identify the significant contributions of the Refuge System and this refuge to wildlife conservation. Public understanding of the Service and its activities in the State of Maine is now very low. Refuge visitors often confuse our agency with the Maine Department of Inland Fisheries and Wildlife. Many are unaware of the Refuge System and its scope, and most do not understand the importance of the refuge in the conservation of migratory birds and other wildlife and their habitats.

A refuge named for Rachel Carson has a special responsibility to the interconnectedness of all living things. Through our expanded interpretation program, visitors will gain a better understanding of its unique, important contribution to local, regional, and national wildlife conservation. That greater awareness will lead to more support for wildlife conservation on and off the refuge. Our proposed future programs will achieve our objectives by increasing visitor contacts, on-site programs, and a new, improved infrastructure. To accomplish that critical link in our refuge mission effectively, we will build and staff a new visitor contact station and refuge headquarters.

**Strategies**

*Within 5 years of implementing the CCP*

- Provide interpretative materials at headquarters, including a general refuge leaflet, a Carson Trail guide, and lists of birds, mammals, reptiles and amphibians.

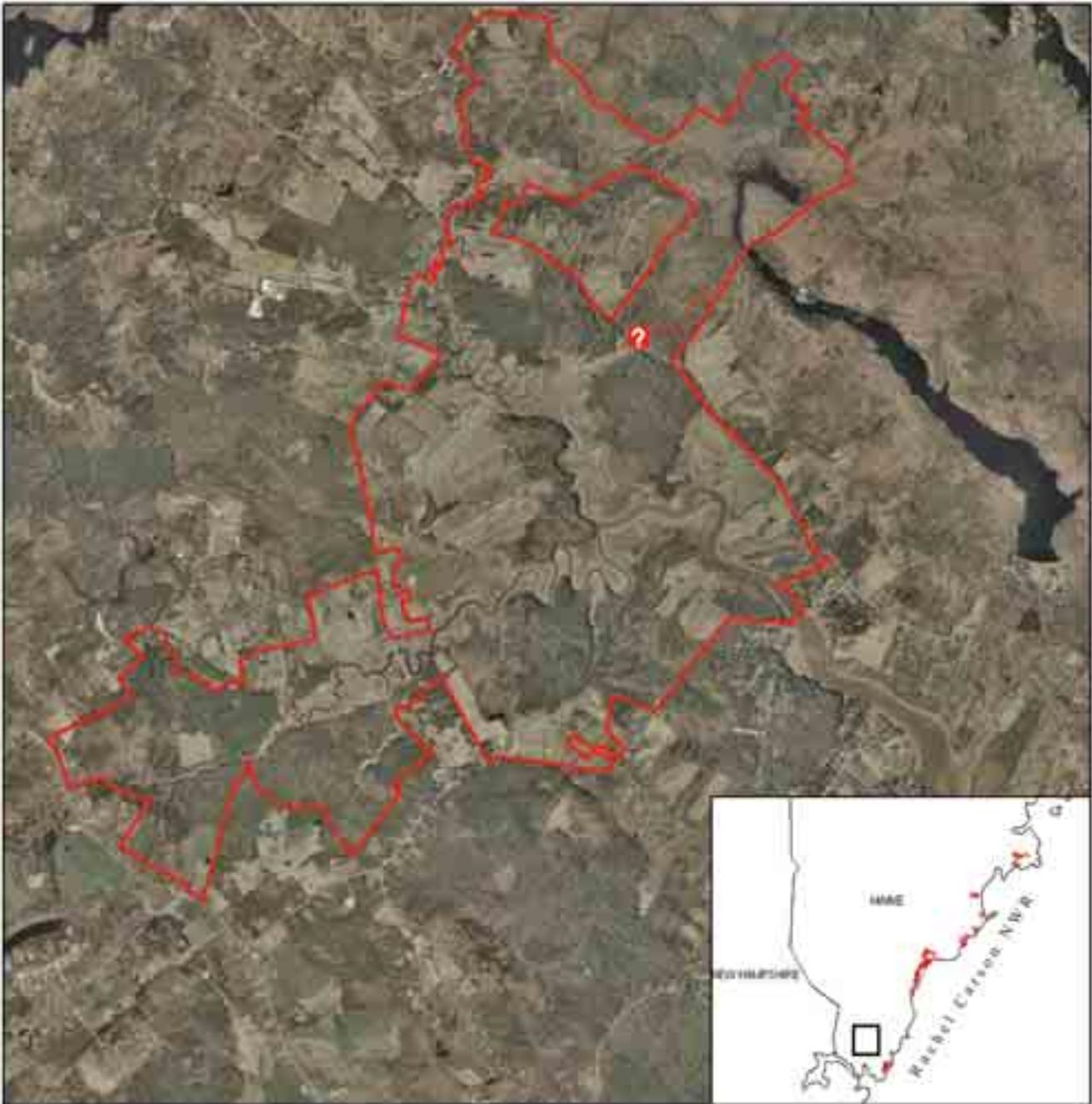




U.S. Fish and Wildlife Service

Public Use

Rachel Carson National Wildlife Refuge - York River Division (Proposed) - Map 4-2



**Kiosks**

- Existing
- Proposed

**Trails**

- Existing Trail
- Proposed Trail

**RC NWR Boundary**

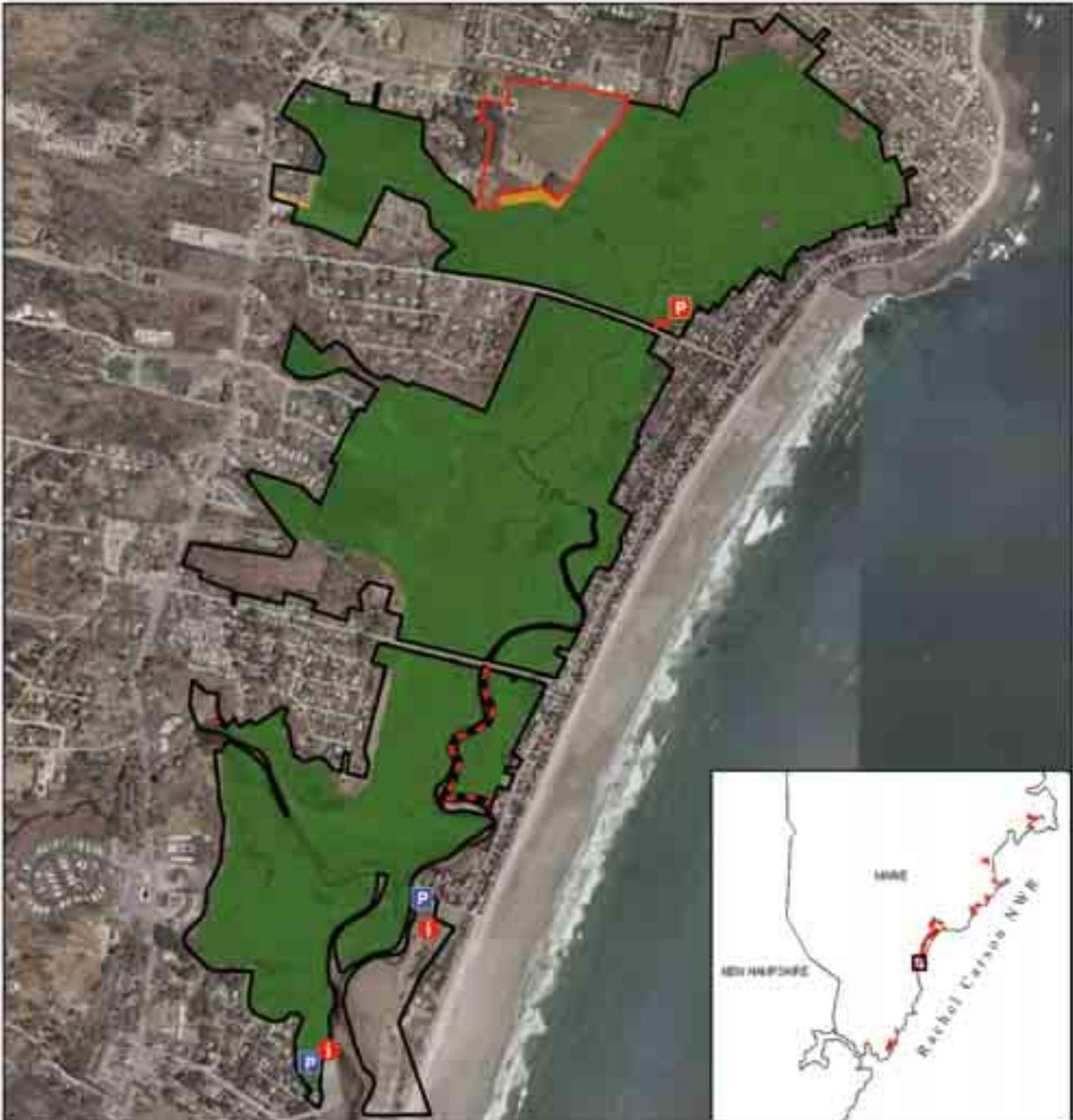
- Approved for Acquisition
- Easement
- Ownership
- Proposed Expansion Areas



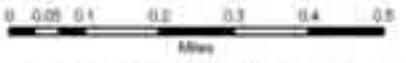
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Boundary and other data USFWS, Photos State of Maine, 2011  
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U.S. Fish and Wildlife Service Public Use  
 Rachel Carson National Wildlife Refuge - Moody Division - Map 4-3



- |               |                   |                          |
|---------------|-------------------|--------------------------|
| <b>Kiosks</b> | <b>Parking</b>    | <b>RC NWR Boundary</b>   |
| Existing      | Existing          | Approved for Acquisition |
| Proposed      | Proposed          | RC NWR Ownership         |
| <b>Signs</b>  | Fishing Areas     | RC NWR Easement          |
| Existing      | Proposed Platform | Proposed Expansion Areas |
| Proposed      |                   |                          |



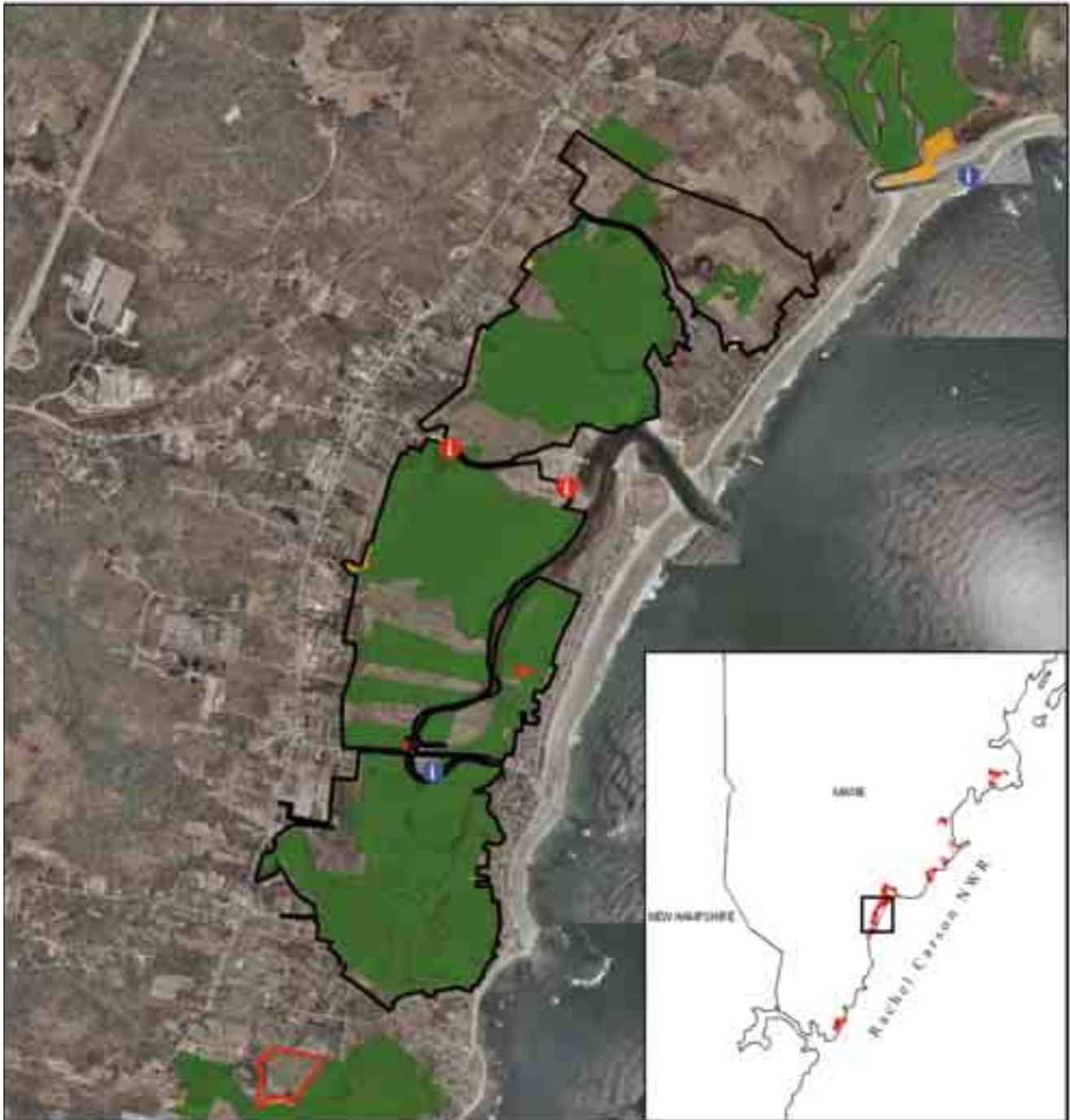
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U.S. Fish and Wildlife Service

Public Use

Rachel Carson National Wildlife Refuge - Lower Wells Division - Map 4-4



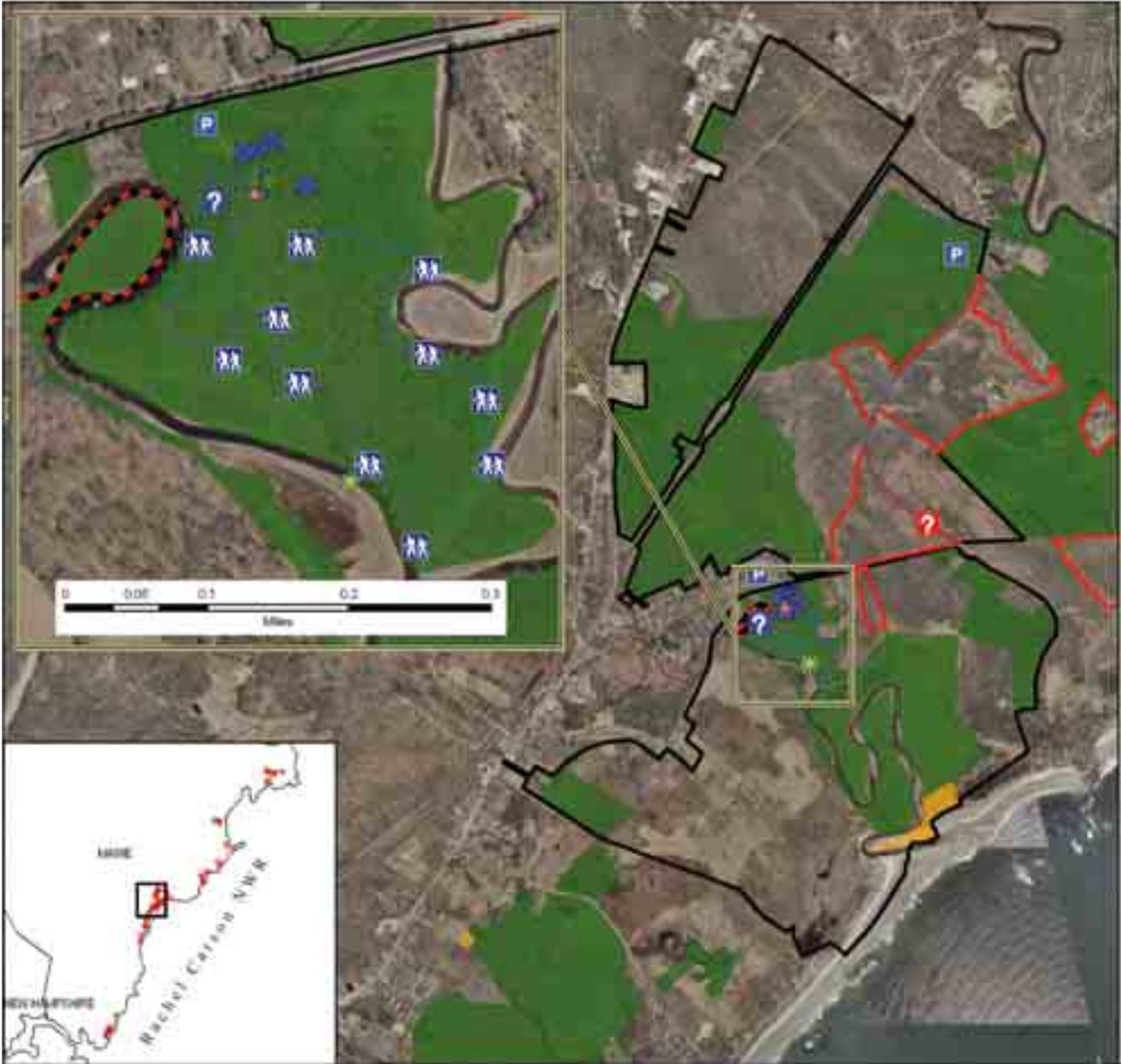
- |              |                   |                        |                          |
|--------------|-------------------|------------------------|--------------------------|
| <b>Signs</b> |                   | <b>RC NWR Boundary</b> |                          |
|              | Existing          |                        | Approved for Acquisition |
|              | Proposed          |                        | Proposed Expansion Areas |
|              | Fishing Areas     |                        | RC NWR Ownership         |
|              | Proposed Platform |                        | RC NWR Easement          |



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Rachel Carson National Wildlife Refuge - Upper Wells Division - Map 4-5



- |               |                |                           |                          |             |
|---------------|----------------|---------------------------|--------------------------|-------------|
| <b>Kiosks</b> | <b>Parking</b> | <b>Existing Buildings</b> | <b>RC NWR Boundary</b>   |             |
| Existing      | Existing       | Headquarters              | Approved for Acquisition | Platform    |
| Proposed      | Restrooms      | Headquarters              | RC NWR Ownership         | Trail Point |
| <b>Signs</b>  | Memorials      | Fishing Areas             | RC INNR Easement         |             |
| Proposed      |                | Existing Trail            | Proposed Expansion Areas |             |
|               |                | Proposed Trail            |                          |             |



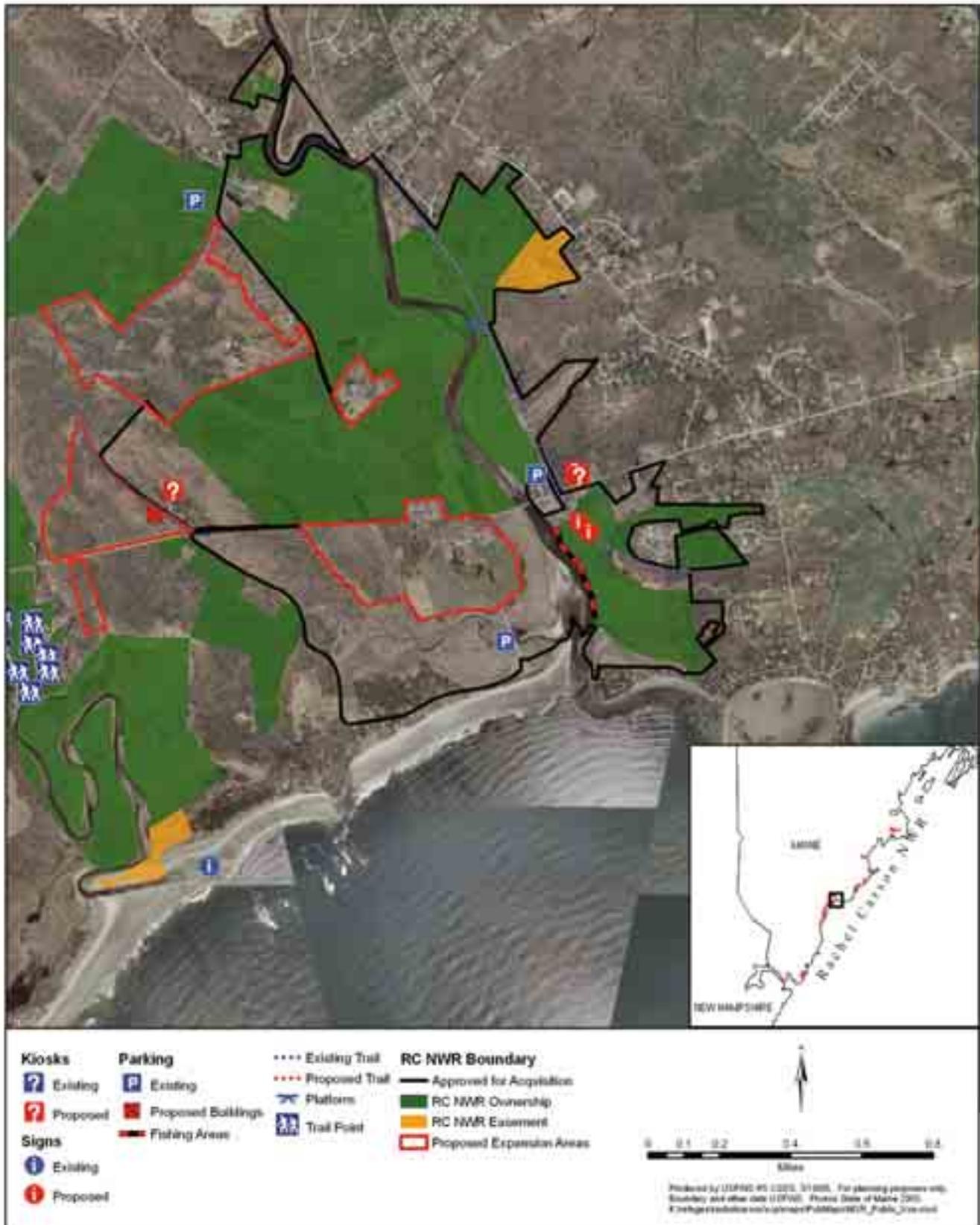
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U.S. Fish and Wildlife Service

Public Use

Rachel Carson National Wildlife Refuge - Mousam River Division - Map 4-6

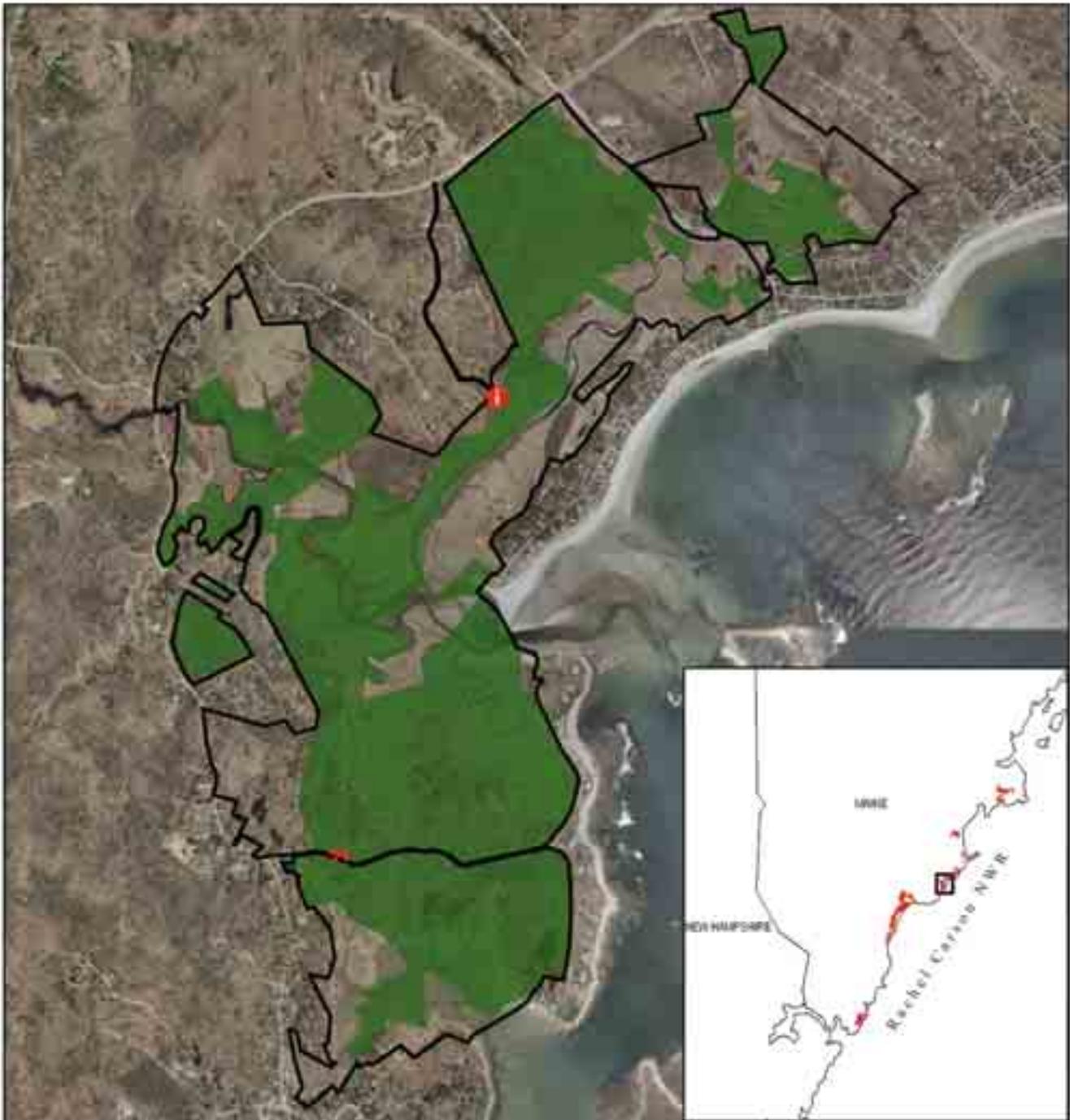




U.S. Fish and Wildlife Service

Public Use

Rachel Carson National Wildlife Refuge - Goose Rocks Division - Map 4-7



Signs

- Existing
- Proposed
- Proposed Platform

RC NWR Boundary

- Approved for Acquisition
- RC FWR Ownership
- RC FWR Easement
- Proposed Expansion Areas



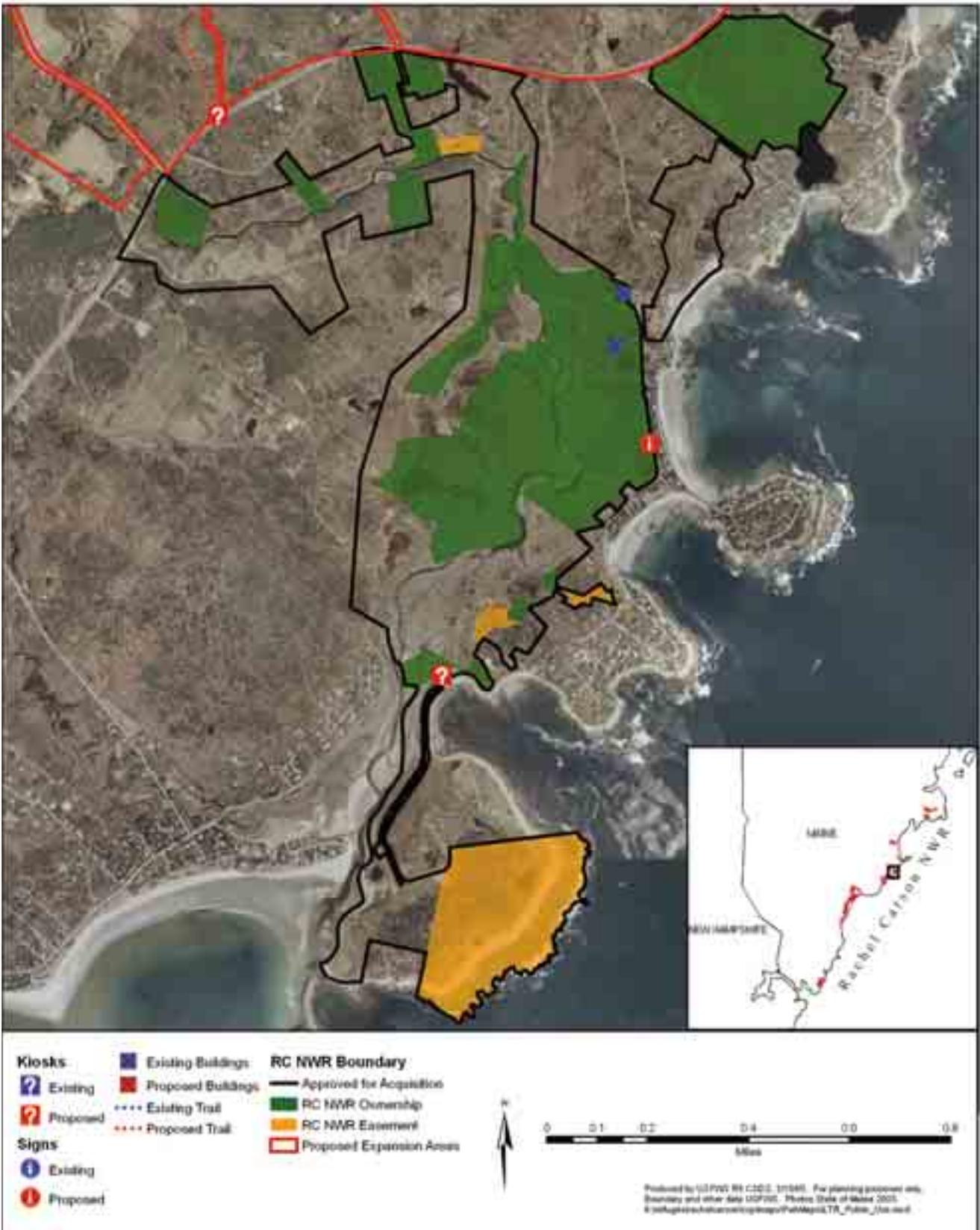
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U.S. Fish and Wildlife Service

Public Use

Rachel Carson National Wildlife Refuge - Little River Division Map 4-8

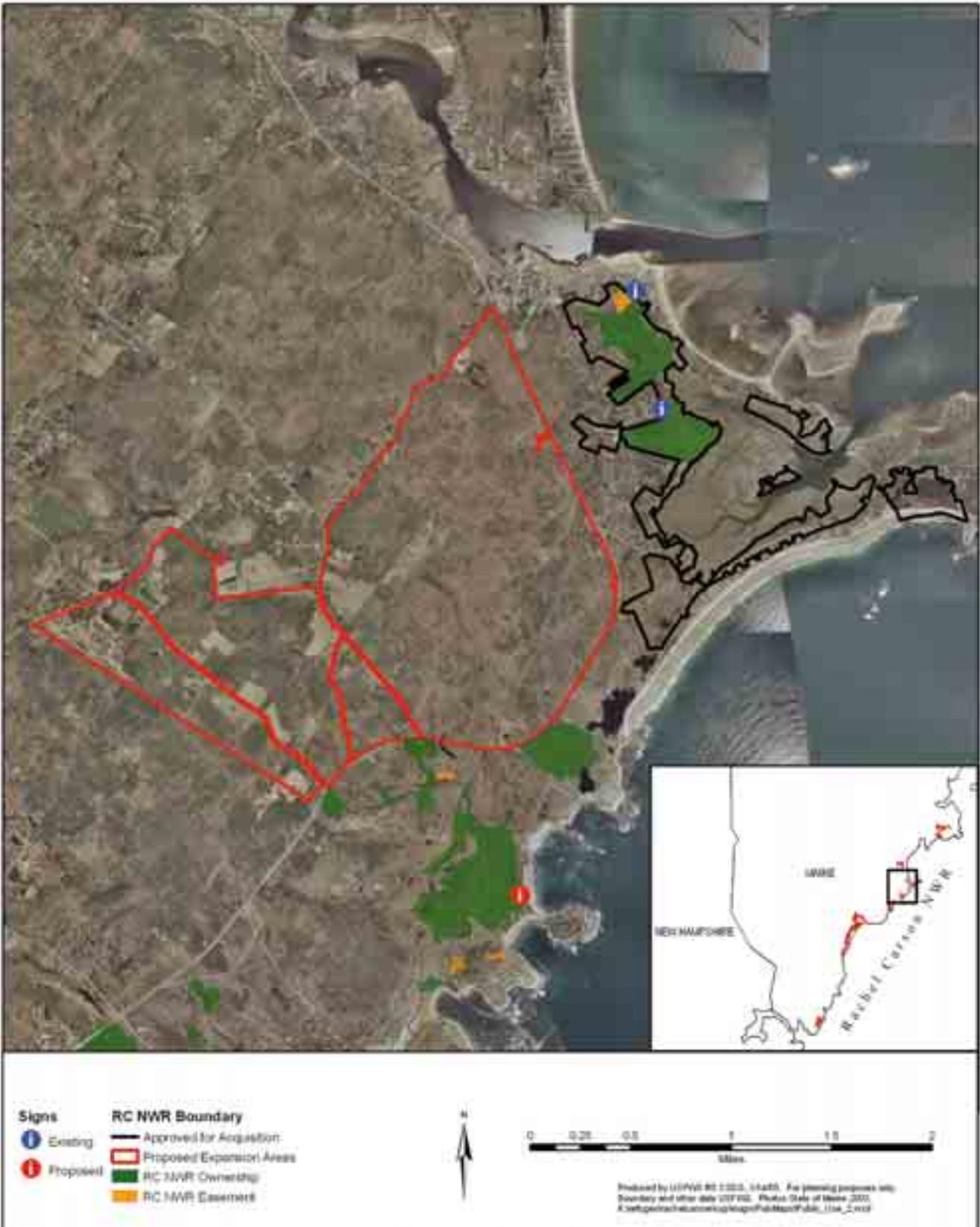




U.S. Fish and Wildlife Service

Public Use

Rachel Carson National Wildlife Refuge - Biddeford Pool Division - Map 4-9

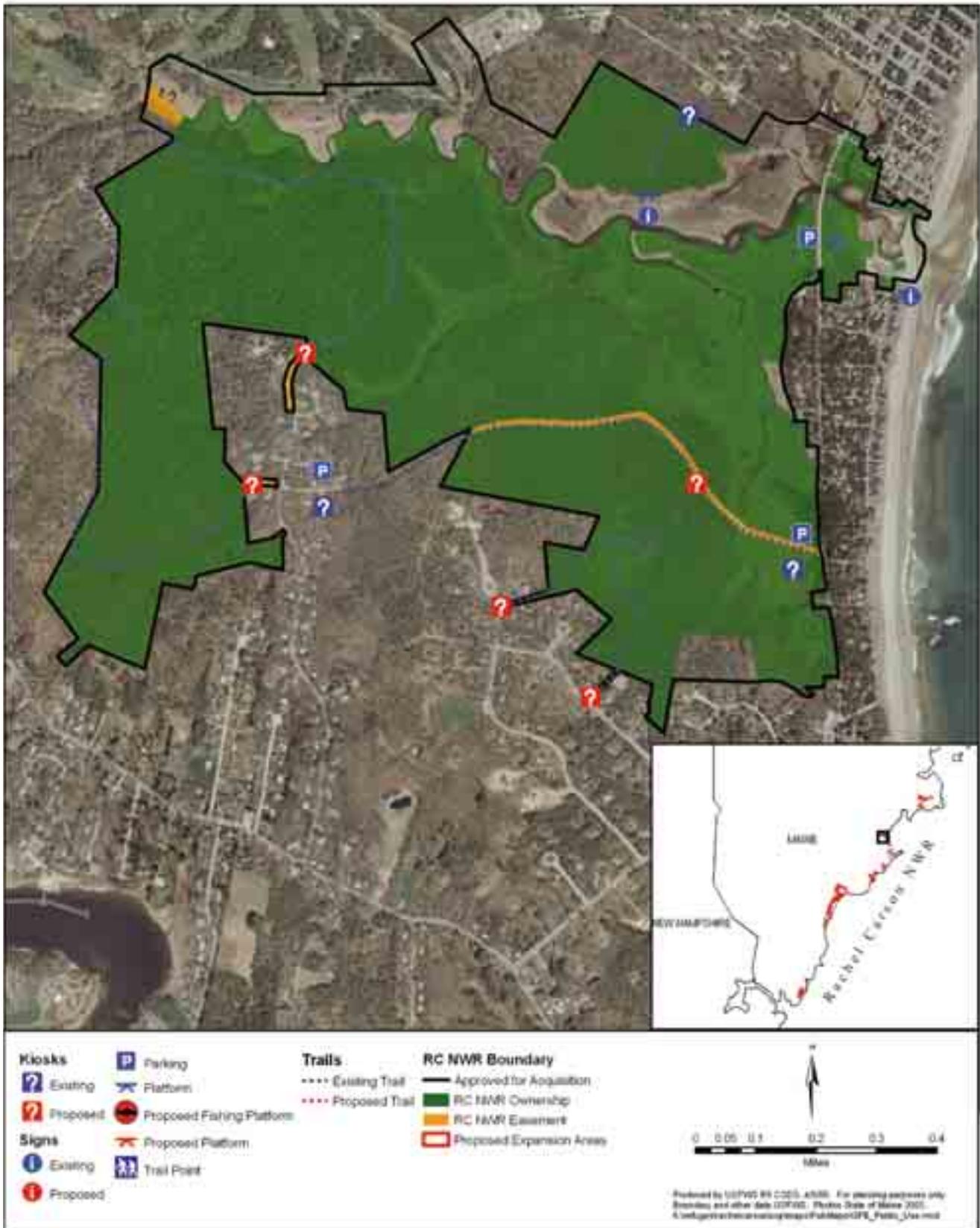


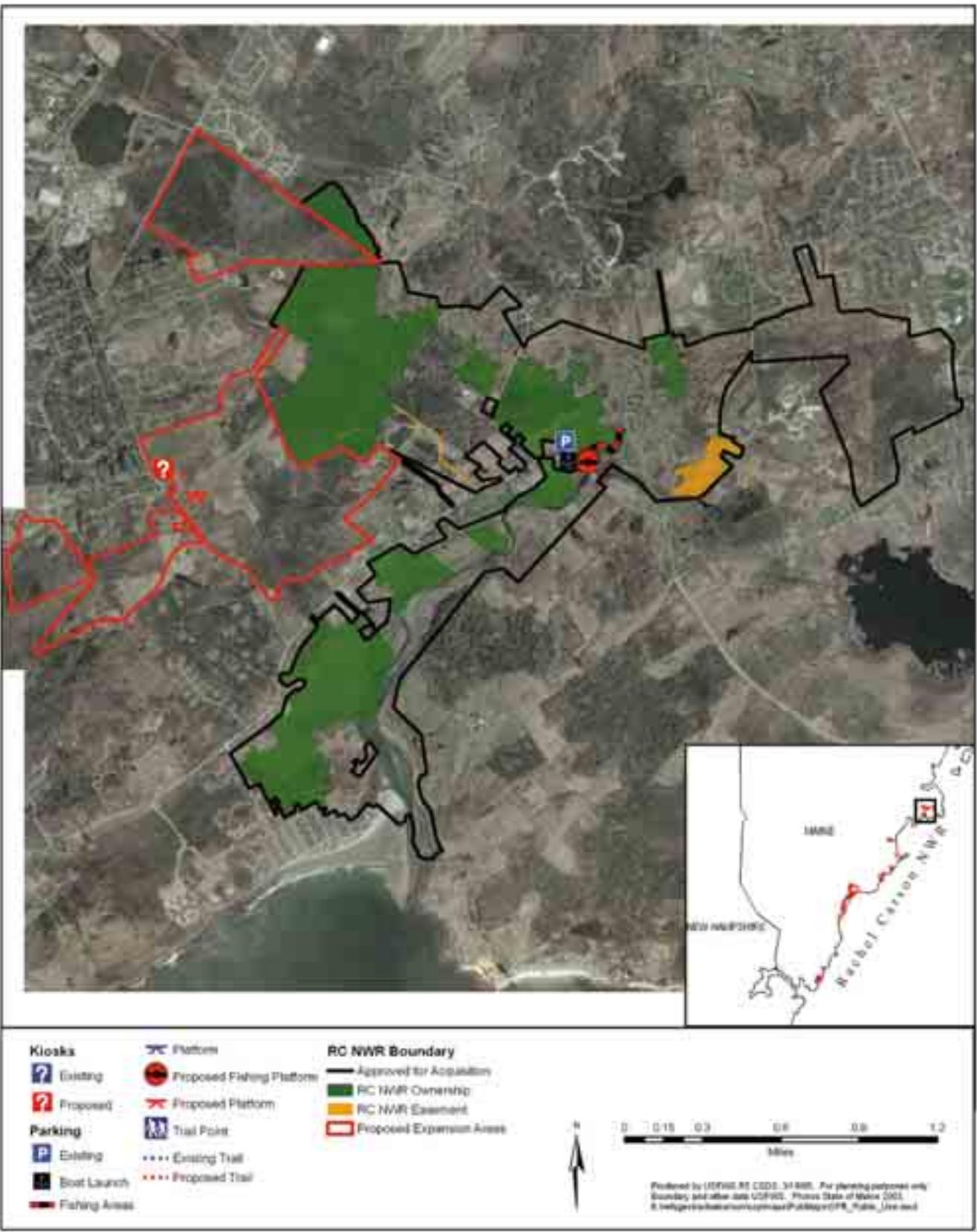


U.S. Fish and Wildlife Service

Public Use

Rachel Carson National Wildlife Refuge - Goosefare Brook Division - Map 4-10





- Provide weekly interpretation programs in the summer
- Update the kiosk at the Carson trail head
- Install interpretive signs or kiosks along roadsides at each of the 11 divisions
- Interpret trust resources and refuge management actions on all trails.
- Develop interpretive programs that incorporate information from regional conservation plans (e.g., Bird Conservation Regions) and refuge documents (e.g., habitat management plan)
- Develop interpretative signs at Cutts Island Trail
- By 2007, host summer interpretive programs, and expand them once the new contact station is built
- Maintain and expand the refuge internship program
- Explore cost-sharing staff positions, such as a shared volunteer coordinator, with the Wells National Estuarine Research Reserve
- Continue to host non-residential Youth Conservation Corps camps to build trails, control invasive species, and achieve maintenance standards
- Hire a Park Ranger/Law Enforcement (GS 5/7; same position as in objective 1.5)

*Within 5 to 10 years of implementing the CCP*

- Develop trails on newly acquired land, using Hart Road in Upper Wells Division, the trolley line in Brave Boat Harbor, and the woods trails in Little River Division and Greenbelt in the Spurwink Division.
- Link northwest and southeast Kennebunkport by extending the Conservation Trust trail through Goose Rocks Division
- Provide water access on York River Division, explore municipal open space plans and, where possible, link trails and wildlife conservation messages with conservation partners

**Objective 5.2—  
Environmental Education**

Within 10 years of completing this plan, and by working with our neighbors and the schools in the 12 towns near the refuge, 50 percent of all 4th to 6th graders, landowners, and elected officials in those communities will perceive (1) the refuge as a local and national treasure, (2) the refuge as a place where wildlife comes first, and (3) the refuge as part of a national system, the world's largest collection of land and water managed specifically for wildlife.

**Rationale**

More than 1 million visitors arrive in southern Maine each year, adding to the combined 500,000 permanent residents of York and Cumberland Counties. The Rachel Carson refuge currently receives more than 250,000 visitors annually. Each year, those visitors come from almost every state in the United States, every province in Canada, and from all corners of the world. Most are drawn by the name, Rachel Carson, named by Time magazine as one of the 100 most influential people of the 20th Century. In fact, Rachel Carson, the former Editor-in-Chief of the Fish and Wildlife Service, is credited with starting the modern environmental movement after publishing her book "Silent Spring."

The refuge is in a unique position among other refuges in the northeast region and nationwide to take advantage of its eponym, draw thousands of visitors, and educate them about wildlife conservation and man's affect on the environment. An environmental education program at the refuge will introduce visitors and residents alike to the work of the Fish and Wildlife Service, the National Wildlife Refuge System, and the refuge. They will come away with greater awareness and understanding of how important wetland protection and restoration, invasive species control, fish passage, endangered species management, and water quality are, and what they can do to support those and other programs.

Educating students fosters their appreciation of the important role the refuge plays in wildlife and habitat conservation. Our goal is to inspire students to make responsible environmental decisions now and in the future. To achieve that, we will work with the communities, increase outreach to teachers, and ensure high-quality supplements for Maine elementary and secondary curricula.

Benefiting from the generosity of the private sector, the refuge will receive a parcel of land in the Wildwood section of Saco, Maine. Private-sector contributors will build a structure to Service specifications. Our Division of Engineering will provide plans of environmentally friendly buildings and other input necessary to build a structure suitable for accommodating the needs of approximately 30 students of on-site environmental education. That structure will meet all applicable codes and provide lavatory facilities and sufficient space for tools, equipment, and the supplies associated with environmental education.

### **Recreational Boating**

All 10 refuge divisions encompass part of a tidal waterway popular for a wide variety of recreational boating, from canoes and kayaks to powerboats of various types and horsepower. In fiscal year 2004, an estimated 20,000 boat uses occurred within the refuge. Car-top boat launching is now available at specific sites on the Brave Boat Harbor and Spurwink River divisions. Either town or private landowners provide other boat access sites on all of the refuge divisions except Goosefare Brook and the Upper Wells divisions. No direct access is provided to the Upper Wells or Goosefare Brook waterways except by entering from the ocean.

Recreational boating on the refuge, especially by canoes and kayaks, continues to increase each year. In October 2004, the Round Gerrish Island Boat Race attracted more than 55 kayaks, canoes, and rowboats and more than 175 spectators. Held since the 1980s, the race typically courses through the Brave Boat Harbor Division. According to race coordinators, its participation has increased each year, drawing entrants from all over northern New England. The refuge has issued a special use permit since 2004, and will monitor this event annually for its impacts on refuge resources. We will also explore opportunities for environmental education and interpretation.

Powered watercraft use, especially of jet-skis, also continues to increase. All refuge waterways lie within the water safety zones defined by the State of Maine. Those prohibit more than headway speed within 200 feet of a shoreline. Despite that prohibition, most boaters either do not know of the law, or choose to ignore it and operate at more than headway speed. That increases wave action, which contributes to accelerated shoreline erosion of the refuge tidal salt marshes.

Refuge law enforcement officers have begun contacting boaters to inform them of the state law. We will seek to partner with the Marine Patrol in posting notices at boat ramps and, if feasible, at entrances to each of the waterways.

Other illegal activities associated with boating include the launching of boats, mostly canoes and kayaks, across refuge lands; the illegal anchoring of all types of boats; and their abandonment when they are no longer wanted. Some individuals seek short-cuts from their residences to the rivers by dragging their boats across the salt marsh, thus creating paths devoid of vegetation and disturbing wildlife in the area.

The refuge began a project in 2003 to develop a refuge guide to boating, and will seek to finish it by 2009.

The refuge will enter into a partnership with University of New England and other institutions of higher learning to provide environmental education instructors in the Wildwood building and for field trips in the immediate area. The curriculum will be based on wildlife science and the refuge. We will refine that content by working with local schools to meet Maine learning needs, and offset our costs with Nature of Learning or National Fish and Wildlife Foundation grants or similar programs.

### Strategies

*Within 5 years of implementing the CCP*

- Provide Service curriculum annually to local schools by request and as opportunities arise
- Support regional environmental education programs annually, including the Envirothon
- Maintain and establish new partnerships with organizations who will lead environmental education programs on refuge lands
- Use the conference room in the new administrative facility for public meetings and educational programs
- Meet annually with decision-makers in the 12-town region and statewide to review and discuss current natural resource issues affecting the refuge and the region
- Establish a corps of volunteers through the Friends Group or by other means to assist in environmental education and other programs
- Utilize the Youth Conservation Corps Program
- Support and sponsor annual, regional, environmental education programs, including an Envirothon

*Within 5 to 10 years of implementing the CCP*

- Integrate refuge-specific lessons into school curriculums in collaboration with local teachers for their use in schools or at the refuge
- Reach out to and interact with teachers to ensure that refuge-related lessons meet Maine Learning Results and teacher needs

*Within 10 to 15 years of implementing the CCP*

- Provide outdoor classroom study guides on species of concern and their habitats
- Use the environmental education facility, proposed for donation at the Goosefare Brook Division, for refuge education programs

## Objective 5.3—Hunting

Provide high-quality hunting opportunities that minimize conflicts with neighbors and refuge programs and ensure that at least 90 percent of the hunters have a positive experience.

### Rationale

The refuge adopts state regulations for hunting deer, migratory birds, and upland birds (grouse, pheasant, quail), although in some cases the Service is more restrictive. The refuge permits hunting in compliance with a hunt program that we adjust annually to ensure safety and good wildlife management. In addition, the refuge manager will expand the review process for the annual hunt plan to

include the evaluation of lands that are now closed but may have the potential to accommodate safe hunting. We will open additional lands to hunting that can biologically, ecologically, and safely accommodate hunting within state guidelines. New lands acquired by the refuge that traditionally have been hunted will remain open until we have completed their public use planning. If newly acquired lands need to be closed, we will complete a separate public review process. The park ranger will oversee hunters in the field to ensure compliance with refuge and other hunting regulations.

Approximately 400 people applied for hunting permits on the refuge in 2003. The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (2001) indicates that 164,000 residents and non-residents participated in hunting in Maine that year. They spent \$162 million on related activities and equipment (USFWS 2002). We recognize hunting as a healthy, traditional, outdoor pastime that is deeply rooted in American heritage and, when managed appropriately, can instill a unique understanding and appreciation of wildlife, their behavior, and their habitat needs. Hunting is a priority public use on national wildlife refuges, where compatible.

According to the draft policy on hunting on national wildlife refuges, issued in the January 16, 2001 Federal Register, a quality hunting experience is one that

- 1) maximizes safety for hunters and other visitors;
- 2) encourages the highest standards of ethical behavior in taking or attempting to take wildlife;
- 3) is available to a broad spectrum of the hunting public;
- 4) contributes positively to or has no adverse effect on population management of resident or migratory species;
- 5) reflects positively on the individual refuge, the System, and the Service;
- 6) provides hunters un-crowded conditions by minimizing conflicts and competition among hunters;
- 7) provides reasonable challenges and opportunities for taking targeted species under the described harvest objective established by the hunting program;
- 8) minimizes the reliance on motorized vehicles and technology designed to increase the advantage of the hunter over wildlife;
- 9) minimizes habitat impacts;
- 10) creates minimal conflict with other priority wildlife-dependent recreational uses or refuge complex operations; and
- 11) incorporates a message of stewardship and conservation in hunting opportunities.

### **Strategies**

*Within 5 years of implementing the CCP*

- Carry on with annual refuge hunt program with the MDIFW
- Manage hunt programs adaptively each year to ensure safety and consistency with good wildlife and habitat management

*Within 5 to 10 years of implementing the CCP*

- Seek opportunities to provide hunting experiences for disabled and youth hunters
- By 2010, open all lands that can biologically, ecologically, and safely accommodate hunting within state guidelines
- By 2010, evaluate feasibility of offering other hunting opportunities (such as wild turkey) in accordance with our biological, ecological, and safety criteria
- By 2011, in partnership with the state and local groups, host a hunter education class annually
- By 2010, coordinate with the MDIFW to participate in local hunter education program annually
- Hire a Park Ranger/Law Enforcement (GS 5/7; same position as in objective 1.3)
- Hire a refuge operations specialist (GS 5/7; the same position as in objective 1.5)

#### **Objective 5.4—Fishing**

Provide high-quality sport fishing opportunities that minimize conflicts with neighbors and refuge programs and ensures that at least 90 percent of the anglers have a positive experience.

##### **Rationale**

Fishing and bank fishing are becoming increasingly popular. All tidal waters of the refuge are open to fishing, and bank fishing is permitted in several areas. We will continue to provide fishing access sites, and will improve the access and interpretive signs at the nine areas now available to anglers. A new refuge fishing brochure with maps, facts, rules, and helpful hints will help anglers enjoy this wildlife-dependent recreation. We will work with the sport fishing community to review potential fishing sites throughout the refuge, and determine the feasibility of providing bank fishing at three additional sites where it can be biologically, ecologically, and safely accommodated. The park ranger will oversee anglers in the field to ensure compliance with Maine fishing regulations, the use of non-lead jigs and sinkers to prevent waterbird poisoning, fishing from dawn until dusk, and other conditions. Refuge areas will be open for fishing using the criteria identified in the step-down management plan.

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (2001) indicates that 376,000 residents and non-residents participated in fishing in Maine that year. They spent \$250 million on related activities and equipment (USFWS 2002).

##### **Strategies**

*Within 5 years of implementing the CCP*

- Require lead-free jigs and sinkers at refuge fishing sites
- By 2007, post and disseminate fishing information for the Spurwink, Mousam, Ogunquit, Merriland, and Webhannet Rivers at refuge headquarters
- By 2008, build a universally accessible fishing pier with interpretive features where Route 77 crosses the Spurwink River; upstream on the Scarborough side
- By 2008, build and maintain a partnership with the state and local recreational fishing groups to promote and identify refuge fishing opportunities and maintain related facilities

- By 2010, update the refuge fishing plan and fishing regulations
- By 2010, analyze the feasibility of providing bank fishing at three additional sites where it can be biologically, ecologically, and safely accommodated
- Hire a Park Ranger/Law Enforcement (GS 5/7; same position as in objective 1.3)
- Hire a refuge operations specialist (GS 5/7; the same position as in objective 1.5)

*Within 5 to 10 years of implementing the CCP*

- By 2013, host a second fishing event annually in partnership with the state and other groups

**Objective 5.5—Wildlife Observation and Photography**

Create and enhance opportunities for high-quality wildlife observation and photography on the refuge, while ensuring that at least 90 percent of our visitors have a positive experience.

**Rationale**

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (2001) indicates that 778,000 residents and non-residents participated in wildlife watching (e.g., observing, feeding, or photographing) in Maine that year. They spent \$345 million on related activities and equipment (USFWS 2002).

We can enhance the existing opportunities for wildlife-watchers on the refuge by adding carry-in, non-motorized boat launches, improving and adding trails, information kiosks, and other visitor facilities such as restrooms. Nearly 100,000 visitors walked the 1-mile Carson Trail at the Wells headquarters, one of the four developed trails on the refuge. Its parking lot is full or overflowing at many times in the summer and fall. In the winter, snowshoeing and skiing provide a popular, compatible method of using refuge trails for wildlife observation and photography. The headquarters trail in Upper Wells is presently the only one with an information kiosk. The 2-mile Cutts Island Trail in Brave Boat Harbor Division has trail signs, but no kiosk nor restroom. Carry-in boat access is available on Chauncy Creek at the intersection of Cutts Island and Seapoint Roads, and on the Spurwink Division at Route 77. Parking is available by verbal agreement with Town of Kittery. The Goose Fare Brook Trail and overlook offers parking, a short, stone-dust trail, and an interpreted observation platform with auto-focus binoculars. The Bridle Path and Atlantic Way and Ted Wells Trails provide views of refuge habitat in Kennebunk, Saco and Old Orchard Beach. Those trails are located on or near refuge property, and are maintained by municipal or private non-profit organizations.

For many years, portable toilets have been the only bathroom facilities available at the Carson Trail. The contract for two portalets (one accessible for disabled visitors) has become increasingly expensive. Also, they are designed to accommodate fewer visitors than the refuge attracts, which sometimes leads to long lines and unsanitary conditions. Many visitors opt not to use them for those and other reasons, or complain that the portalets were an unpleasant aspect of their visit. No public facilities are available anywhere near the Brave Boat Harbor trail head.

**Strategies**

*Within 5 years of implementing the CCP*

- Provide trail information annually at kiosk(s)
- Invite participation periodically in photo contest(s)
- Continue to solicit high-quality wildlife photos of the refuge

- By 2007, install long-needed, year-round, public rest rooms at the Upper Wells Division, which receives high public use
- By 2007, begin installing interpretive structures (kiosks or signs) at the Mousam River, Lower Wells, Little River, and Moody divisions
- By 2007, promote refuge wildlife viewing and photography by regular media press releases and participating in the Watchable Wildlife Program
- By 2008, improve the tread and interpretative signs on Cutts Island Trail at the Brave Boat Harbor Division
- By 2010, build an observation platform and small parking area at Marshall Point at the Goose Rocks Division
- By 2010, partner with others to install an interpretive panel and wildlife viewing area at Biddeford Pool

*Within 5 to 10 years of implementing the CCP*

- By 2013, build a photography blind and interpretive trail at the Upper Wells Division

**Objective 5.6—Furbearer Management**

In conjunction with the state, review existing furbearer trapping opportunities within the new expansion areas and, when compatible, establish a furbearer management program within those areas.

**Rationale**

Trapping is a technique that can be used to assist in achieving habitat and population management objectives. In some instances, trapping may be contracted to achieve very specific goals or objectives, while in others, there could be greater flexibility that would allow for the consideration of a recreational program. The refuge will establish a process, working with the state, to evaluate the newly approved expansion areas for the possibility of establishing a furbearer management/trapping program. If that evaluation results in the identification of expansion areas that can biologically, ecologically, and safely accommodate trapping within state guidelines, then a program may be established. New lands acquired by the refuge that traditionally have been trapped will remain open until we have completed their planning. If newly acquired lands need to be closed, we will complete a separate public review process. The park ranger will oversee trappers in the field to ensure compliance with refuge and other trapping regulations.

**Strategies**

*Within 5 years of implementing the CCP*

- With the state, evaluate feasibility of establishing a furbearer management trapping program on newly approved expansion areas that can biologically, economically and safely accommodate trapping within state guidelines
- Hire a Park Ranger/Law Enforcement (GS 5/7; same position as in objective 1.3)
- Hire a refuge operations specialist (GS 5/7; the same position as in objective 1.5)

**GOAL 6. Foster off-refuge cooperative actions and partnerships to promote wildlife conservation and further refuge goals.**

**Background**

The landmark National Wildlife Refuge System Improvement Act of 1997 prepared a renewed vision for the future of the Refuge System, where

- wildlife comes first
- refuges are anchors for biodiversity and ecosystem-level conservation
- lands and waters of the System are biologically healthy
- refuges are national and international leaders in habitat management and wildlife conservation.

Meeting the wildlife conservation challenges of the 21st century and fulfilling the System mission and vision requires planning and partnerships. The need for partnerships is especially relevant for the Rachel Carson refuge. In the heart of the Gulf of Maine watershed, and in a region of great biological diversity in Maine, the refuge sits at a critical place in that increasingly developed and fragmented region. To fulfill its promise to preserve wildlife and habitat for its own sake and for the benefit of the American people, the refuge must collaborate with its neighbors, local communities, landowners, and conservation partners.

**Objective 6.1—Landscape-Scale Conservation**

Provide expertise annually to at least two landscape- or watershed-scale projects that benefit the coastal ecosystems of the Gulf of Maine watershed

**Rationale**

The scientific and conservation communities have become increasingly aware of the influence of human land use practices on ecosystem function, and that native plants and animals require healthy, functioning ecosystems to survive. Since natural resources do not organize themselves according to political boundaries, a larger landscape perspective is needed to ensure the viability of the plants and animals and the habitats on which they depend. In addition to management actions on the refuge, conserving and managing land through landscape-scale partnerships is essential for maintaining large, unfragmented habitat blocks and connectivity for wildlife travel and ensuring the ecological health of upland, freshwater and marine environments.

Refuge staff are involved in the Mount Agamenticus to the Sea Conservation Initiative centered around the York River and its environs in southern Maine. That collaboration helps the refuge and its partners identify and protect the most significant ecological features. The refuge is also a close partner with the Wells National Estuarine Research Reserve in their watershed-based initiatives.

**Strategies**

*Within 5 years of implementing the CCP*

- Continue to participate with conservation organizations such as the Mount A to the Sea Initiative, Saco Bay Partners, and Wells National Estuarine Research Reserve to achieve conservation goals
- Partner with other conservation organizations, such as land trusts and NGOs, for land conservation

*Within 5 to 10 years of implementing the CCP*

- By 2013, facilitate watershed-wide or multi-town management efforts, such as purple loosestrife control using beetles or the management of federal-listed threatened or endangered species

**Objective 6.2—Habitat Management**

Provide technical expertise on wildlife habitat management annually to private or public landowners, including individuals, towns, organizations and businesses in each of the 12 communities of the refuge.

### **Rationale**

The refuge provides opportunities for visitors to observe environmentally sound wildlife and habitat management. That makes an important impact on how people view the role of management, restoration, and stewardship. The refuge supports critical habitats, yet it cannot provide all the habitat needs. In fact, nearly 70 percent of all available fish and wildlife habitat in the United States is in private ownership. The refuge can extend its expertise on wetland restoration, invasive species control, prescribed burning, and other techniques to other public and private landowners. That outreach will help in protecting refuge lands as well as maintaining the habitats, linkages, and corridors necessary to sustain native biological diversity across the landscape.

Surveys show that landowners have a great interest in protecting wildlife and their habitats. Landowners can aid in preserving habitat for New England cottontails, work with refuge staff on protecting nesting piping plovers on their beach, control invasive species on their lands, and much more. Many land trusts are active in southern Maine, and when they acquire lands, they look to the refuge for guidance on managing them.

The refuge lies in both York and Cumberland counties, which encompass approximately 1,826 of Maine's 30,862 square miles. One coordinator provides technical assistance for all private lands throughout the State of Maine. Covering such a large area limits the scope of work this important program can achieve.

We propose implementing the Private Lands Program in southern Maine which would cover both York and Cumberland counties. The private lands biologist we propose for the refuge would lead in implementing our Private Lands Program (Partners for Fish and Wildlife) in that area. Working closely with landowners and our state coordinator would greatly expand our ability to conduct more projects and provide more assistance to landowners and partners, thus providing benefits to trust resources as well as the refuge.

We modeled our district concept on the Private Lands Program in Wisconsin and Minnesota, where the local Service offices coordinate the program. This proposal has already won the support of our private lands coordinator for the State of Maine.

### **Strategies**

- Continue to work with the Natural Resource Conservation Service (NRCS), Soil and Water Conservation Districts (SWCD), Maine Cooperative Extension, and other Service staff on landowner assistance. By 2010, work with those same groups on a coordinated landowner assistance program.
- By 2011, implement the Private Lands Program in southern Maine
- By 2010, collaborate with partners in identifying grants and other funds for habitat management on off-refuge lands, including Partners for Wildlife, Wildlife Habitat Incentive Program (WHIP), and other programs
- Partner with local land trusts to encourage the management of lands to benefit species of conservation concern
- Restore a minimum of 50 acres of freshwater wetland, scrub-shrub, grassland, or forested habitats annually
- Hire a private lands habitat biologist (GS 9/11; RONS 03002)

**Objective 6.3—People**

Increase public understanding and support of wildlife conservation, habitat management, and land and water stewardship in the 12-community region of the refuge.

**Rationale**

More than 75 million Americans enjoy watching wildlife and participating in wildlife-related recreation, but fewer may understand how best to provide the habitats essential for maintaining our native wildlife diversity. The refuge can help people understand and value the wildlife and habitats of their community. As they begin to value those places and the role of land conservation and management in protecting the wildlife they like to watch, they are more apt to take action to support our efforts.

Visitors are attracted to the refuge for its wildlife experiences and for its solitude. However, many people, even local residents, often are unaware that they have a refuge in their community. To enhance those connections and draw people into the refuge and its mission, refuge staff can reach out by participating in workshops with partners, joining in community celebrations, and creating exhibits for events.

**Strategies**

*Within 5 years of implementing the CCP*

- Continue to promote Rachel Carson’s legacy of outreach for conservation
- Cosponsor natural resource workshops
- Host one local or statewide annual contest, such as a Junior Duck Stamp or Photo Contest
- Develop and host an annual Rachel Carson Festival with a launch in 2007, the 100 birth anniversary of Rachel Carson

*Within 5 to 10 years of implementing the CCP*

- Coordinate volunteers to develop and staff exhibits annually at four or more local events, such as Kittery’s Septemberfest, York’s Harvestfest, Portland’s Old Fort fest, Market Square Days in Portsmouth, the PunkinFiddle and Laudholm Craft Fair, or WNERR Earth Day
- Coordinate volunteers to develop and staff exhibits annually with other Maine refuge staff at two major statewide events, such as the Fryeburg and Common Ground Fairs
- Train volunteers to provide an educational program or materials annually to at least one school per town

**Implementation,  
Monitoring, and  
Revision**

**Refuge Funding Needs**

Successful implementation of the CCP relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. The recommended projects and their recurring costs, such as staff salaries, are listed and prioritized in the Refuge Operations Needs System (RONS) database (appendix E). In that appendix, we also identify new projects that we will include in the RONS database with the next annual update. The source of funding for those projects and salaries primarily comes from Refuge Operations (1261) dollars. Also included in appendix E are our maintenance funding needs.

We will seek funds for refuge public use, parking lots, bridges, restrooms, and trails from the Refuge Roads Program (RRP), a Federal Lands Highway Program that Congress funded through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (P.L. 109–59; 119 STAT. 1144). Those funds can also be used for interpretive enhancements associated with the projects, as long as the costs for the interpretive facilities do not exceed 5 percent of the project budget. RRP funds can be used as the non-federal match for FHA funds available through state departments of transportation. Refuges can use appropriated Service funds as the non-federal match for those funds, as well. That matching ability can be used to further city, county, and state transportation and transit funds for projects that benefit the refuge.

### **Staffing the Refuge**

We will always ensure that visitors have a safe visit, engage in approved, compatible activities, and understand and adhere to refuge regulations. To accomplish that includes maintaining refuge boundary signs and continuing to make visitor contacts and conduct outreach and law enforcement. If RONS funding is not available, we will continue to seek alternate means of accomplishing our projects: for example, through volunteers, challenge cost share grants or other partnership grants, and interns.

### **Monitoring and Evaluation**

Monitoring and evaluating the implementation of 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?”

The second level of monitoring, which we refer to as effectiveness monitoring, responds to the question, “Are 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 socioeconomic 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 Inventory and Monitoring Plan will be based on the needs and priorities identified in the HMP.

### **Adaptive Management**

Adaptive management strategies keep the CCP relevant and current through scientific research and management. We acknowledge that our information on species and ecosystems is incomplete, provisional, and subject to change as our knowledge base improves. The need for adaptive management is all the more compelling today.

“The earth’s ecosystems are being modified in new ways and at faster rates than at any other time in their nearly 4 billion year history. These new and rapid changes present significant challenges to our ability to predict the inherently uncertain responses and behaviors of ecosystems.”  
(Christensen, et al. 1996)

Climate plays a significant role in the geographic distribution of ecosystems and wildlife, and most scientists agree that global climate change is already affecting some ecosystems. “Global temperatures increased by over 1°F in the past century and are projected to increase 2.5–10.4°F by 2100 as a result of human emissions of greenhouse gases” (Parmesan and Galbraith 2004). Some recent shifts in wildlife populations are attributed to changing climate conditions, and those impacts are projected to increase. Changes in temperature and precipitation will affect biological diversity, including national wildlife refuges, and challenge land managers.

Our objectives and strategies must be adaptable in responding to new information and spatial and temporal changes. We will continually evaluate our management actions, both formally and informally, through monitoring or research, to reconsider whether their original assumptions and predictions are still valid. In that way, management becomes an active process of learning what really works. Public understanding and appreciation of the adaptive nature of natural resource management is most important, especially in light of the potential large-scale impacts of global climate change. The refuge manager is responsible for changing management actions if they do not produce the desired conditions. Significant changes may warrant additional NEPA analysis. Minor changes will not, but we will document them in annual monitoring or project evaluation reports or in our Annual Narrative Report.

**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. The results of that monitoring or new information may indicate the need to change our strategies.

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 3.3 C) will require only an environmental action memorandum.